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System for Content-Based Image Retrieval using Wavelet Transform and Histogram Features

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Abstract: Content- based image retrieval (CBIR) has been wide researched for the retrieval of contently similar pictures. In several applications like education, biomedicine, crime hindrance the importance of digital information is increasing speedily. During this paper we have a tendency to area unit planned a content-based retrieval model , initial user must offer a question image that is then accustomed retrieve the pictures that area unit similar from information. Image retrieval is being done by mistreatment content of digital image referred to as options i.e. color and texture feature. To extract these options the system uses color histogram for color feature and wavelet transform for texture and site info of a picture. The planned system reduces the interval for retrieval from information containing 651 general color images with more brilliant representatives.

IndexTerms - ***Image Retrieval, Color Histogram, Quantization, Haar Wavelet Transform.***

I. INTRODUCTION

With the event of the web, and therefore the availableness of image capturing devices like digital cameras, image scanners, the dimensions of digital image assortment is increasing speedily. economical image looking, browsing and retrieval tools area unit needed by users from numerous domains, as well as remote sensing, fashion, crime hindrance, publishing, medicine, design, etc. For this purpose, several general purpose image retrieval systems are developed. There area unit two frameworks: text-based and content-based. The text-based approach may be derived back to Nineteen Seventies. In such systems, the pictures area unit manually annotated by text descriptors, that area unit then employed by a direction system (DBMS) to perform image retrieval. However, with the substantial increase of the dimensions of pictures additionally because the size of image information, the task of user-based annotation becomes terribly cumbersome, and, at some extent, subjective is incomplete because the text usually fails to convey the made structure of the pictures. There is conjointly quality in annotation because of the judgment of human perception. To beat these disadvantages in text-based retrieval system, content-based image retrieval (CBIR) was introduced within the early Eighties. In CBIR, pictures area unit indexed by their visual content, like color, texture, shapes. the elemental distinction between content-based and text-based retrieval systems is that the human interaction is a vital a part of the latter system. As a result, content-based image retrieval (CBIR) from un-annotated image databases has been a quick growing analysis space recently. Content primarily based Image Retrieval may be a method framework for with efficiency retrieving image from a group of pictures by similarity. The retrieval depends on extracting the acceptable characteristic qualities describing the specified contents of pictures. Additionally, appropriate querying, matching, categorization and looking techniques area unit needed. This approach retrieves or search digital pictures from giant information mistreatment the contents of pictures themselves or grammar image options while not human intervention. To help image retrieval, techniques from statistics, pattern recognition, signal process and laptop vision area unit unremarkably deployed. Different terms used interchangeably for CBIR area unit question by image content (QBIC) and content-based visual info retrieval (CBVIR).Research on content-based image retrieval has gained tremendous momentum throughout the last decade. A lot of research work has been carried out on Image Retrieval by many researchers, growing in both depth and breadth. The term Content Based Image Retrieval (CBIR) seems to have originated with the work of Kato [1] for the automatic retrieval of the images from a database, based on the color and shape present. Since then, the term has widely been used to describe the process of retrieving desired images from a large collection of database, on the basis of syntactical image features (color, texture and shape). The techniques, tools and algorithms that are used, originate from the fields, such as statistics, pattern recognition, signal processing, data mining and computer vision.Many image retrieval systems have been successfully developed, such as the IBM QBIC System [2], developed at the IBM Almaden Research Center, the VIRAGE System [3], developed by the Virage Incorporation, the Photobook System [4], developed by the MIT Media Lab, the VisualSeek System [5], developed at Columbia University, the WBIIS System [6] developed at Stanford University, and the Blobworld System [7], developed at U.C. Berkeley and Simplicity System [8].

II. LITERATURE SERVEY

Following is a summary of existing work.

Lin et al. [9] planned a color-texture and color-histogram based mostly image retrieval system (CTCHIR). during this 3 image options square measure planned for image retrieval. the primary and second image options square measure supported color and texture options, severally known as color co-occurrence matrix (CCM) and distinction between pixels of scan pattern (DBPSP). The third image feature relies on color distribution, known as color bar graph for k-mean(CHKM). CCM is that the standard pattern co-occurrence matrix that calculates the likelihood of the prevalence of same constituent color between every

Forecasting Air Quality for Different Air Pollutant Levels in Urban Areas Using Linear Regression Modeling

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Abstract: Air countenances our planet Earth to breathe in – it is the concoction of gases that augments to the air giving life expectancy to the globe and faunas that mark Earth such an ebullient domicile. Conversely, the gases that you are taking in day by day may perhaps be interminably slaying you. Bestowing to the World Health Organization, all over the place 2 million people give out from the impression of adulterated air every single year. Through the advancement of the economy and civilization all over the ecosphere, very nearly all cosmopolitan cities are coming into contact with augmented deliberations of ground-level air contaminants. Incited by the amassed sentience of the health facets in arrears to air effluence acquaintance exclusively by supreme profound consortiums of population such as progenies and the eldest inhabitants, short–range air pollution forecasts are delivered in inordinate extents by indigenous specialists. The Air Quality Index (AQI) is a numeral prearranged by constitutional bureaus to designate the eminence of the air at an assumed locality. AQI is used in lieu of resident and provincial air quality management in cosmopolitan cities entirely from corner to corner all around the world. Grounded on statistics from the preceding 6 years (2012-2018), the exploration spectacles that it relates to both the circadian limit of 50 micrograms per cubic meter and the tolerable number of per diem concentration fat chances to 35 per year. Correspondingly, the average almanac levels of PM10 overdid the approved customary of no more than 40 micrograms per cubic meter. For the reassurance of air contamination effluence, solid analyzing contexts are employed in copious borough areas. Making consumption of intelligence manoeuvres, in precise dominant frameworks and learning centred dealings can be believed as a boosting methodology. An evidence based attitude bids additional choice to the arithmetical simulations. In this paper, a linear regression model is proposed in which we take statistics from past 50 days and after analyzing it we are predicting intensities of diverse air pollutants 5 days in advance.

Index Terms **- Air Pollution, Air Quality Index (AQI), Linear Regression, Forecasting.**

I. INTRODUCTION

By this stretch, the ecological problem may possibly be the supreme solemn delinquent which has a pronounced influence on human well-beings and ecologies. The administrations have put forth marvellous determinations in the direction of the control of pollution, and have gained considerable triumph. For the reason that the use of gasoline and further petrochemicals and fossil fuels, air contaminants are evicted fundamentally by manufacturing subdivisions and automobiles. The realization of air impurities is an exact complicated and non-linear occurrence, owing to photochemical responses. Air pollution vitiates air superiority and centrals to severe maladies, such as asthma, bronchitis etc. Air Pollutant is shaped in the atmosphere when supplementary unswervingly emanated air contaminants conglomerate together. Even though Air Quality System monitoring data are comprehended as the ultimate standard for distinguishing ambient air quality and influential conformity by way of the government Air Quality Standards, principally this sort of data is inadequate in space and time. The extrapolation of the concentration of air impurities can educate the superior understanding of air effluence and arrange for useful statistics for the enlargement of most favourable emission control stratagems [1–5]. This prognostic knack would correspondingly provide a better understanding of the nature and relative comparisons of diverse emanation foundations that for all intents and purposes accountable for the ascertained levels of air pollutants. The arrangement which is competent to foretell the altitudes of air contaminants with ample prediction can arrange for individuals the time obligatory to cope the urgency. Massive progress has been made in the prophecy of the echelons of air pollutants over the preceding few epochs. Conversely, it is still a challenge to unerringly predict the levels of air contaminants due to the convoluted potent influences. It is indispensable to study additional proficient ways and means to approximately predict the levels of air pollutants in the nigh future.

Conspicuous levels of PM10 and PM2.5 can origin the augmented jeopardies of circulatory and respirational sicknesses [6]. The forecasting exemplary is prerequisite to make definite that these bounds are not surpassed, and if not, the evidence of the prediction will be of the essence for forthcoming environmental dogmas. The methodologies for the extrapolation of the intensities of different air contaminants can be disseminated into two categories: deterministic and stochastic. The deterministic methodology model the corporeal and biological transportation progression of the air pollutants in rapports of their efficacy of barometric variables such as wind rapidity, relative dampness, and temperatures with numerical models to foresee the levels of air impurities [7]. These methodologies can engender either short-run or long-run pollutant deliberation likelihoods. The functioning of these facsimiles depends upon comprehensive understanding of the formation course of pollutants. Some researchers strain to develop and mark superior a unified air quality modeling system that can prototype the sources, advancement, and ecological paraphernalia of different air pollutants by all scales. Nevertheless, it is still intriguing to unerringly predict the concentrations of diverse air contaminants for the motivation that the numerosity of sources and the complicated corporeal and biochemical processes affect the realization and shipment of these air contaminants. First of all the considerations in the equations have an imperative influence on the extrapolation enactment. In view of that, the intricacy of the hefty partial differential reckonings is quite high--they are arduous to solve exactly and will call for prodigious computation assets. In the time being, the concreteness and eminence of annotations which are used as inputs for the model also distress the guesstimate of numerical predictions. In this paper, we will predict PM2.5, PM10, NO_2, NH_3, SO_2 and CO by performing Linear Regression on them.



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A Survey on Different Machine Learning Techniques for Air Quality Forecasting for Urban Air Pollution

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Abstract: ***The delinquent of air pollution has become a staid concern in developed as well as developing republics. Distressing human's respiratory and cardiovascular system, air pollution is the origin for increased impermanence and increased risk for diseases for the inhabitants.Particulate matter (PM 2.5) needs more responsiveness. When its level is in elevation in the air, it causes solemn issues on people's health. Hence, we need to control it by uncompromisingly keeping a trail of its levels in air. With cumulative air pollution, we need to implement proficient air quality monitoring models which collect evidence about the deliberation of air pollutants and provide assessment of air pollution in apiece expanse. Hence, evaluating air quality and its prediction is an imperative research capacity. This paper is basically a little contribution towards this challenge. We compare four unpretentious machine learning algorithms, linear regression, naïve bayes, support vector machine and random forest. Enactment of these algorithms can undeniably be helpful to predict air pollutants levels ahead of time.***
Keywords**:** ***Air Quality, Machine Learning, Linear Regression, Naïve Bayes, Support Vector machine, Random Forest.***

I. INTRODUCTION

Air is the integral fragment for the way of life and endurance of the entire life on this planet. The whole shebang including animals, plants and humans need air for their subsistence. Thus, all living organisms need virtuous quality of air which is deprived of damaging experiences to carry on their life. It is found that the elder people and fledgling children are affected by air effluence in inordinate amounts. Foremost outdoor air pollutants in conurbations take account of ozone (O3), particle matter (PM), sulphur dioxide (SO2), carbon monoxide (CO), nitrogen oxides (NOx), volatile organic compounds (VOCs), pesticides, and metals, among others [1,2]. Air pollutants cause pro tem effects such as eye, snozzle, and oesophagus irritation, nuisances, hypersensitive reactions, and upper respirational toxicities. Abiding health effects caused by air pollution include lung malignancy, brain mutilation, liver impairment, kidney destruction, heart ailment, and breathing sickness. It also complements to the diminution of the ozone stratum, which protects the Globe from sun's UV flickers. Increased impermanence and indisposition rates have been found in connotation with augmented air pollutants (such as O3, PM and SO2) concentrations [2–4]. Bestowing to the testimony from the American Lung Association [5], a 10 parts per billion (ppb) increase in the O3 mingling ratio might cause over 3700 premature bereavements per annum in the United States (U.S.). Chicago, as intended for many other megacities in U.S., has thrashed with air pollution as an upshot of industrialization and urbanization. Although Ozone forerunners (such as VOCs, NOx, and CO) emanations have ominously decreased ever since the late 1970s, O3 levels in Chicago have not been in acquiescence with standards customary by the Environmental Protection Agency (EPA) to care for community health [5]. Particulate matter can be either imitation or sincerely befalling. Some specimens include dirt, cinders and sea-spray. Particulate matter is emanated during the incineration of fuels, such as for power generation, inland heating and in means of transportation engines. Particulate matter fluctuates in magnitude (i.e. the diameter or thickness of the particle). PM2.5 refers to the bulk per cubic meter of air of constituent part with a size (span) by and large less than 2.5 micrometers (μm) [6]. PM2.5 which is readily known as suspended fine particulate matter (2.5 micrometers is one 400th of a millimeter). Particle proportions is perilous in seminal the particle deposition whereabouts in the human respiratory system [6]. PM2.5, stating to particles with a diameter less than or equal to 2.5 μm, has been an amassed concern, as these particles can be deposited into the lung gas-exchange region, the alveoli [7]. Hence, air pollution is one of the most important and serious disquiet for us in our day. So directing on this dispute, in the former decades, many researchers have spent lots of time on revising and developing different models and methods in air quality exploration and evaluation. Evaluation of air quality has been shepherded using unadventurous approaches in all these eons.

Machine Learning is the prevalent upswing now. Machine learning is an important turf where system which apparatuses artificial intelligence, amasses data from sensors in an environment and absorbs exactly how to act. One of the motivation why we choose

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FORECASTING UNION BUDGET OF INDIA BY LINEAR REGRESSION WITH STANDARD ERROR ADJUSTMENT

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Keywords: Machine learning, Time series, Artificial intelligence, Linear regression, Predictive analytics.

ABSTRACT

An accurate budget forecast of any country before starting of any financial year is very important; it is a key factor in determining the budgetary allocation to various subjects. India is a vast country with nearly 1.2 billion people. Hence, it is difficult to forecast Indian budget quickly and accurately at the planning stage, when data, documentation, etc. are incomplete. The solution of this problem is addressed by our model. Using this model is an easy, fast and accurate way without having to prepare the data and other documentation first, even when just enough data, for example previous year's budget is given. The suggested solution using the model can be used to predict how much the Indian budget will be. The suggested model has passed statistical test of linear regression analysis. Forecasting budget using this model is easier, fast and accurate, so decision for making the necessary budgetary allocation can be done very quickly.

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ABSTRACT

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Survey Paper on Secure Content-Based Image Retrieval in Cloud Computing

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Abstract–Now days, Cloud computing it is been playing a crucial role in terms of data storing and reducing the overall cost to entrepreneurs. Storage requirements for visual data have increased in recent years, following the appearance of many interactive multimedia services and applications for mobile devices in personal and business scenarios. This was a key a determining factor for the adoption of cloud-based data outsourcing solutions. However, even the outsourcing of data storage in the cloud leads to new security challenges that must be carefully addressed. We propose a secure framework for the storage and recovery of the subcontracted privacy protection in large archives of shared images. Our proposal is based on IES-CBIR, a novel Encryption scheme of the image that presents image recovery properties based on content. The framework allows both encrypted storage and search using content-based image retrieval queries while preserving privacy against honest but curious cloud administrators. We have built a prototype of the proposed framework, formally analyzed and tested its safety properties, and experimentally assessed its performance and accuracy of recovery. Our results show that IES-CBIR is probably safe, allowing more efficient operations that the existing proposals, both in terms of complexity of time and space, and opens the way to new scenarios of practical application.

Keywords–.computation outsourcing, encrypted data processing, AES, content based image retrieval.

I. INTRODUCTION

Content-based image retrieval (CBIR) is also known as query by image content and content-based visual information retrieval is the use of computer vision to the image retrieval problem of searching for digital images in large databases. "Content-based" means that the search will analyze the actual contents of the image. The term 'content' in this context might refer colors, shapes, textures, or any other information that can be derived from the image itself. Without the ability to examine image content, searches must rely on metadata such as captions or keywords. Such metadata must be generated by a human and stored exactly each image in the database. An image retrieval system returns a set of images from a collection of images in the database to meet users demand with similarity assessment such as image content similarity, edge pattern similarity, color similarity etc. Image retrieval system offers an efficient way to access, browse, and retrieve a set of similar images in the real-time applications. As a result of recent advancements in digital storage technology, it is now possible to create large and extensive databases of digital imagery. These collections may contain millions of images and terabytes of data. For users to make the most of these databases effective, efficient methods of searching must be devised.

Prior to automated indexing methods, image databases were indexed according to keywords that were both decided upon and entered by a human categorizer. Unfortunately, this practice comes with two very severe shortcomings. First, as a database becomes increasingly large the manpower required to index each image becomes less practical. Secondly, two different people, or even the same person on two different days, may index similar images inconsistently. The result of these inefficiencies is a less than optimal search result for the end user of the system. Having a computer do the indexing based on a CBIR scheme attempts to address the shortcomings of human-based indexing. Since a computer can process images at a much higher rate, while never tiring For example, each CBIR system needs to be tuned for its particular use in order to give optimal results. A retrieval system designed for querying medical x-ray images will more than likely prove to

be a poor system for retrieving satellite images of South American rain forests. In addition, presently employed algorithms cannot yet consistently extract abstract features of images, such as emotional response, that would be relatively easy for a human to observe. Several approaches have been developed to capture the information of image contents by directly computing the image features from an image. The image features are directly constructed from the typical Block Truncation Coding or half toning based compressed data stream without performing the decoding procedure. These image retrieval schemes involve two phases, indexing and searching, to retrieve a set of similar images from the database. The indexing phase extracts the image features from all of the images in the database which is later stored in database as feature vector. In the searching phase, the retrieval system derives the image features from an image submitted by a user.

II. RELATED WORK

Y. Gong and S. Lazebnikproposed the problem of learning binary codes that preserves the similarity for an efficient search for similarity in large-scale image collections is formulated by terms of zero-rotation data centering to minimizing quantization error by mapping data to the vertices of a zero-center binary hypercube as well as proposing a simple and efficient alternative minimizing algorithm to perform this operation [1].

The author Y. Pan, T. Yao, T. Mei, H. Li, C.-W. Ngo, and Y. Rui, proposed an approach for jointly exploring cross-view learning and the use of click data. The cross view learning is used for creating latent subspace with the ability to compare information from incomparable original views (ie text and image views), and use of click data explores access data that is widely available and freely accessible for understanding of the query [2].

The author D. Zhai, H. Chang, Y. Zhen, X. Liu, X. Chen, and W. Gao have been proposed HFL for the searching of inter-vision similarities. A new multimode HFL method, called Parametric Local Multimodal Hashing (PLMH) that can learn a set of hash functions to adapt locally to the data structure of each mode [3].

author G. Ding, Y. Guo, and J. Zhouproposed the problem of learning hash functions in the context of multimodal data for the search for similarity between cross-views is formulated by they proposed the Collective Matrix Factorization Hashing (CMFH) method which can generates unique hash codes for various modalities of single instance through collective matrix factorization along with the latent factor model [4].

Author H. Jegou, F. Perronnin, M. Douzeovercommed the problem of large-scale image search. For this purpose they have provided three restrictions i.e search accuracy, effciency and memory usage and proposed different ways to add local image descriptors into a vector and demonstrated that Fisher's kernel performs as much better as visual bag approach for any given vector dimension [5].

The author J. Zhou, G. Ding, and Y. Guo proposed a new LSSH (Latent Semantic Sparse Hashing) algorithm to perform a search for similarity between modes using Sparse Coding and Matrix Factorization. For this purpose LSSH uses Sparse Coding to acquire the most important image structures and Matrix Factorization to learn the latent concepts of the text. [6].

The author Z. Yu, F. Wu, Y. Yang, Q. Tian, J. Luo, and Y.Zhuan proposed a Discriminative Coupled Dictionary Hashing (DCDH), in which the paired dictionary for each mode is acquired with secondary information (for example, categories). These coupled dictionaries not only preserve the intra-similarity and interconnection between multimode data, but also contain dictionary atoms that are semantically discriminating (that is, data in the same category are reconstructed from atoms in the similar dictionary) [7].

The author H. Zhang, J. Yuan, X. Gao, and Z. Chen has been proposed a method of cross-media recovery based on short and long-term relevance feedback. This method focused on two typical types of multimedia data, i.e. image and audio. Firstly they have created a multimodal representation through a statistical correlation between the image arrays and audio entities, and they defined the metric of the distance between the means for the measurement of similarity; therefore an optimization strategy based on relevant feedback combines the results of short-term learning and long-term accumulated knowledge in the objective function [8].

The author A. Karpathy and L. Fei-Fei proposed a model generating the descriptions of natural language of images and their regions. This approach have advantage of image data sets and their sentence descriptions to know the intermodal correspondences between language and visual data.The alignment model is based on combination of convolutional neural networks on image regions, bidirectional recurrent neural networks on sentences . The structured goal aligns two modalities through a multimodal model [9].

The author J. Song, Y. Yang, Y. Yang, Z. Huang, and H. T. Shen proposed a multimedia recovery paradigm to innovate large-scale research of different multimedia data. It is able to find results from different types of media of heterogeneous data sources, for example by using a query image to retrieve relevant text documents or images from different data sources [10].

III. OPEN ISSUES

Along with the increasing requirements, in recent years, cross-media search tasks have received considerable attention. Since, each modality having different representation methods and correlational structures, a variety of methods studied the problem from the aspect of learning correlations between different modalities. Existing methods proposed to use Canonical Correlation Analysis (CCA), manifolds learning, dual-wing harmoniums, deep auto encoder, and deep Boltzmann machine to approach the task. Due to the efficiency of hashing-based methods, there also exists a rich line of work focusing the problem of mapping multi-modal

high-dimensional data to low-dimensional hash codes, such as Latent semantic sparse hashing (LSSH), discriminative coupled dictionary hashing (DCDH), Cross-view Hashing (CVH), and so on.

IV. Proposed Approaches:-

We propose a secure framework for the storage and recovery of the subcontracted privacy protection in large archives of shared images. Our proposal is based on CBIR, a novel Encryption scheme of the image that presents image recovery properties based on content. The framework allows both encrypted storage and search using content-based image retrieval queries while preserving privacy against honest but curious cloud administrators. We have built a prototype of the proposed framework, formally analyzed and tested its safety properties, and experimentally assessed its performance and accuracy of recovery. Our results show that CBIR is probably safe, allowing more efficient operations that the existing proposals, both in terms of complexity of time and space, and opens the way to new scenarios of practical application.

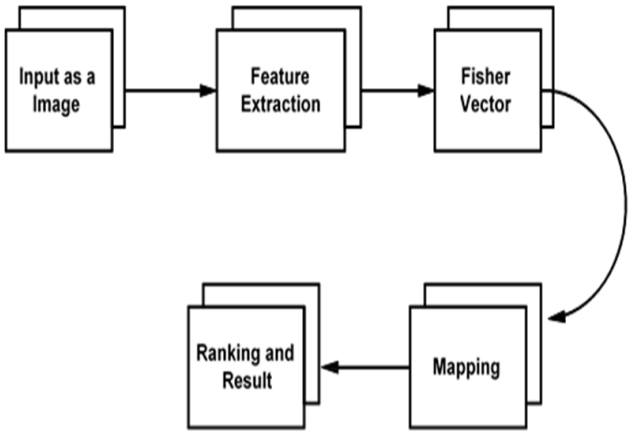


Fig. System Architecture

Conclusion

In this Paper, we have proposed a new secure framework for the external storage of privacy protection, research and recovery of large-scale dynamic image archives, where the reduction of the general expenses of the customer is central appearance. At the base of our framework there is a new cryptography scheme, specifically designed for images, called CBIR. The key to its design is the observation that in the images, color information can be separated from the plot information, allowing the use of different cryptographic techniques with different properties for each and allowing to preserve privacy Image recovery based on the content that will be created from unreliable third-party cloud servers. We formally analyze the safety of our proposals and further experiments the evaluation of the implemented prototypes revealed that our approach reaches an interesting exchange between precision and I remember in the CBIR, while exhibiting high performances and scalability compared to alternative solutions.

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Secure Content-Based Image Retrieval in Cloud Computing

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***Abstract*— Cloud based storing visual data have increased in recent years, following the emergence of many interactive multimedia services and applications for mobile devices in personal and business scenarios. This was a determining factor in the adoption of cloud-based data outsourcing solutions. However, even outsourcing cloud data storage brings new security challenges that need to be addressed carefully. We offer a secure framework for storing and recovering outsourced privacy protection in large shared image files. Our proposal is based on CBIR, a new image cryptography scheme that features image recovery based on content. The framework allows both encrypted storage and querying for content-based image retrieval, while maintaining privacy in the face of honest but curious cloud administrators. We have built a prototype of the proposed framework, analyze and formally test its safety properties, and experimentally evaluate its performance and recovery accuracy. Our results show that CBIR is probably safe, enabling more efficient operations than existing proposals, both in terms of time and space complexity, and opens the way for new scenarios of practical application.**

Keywords –.Cloud computing, Data and computation outsourcing, encrypted data processing, searchable encryption content based image retrieval.

I. INTRODUCTION

Content-based image retrieval (CBIR) is also known as query by image content and content-based visual information retrieval is the use of computer vision to the image retrieval problem of searching for digital images in large databases. "Content-based" means that the search will analyze the actual contents of the image. The term 'content' in this context might refer colors, shapes, textures, or any other information that can be derived from the image itself. Without the ability to examine image content, searches must rely on metadata such as captions or keywords. Such metadata must be generated by a human and stored exactly each image in the database. An image retrieval system returns a set of images from a collection of images in the database to meet users demand with similarity assessment such as image content similarity, edge pattern similarity, color similarity etc. Image retrieval system offers an efficient way to access, browse, and retrieve a set of similar images in the real-time applications. As a result of recent advancements in digital storage technology, it is now possible to create large and extensive databases of digital imagery. These collections may contain millions of images and terabytes of data. For users to make the most of these databases effective, efficient methods of searching must be devised. Prior to automated indexing methods, image databases were indexed according to keywords that were both decided upon and entered by a human categorizer. Unfortunately, this practice comes with two very severe shortcomings. First, as a database becomes increasingly large the manpower required to index each image becomes less practical. Secondly, two different people, or even the same person on two different days, may index similar images inconsistently. The result of these inefficiencies is a less than optimal search result for the end user of the system.

Computer do the indexing based on a CBIR scheme attempts to address the shortcomings of human-based indexing. Since a computer can process images at a much higher rate, while never tiring For example, each CBIR system needs to be tuned for its particular use in order to give optimal results. A retrieval system designed for querying medical x-ray images will more than likely prove to be a poor system for retrieving satellite images of South American rain forests. In addition, presently employed algorithms cannot yet consistently extract abstract features of images, such as emotional response, that would be relatively easy for a human to observe. Several approaches have been developed to capture the information of image contents by directly computing the image features from an image. The image features are directly constructed from the typical Block Truncation Coding or half toning based compressed data stream without performing the decoding procedure. These image retrieval schemes involve two phases, indexing and searching, to retrieve a set of similar images from the database. The indexing phase extracts the image features from all of the images in the database which is later stored in

Semisuperwised Graph Theoretic Method For Retrieval Of Multilabel Images

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***Abstract*— Reference data sets are essential for the development and evaluation of remote sensing content based image retrieval approaches (RSCBIR). However, most existing data sets have a unique label and each image of these data sets is annotated by a single label that represents the most significant semantic content of the image. This is sufficient for simple problems, such as the distinction between a building and a beach, but more labels and sometimes even dense (pixel) labels are required for more complex problems such as RSIR and semantic segmentation. Annotating images with multilabels is costly and time consuming. To address these issues, introduce a semi-supervised Graphic-theoretical method in the context of multilabel Problems in RS image recovery. These method does not address the issue of relevant feedback for the training classifier due to this the query images that does not exist in the training archive that return without labelling. To overcome this issue we are developing the relevant feedback method, so that each query image must be annotated with appropriate labels and query images can be matched with the training set. This approaches more accuracy in RS images retrieval.**

The proposed method is based in four main stages. The first step segments each image into the Archive and extract the features of each region. The second step build a neighborhood image and use a correlation label the propagation algorithm to automatically assign a set of labels to each image in the file that uses only a small number Educational images annotated with multilabels. The third step associates class tags with image regions of a new region labeling strategy, while the final step recovers the images. Similar to an image of the query given by a sub-program matching strategy.

Keywords-Content-based image retrieval (CBIR), correlated label propagation, multilabel categorization, region adjacency graph (RAG), remote sensing (RS), semi supervised learning, subgraph matching.

I. INTRODUCTION

With the progress of satellite technology, the volume of remote sensing (RS) and Amount of information that can be extracted from them. They have increased significantly. As a result, the image is based on the content Recovery (CBIR) has recently become an important problem of research in RS to keep up with growth Need for automation. One image is usually described by hundreds of feature vectors, and millions of photos uploaded imply billions of feature vectors. Therefore, it is necessary to introduce optimization techniques such as indexing or distributed computing to accelerate the search process. But most previous efforts did not support image privacy protection or assumed that feature vectors do not reveal content of images. However, recent researches show that an image can be approximately reconstructed based on the output of a black box feature descriptor software such as those classically used for image indexing. The image reconstructed using feature vectors appears quite similar as the original image, and it shows a good match with the original one. For example Yi Yang, Shawn Newsam they execute evaluation of local invariant features for image recovery of land use classes and cover in high resolution aerial images[2] but This paper does not discuss about the computational cost of feature extraction & multilabel images, the silence based local feature are invariant to microscopic changes. The Erchan Aptoula has defined the method for global & local pattern spectra for the geographical image retrieval & evaluated the performance of global & local spectrum based on multi variant structure for remote sensing images but the drawback of this paper is that it does not use the multilabel images[3]. B. Chaudhuri, B. Demir, L. Bruzzone, and S. Chaudhuri has introduces the method for unsuperwised graph theoretic method for the retrieval of single labelled complex remote sensing image retrieval using k-NN algorithm based on LBP. But the drawback of this paper is that the methods are not able for automatic region labelling & multilabel image retrieval in RS[6]. In 2018 the Bindita Chaudhuri, Begüm Demir, Subhasis Chaudhuri, Lorenzo Bruzzone has defined the

semisuperwised graph theoretic method. This paper discuss about the multilabel RS image retrieval based on four steps: 1) image segmentation and feature extraction; 2) multilabels image categorization; 3) automatic region labelling; and 4) image retrieval. This method does discussed about the color and feature extraction but it is not able to identify class in an image during multilabel image categorization[1]. To overcome these the proposed MLIRM uses security for the users as well as we are going to use relevant feedback mechanism for automatic region labelling. These methods are entirely automatic and much better reconstruction may be achieved with user interaction. The reconstruction allows clear interpretation of the semantic image content, which arouses great concerns on the image privacy in the image indexing and search systems.

Usually a CBIR system has two Main steps 1) extraction of functionality in which the images they are described and represented by a set of characteristics 2) matching of the images on which the image of the query is based in features with all images in the file and more Relevant images are retrieved. As a result, the performance of CBIR systems depend on capacity and effectiveness of: 1) the characteristics extracted in the characterization of semantics. Image content and 2) recovery algorithms in Evaluate the similarity between the characteristics considered.

Objectives:

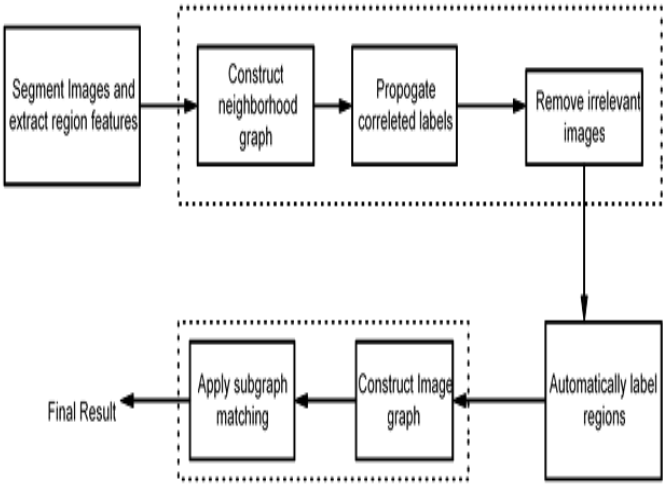
(i) To support automatic image region labelling
(ii) To implement Semi supervised Graph-Theoretic Method for RSIR.
(iii) To implement algorithm for Image Segmentation And Feature Extraction in which images are described & represented by set of features;
(iv) To create Multilabel Image Categorization;
(v) To implement algorithm for Automatic Region Labeling; And
(vi) To retrieve matching images from the dataset

II. PROPOSED SYSTEM

To overcome existing critical issues, in this paper, we propose a semi supervised graph-theoretic method in the framework of multilabels RS image retrieval problems. The proposed method is based on four main steps: 1) image segmentation and feature extraction; 2) multilabels image categorization; 3) automatic region labelling; and 4) image retrieval. The method requires that the user initially selects a small fraction of images in the archive as training images, assigns multiple class labels to each image depending on the primitive classes present in it, and also annotates a few regions of those images with the corresponding labels. Then, the first step segments each image in the archive into semantically meaningful regions and extracts features from these regions. The second step aims to automatically assign multilabels to each image in the archive using a graph-based semi supervised algorithm. In this algorithm, a neighbourhood graph is initially constructed taking all the images in the archive, where the nodes represent the images and the edges represent the neighbours of the images in terms of similarity. Then, the class labels of the training images are propagated using a correlated label propagation method to the unlabelled images to associate them with multiple labels.

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System Architecture:



Project Methodology:

1. Extraction of features in which the images are described and represented by a set of features.

2. Image matching in which the image of the query is compared based on the features with all the images in the file and the most relevant images are retrieved. Consequently, the performance of CBIR systems depends on the capacity and effectiveness of:

2.1 The features extracted in the characterization of the semantic content of the images and

2.2 The recovery algorithms in the evaluation of the similarity between the features considered.

In RS literature, representations of global images based on a series of local descriptors have been judged to be effective. For example, local descriptors extracted from the transformation of the invariant scale feature and their representations of word bags have been introduced. In, the morphological representations of the bags of the local morphological descriptors are calculated in the context of the CBIR. SITI are defined by initially assigning a binary code to each pixel of the image based on the threshold of its adjacent sample values and then calculate a histogram of the codes. After extracting the image descriptors, the image recovery is obtained from the neighbor k near (k-NN) algorithm or from an optimized search strategy, in which the recovery system classifies images based on the similarity of its features with the Image query and then shows the most similar images in the order of similarity. All the descriptors mentioned above are potentially effective for modeling the content of RS images,

but they do not model the possible primitives such as the different types of land cover present in the images and their relationships. This can lead to a large semantic gap between low-level features and high-level semantic concepts in the RS images.

Algorithms:

1. Shape-Based Invariant Texture Index (SITI) for Feature Extraction

A. Feature Extraction image content identification.

Steps:

Color feature is one of the most widely used visual features in image retrieval, for its invariance with respect to image scaling, rotation, translation. In this work, an image is divided into four equal sized blocks and a centralized image with equal-size. For each block, a 9-D color moment is computed, thus the dimension of color comment for each image is 45. The 9-D color moment of an image segment is utilized, which contains values of mean, standard deviation and skewness of each channel in HSV color space.

Edge Detection:

Most of the shape information of an image is enclosed in edges. So first we detect these edges in an image and by using these filters and then by enhancing those areas of image which contains edges, sharpness of the image will increase and image will become clearer.

Canny Edge Detection:

Canny edge detection is a technique to extract useful structural information from different vision objects and dramatically reduce the amount of data to be processed. It has been widely applied in various computer vision systems. Canny has found that the requirements for the application of edge detection on diverse vision systems are relatively similar. Thus, an edge detection solution to address these requirements can be implemented in a wide range of situations. The general criteria for edge detection include:
Detection of edge with low error rate, which means that the detection should accurately catch as many edges shown in the image as possible
The edge point detected from the operator should accurately localize on the center of the edge.
A given edge in the image should only be marked once, and where possible, image noise should not create false edges.

The Process of Canny edge detection algorithm can be broken down to 5 different steps:

1. Apply filter to smooth the image in order to remove the noise
2. Find the intensity gradients of the image
3. Apply non-maximum suppression to get rid of spurious response to edge detection
4. Apply double threshold to determine potential edges
5. Track edge by hysteresis: Finalize the detection of edges by suppressing all the other edges that are weak and not connected to strong edges.

Texture feature describes the structure arrangement of surfaces and their relationship to the environment, such as fruit skin, clouds, trees, and fabric. The texture feature in our method is described by hierarchical wavelet packet descriptor (HWVP). A 170- D HWVP descriptor is utilized by setting the decomposition level to be 3 and the wavelet packet basis to be DB2.

2. Kmeans for Segmentation:

A. K-means clustering

K-Means is the one of the unsupervised learning algorithm for clusters. Clustering the image is grouping the pixels according to the same characteristics. In the k-means algorithm initially we have to define the number of clusters k. Then k-cluster center are chosen randomly. The distance between the each pixel to each cluster centers are calculated. The distance may be of simple Euclidean function. Single pixel is compared to all cluster centers using the distance formula. The pixel is moved to particular cluster which has shortest distance among all. Then the centroid is re-estimated. Again each pixel is compared to all centroids. The process continuous until the center converges.

Flowchart of k-means algorithm:

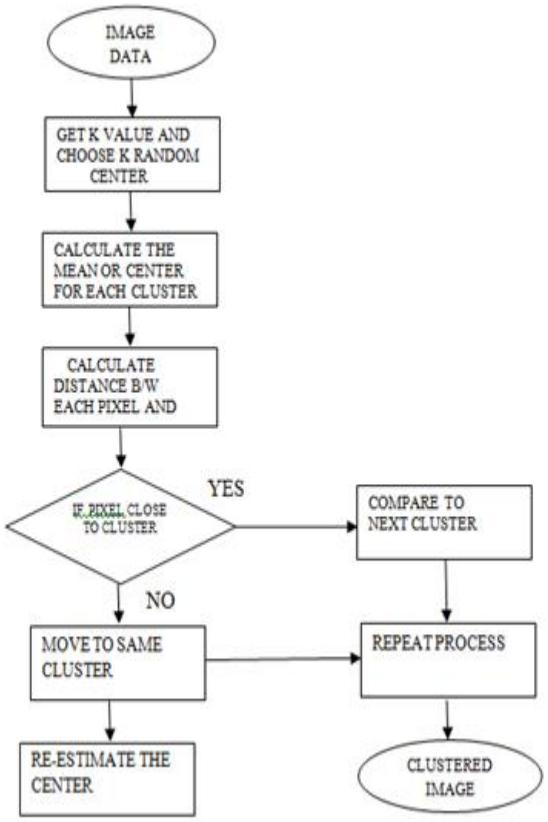


Fig: K-means flow chart

3. SM Algorithm for automatic region labelling:

SM algorithm is chosen to provide the solution to the graph matching problem quickly and efficiently in order to achieve fast retrieval.
The features could consist of points, lines, shape descriptors or interest points, depending on the specific application. For problems where the features are non-discriminative (e.g. points), it is the features pairwise geometric information that helps in finding the right correspondence. When discriminative features are extracted (e.g. interest points) then both the geometry and the properties of each individual feature can be used.

K-means Algorithm:

Steps:

- Give the no of cluster value as k.
- Randomly choose the k cluster centers
- Calculate mean or center of the cluster
- Calculate the distance b/w each pixel to each cluster center
- If the distance is near to the center then move to that cluster.
- Otherwise move to next cluster.
- Re-estimate the center.
- Repeat the process until the center doesn't move.

SITI Algorithm:

Steps:

- Initialize a SITI filter object with vl_siti_new (). The filter can be reused for multiple images of the same size.
- For each octave in the scale space:
- Compute the next octave of the DOG scale space using either vl_siti _process_first_octave() or vl_siti_process_next_octave() (stop processing if VL_ERR_EOF is returned).
- Run the detector with vl_siti_detect () to get the pixel points.
- For each key point:
- Use vl_siti_calc_keypoint_orientations () to get the pixelpoint orientation(s).
- For each orientation:
- Use vl_siti_calc_keypoint_descriptor () to get the pixelpoint descriptor.

SM Algorithm:

Steps:

- Assign an appropriate label to each region of the images $x_i \in X^{sub}$based on segmentation and pixel key points.
- To label a region of r_t^k of X_t, we compute the dissimilarity $d(\cdot,\cdot)$between the feature vector $f_t^k$and each of the prototype featurevectors of only those class labels that are associated with Xt .
- $r_t^k$is assigned the label c for which the value of $d(\cdot, \cdot)$
- After labelling, each class label contained in $x_{t^1} \in X^{sub}$

Dataset:

This is a 21 class land use image dataset meant for research purposes.

There are 100 images for each of the following classes:

- Agricultural
- Airplane
- Baseball diamond
- Beach
- Buildings
- Chaparral
- Dense residential
- Forest
- Freeway
- Golf course
- Harbor
- Intersection
- Medium residential
- Mobile homepark
- Overpass
- Parking lot
- River
- Runway
- Sparse residential
- Storag etanks
- Tennis court

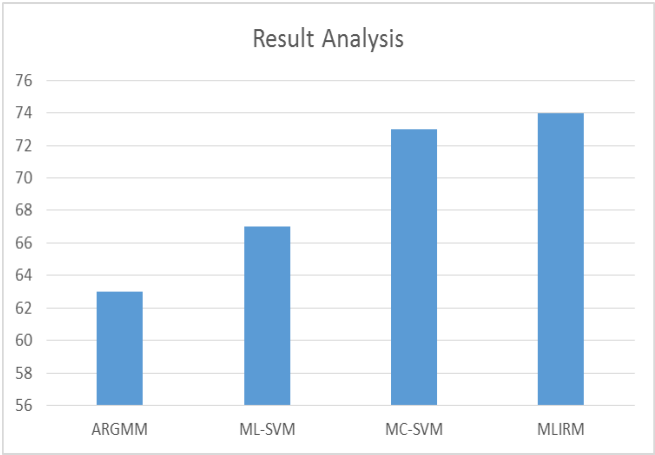
Each image measures 256x256 pixels.

The images were manually extracted from large images from the USGS National Map Urban Area Imagery collection for various urban areas around the country. The pixel resolution of this public domain imagery is 1 foot.

III. RESULT & DISCUSSION:

In the proposed system we are using the MLIRM for RS images with the comparison of existing system. The following table shows the accuracy of result given by proposed method MLIRM and existing method like ARGMM, ML-SVM, MC-SVM. The proposed MLIRM gives higher result than ARGMM. For both ML-SVM & MC-SVM require training of independent training of SVM classifier with the prediction of label vector of query images and retrieval of matching images. Both these steps require comparatively large time of computation. The proposed method uses different methods for feature extraction and retrieval of matching images from the archive. For the feature extraction of query images the images can be detect with canny edge detection method for the exact matching of edges with the edges of original image in archive.

IV. RESULT ANALYSIS



Sr no	Algorithm	Accuracy(%)
1	ARGMM	63
2	ML-SVM	67
3	MC-SVM	73
4	MLIRM	75

CONCLUSION

In this paper, we have introduced a theoretical method of semi-supervised graphs in the framework of multi-label remote sensing image retrieval, which requires only a small number of multi-level training images. The proposed method consists of four main phases. The first step includes image segmentation and extraction of characteristics from segmented regions. The second step exploits the underlying tag maps of different land cover classes and uses an algorithm based on semi-tracked graphs to associate each image of the file with multilabel by propagating the training image tag information to unlabeled images. In the third phase, a few training area image labels are used to associate each region of training images (and subsequently images without tags) with a particular class label. In the fourth step, these labels are used to create a RAG for each image, which is then used in the graphic mapping algorithm to calculate the similarity of the image.

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Survey Paper on Multilabel Remote Sensing Image Retrieval Using CBIR Techniques

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***Abstract*— In recent years the content based image retrieval has received widespread research interest in field of computer vision and pattern reorganization. The main concept of CBIR is to reduce the gap between low level visual features and high level human concepts, based on the visual features such as color, shape & texture extracted from images, the CBIR System tries to fulfil the needs of users who are retrieving the images with the desired concept in their mind. As there is tremendous growth in satellite technology, the availability of remote sensing images in archives is growing and thus CBIR has get extensive attention in field of RS for the necessity to search and retrieval of RS images. However most of the systems assumes that the training images are annotated by single label but this assumption does not fit for the complexity of RS images that contain mulitiple land cover classes called multilabel. The CBIR multilabel RS aims to retrieve the relevant images from the very large image archives based on 1) characterization of images by set of features and 2) retrieval of images that are similar to query images. The different methods are discussed in literature survey.**

Keywords-Content-based image retrieval (CBIR), correlated label propagation, multilabel categorization, region adjacency graph (RAG), remote sensing (RS), semi supervised learning, subgraph matching.

I. INTRODUCTION

With the progress of satellite technology, the volume of remote sensing (RS) and Amount of information that can be extracted from them. They have increased significantly. As a result, the image is based on the content Recovery (CBIR) has recently become an important problem of research in RS to keep up with growth Need for automation. State-of-the-art image search systems typically extract distinctive feature descriptors (high-dimension feature vectors) from interest points of images to measure their content similarity. One image is usually described by hundreds of feature vectors, and millions of photos uploaded imply billions of feature vectors. Therefore, it is necessary to introduce optimization techniques such as indexing or distributed computing to accelerate the search process. But most previous efforts did not support image privacy protection or assumed that feature vectors do not reveal content of images. However, recent researches show that an image can be approximately reconstructed based on the output of a black box feature descriptor software such as those classically used for image indexing. The image reconstructed using feature vectors appears quite similar as the original image, and it shows a good match with the original one. Those methods are entirely automatic and much better reconstruction may be achieved with user interaction. The reconstruction allows clear interpretation of the semantic image content, which arouses great concerns on the image privacy in the image indexing and search systems.

Usually a CBIR system has two Main steps 1) extraction of functionality in which the images they are described and represented by a set of characteristics 2) matching of the images on which the image of the query is based in features with all images in the file and more Relevant images are retrieved. As a result, the performance of CBIR systems depend on capacity and effectiveness of: 1) the characteristics extracted in the characterization of semantics. Image content and 2) recovery algorithms in Evaluate the similarity between the characteristics considered. In Literature RS, representations of global images based on a set of Local descriptors have been found effective.

Motivation:

Content-based image retrieval (CBIR) applications have been rapidly developed along with the increase in the quantity, availability and importance of images in our daily life.

CBIR scheme has been limited by it's the severe computation and storage requirement for visual data have been increasing in recent years, following the emergence of many highly interactive online services and applications for many devices in both personal and corporate scenarios.

Objectives:

- To support automatic image region labelling
- To implement Semi supervised Graph-Theoretic Method for RSIR.
- To prevent data from unauthorized users.
- To prevent leakage on the query contents or results

II. RELATED WORK

Literature survey is the most important step in any kind of research. Before start developing we need to study the previous papers of our domain which we are working and on the basis of study we can predict or generate the drawback and start working with the reference of previous papers.

DU Peijun1, CHEN Yunhao, TANG Hong and FANG Tao: Some basic problems in content-based remote sensing Image recovery is discussed in this document. The frame, Flow processing and levels are proposed based on the theory of CBIR and characteristics of the RS image Oriented to Practical needs, five recovery models included Based on models, based on attributes, based on metadata, an integrated and semantic

recovery is proposed. The Content and features that can be used in Content-Based .The remote sensing image recovery includes color, shape, texture, Spectra, spatial relations, metadata and relative rules eknowledge. Among those features, spectral, spatial characteristics, Features and metadata are the main aspects of the RS image different from common images [2].

Yi Yang, Shawn Newsam: They execute a thorough evaluation of local invariant features for image recovery of land use classes and cover in high resolution aerial images we inform about the effects of a series of drawings. Parameters in a word bag representation that includes local extraction against grid-based extraction, the size of the visual textbook, and the grouping algorithm used to create the code book and the measure of dissimilarity used to compare representations of BOVW. We also make comparisons with Standard functions such as color and texture. The performance of it is quantitatively evaluated using a LULC foreground of its kind real data set that will be made available to the public for others the researchers also reported the effects of the nucleus. Design parameters, we also describe interesting results such as the performance-performance compensations that are possible through the Appropriate combinations of code books of different sizes and dissimilarities. Although the focus is on image recovery, we expect our Knowledge is informative for other applications, such as detection. And classification [3].

Erchan Aptoula: In this work, we present the results of the application descriptors of the global morphological structure to the problem of Image restoration based on the content of remote sensing. In particular, we explore the potential of the newly developed multiscale texture descriptors, i.e. the circular covariance histogram and the Point triplets of invariant rotation. On the other hand, we present a couple of new descriptors, taking advantage of the Fourier power spectrum of the Scale the space based on almost flat areas of your entrance. The descriptors are evaluated with the UC Merced Land Use data set - Land Cover, which was recently public. The proposed approaches is indicated to overcome the best known recovery scores, despite his the shortest length of the functionality vector, thus confirming the practical interest of descriptors of global contents and mathematical morphology in this context [4].

Marcelo Musci, Raul Queiroz Feitosa, Gilson A. O. P. Costa, and Maria Luiza Fernandes Velloso: This work it also proposes a new descriptor of frames assembled through the concatenation of the histograms of any LBP or LPQ descriptor and estimates of local variance. Proven experimental analysis that the proposed descriptors, although more compact, retain the ability to discriminate two-dimensional histograms. Which represents the joint distribution of texture descriptors contrast information. Finally, the letter compares discrimination. Capacity of text descriptors based on LBP and LPQ with the characteristics deriving from the coexistence of the gray levelMatrices (GLCM). Relative experiments have revealed a remarkable one superiority of the LBP and LPQ descriptors on the GLCM characteristics in the context of the classification of RS image data [5].

Bindita Chaudhuri, Begüm Demir, Lorenzo Bruzzone, Fellow, andSubhasis Chaudhuri, Fellow: The proposed approach is characterized with two main steps: 1) Modeling each image with a graph, which provides a representation of the image based on the region that combines both premises information and related spatial organization; and 2) recover the Images in the file that are more similar to the query image than evaluate the similarities based on graphs. In the first step, each image. it is initially segmented into different regions and then modeled by an assigned relational graph, in which the nodes and edges represent Characteristics of the region and its spatial relationships, respectively. In the second phase, a new strategy of incorrect graphic correspondence, which jointly exploits a subphysical isomorphism algorithm and a spectrum the graphic insertion technique is applied to match the corresponding ones. Graphics and to retrieve images in the order of graphic similarity. Experiments performed in a file of aerial image points that the proposed approach significantly improves Recovery State of the art performance without RS supervision Image recovery methods [6].

Begüm Demir, Lorenzo Bruzzone: This article presents an active novel learning method (AL) to check the RF to recover the remote sensing Images of large files in the support vector machine classifier. The proposed AL method is specifically designed for CBIR and defines an effective and as small as possible Set of pertinent and irrelevant images with respect to a general image of consultation through the joint assessment of three criteria: 1) uncertainty;2) diversity; and 3) image density in the file. The uncertainty and diversity criteria aim to select the most informative Images in the file, while the goal of the density criterion is Choose images that are representative of the underlying Distribution of data in the file. The proposed AL method evaluates the three criteria jointly based on two successive steps .In the first step, the most uncertain (i.e. ambiguous) images are selected from the file based on margin sampling strategy. In the second phase, the images that are different (e.g. distant) and associated with high density regions of the space of the characteristics of the image in the file are chosen among the most uncertain images This step is achieved through a novel based on clustering strategy. The AL method proposed for conducting RF contributions to mitigate the problems of the unbalanced and partial set of relevant irrelevant images. The experimental results show the effectiveness of the proposed AL method [7].

Matthew R. Boutella, Jiebo Luob, Xipeng Shena, Christopher M. Browna: They present you a framework to manage these problems and apply it to the problem of classifying the semantic scene, in which a natural scene can contains multiple objects, so that the scene can be described by multiple class labels (for example, a scene of a field with a mountain in background). This problem poses challenges to the classic model recognition model and requires different treatment. We discuss training and testing approaches in this scenario and introduce new metrics to evaluate individual examples, class memory and general precision and accuracy. Experiments show that our methods are suitable for scene classification; Furthermore, our work seems to generalize to other classification problems of the same nature [8].

Ran Li, YaFei Zhang, Zining Lu, Jianjiang Lu, Yulong Tian: In this work, author has propose a novel multi-label image annotation for annotated image recovery keyword for the annotation of images with multiple labels, an encoding the

genetic algorithm is used to select the optimal characteristic subsets and corresponding optimal weights for each against a SVM classifier. After segmenting an image without labeling in different regions with pre-trained image segmentation algorithm SVMs are used to annotate each region, the final label is obtained by combining all the labels in the region. A new annotation it is proposed to obtain the improvement approach based on Page Rank get rid of irrelevant tags Based on multi-image label, image. The recovery system provides image recovery based on keywords Service. Multiple labels can provide abundant descriptions for Semantic level image content and results of experiments shows that the multi-tag annotation algorithm can improve Precision and recovery of image recovery [9].

V. Ranjan, N. Rasiwasia, and C. V. Jawahar: In this work, we address the problem of cross-modal retrieval in presence of multi-label annotations. In particular, we introduce multi-label Canonical Correlation Analysis (ml-CCA), an extension of CCA, for learning shared subspaces taking into account the high level semantic information in the form of multi-label annotations. Unlike CCA, ml-CCA does not rely on explicit pairings between the modalities, instead it uses the multi-label information to establish correspondences. This results in a discriminative subspace which is better suited for cross-modal retrieval tasks. We also present Fast ml-CCA, a computationally efficient version of ml-CCA, which is able to handle large scale datasets. We show the efficacy of our approach by conducting extensive cross-modal retrieval experiments on three standard benchmark datasets. The results show that the proposed approach achieves state-of-the-art retrieval performance on the three datasets[10].

Gulisong Nasierding, Abbas Z. Kouzani: This document presents an empirical multi-label study classification methods and provides suggestions for multi-labeling Effective classification for automatic image annotation applications the study shows that the triple random set the multi-label classification algorithm (TREMLC) exceeds performance among their counterparts, especially in the scene image data set. Closer k-neighbor multi-label (ML-kNN) and binary relevant learning algorithms (BR) work well in Corel Image data set Based on the overall results of the evaluation, Examples are provided to show the predictive performance of the labels Algorithms using examples of selected images. This provides an Indication of the suitability of several multiple labels. Classification methods for low image automatic annotation different configurations of the problem [11].

Min Wang and Tengyi Song: This article proposes an image of remote sensing (RS) recovery scheme using the corresponding image of the semantic image (SS).Low visual level (VF) image functions are assigned first in multilevel spatial semantics by FV extraction, based on objects classification of vector support machines, inference of spatial relations, and modeling SS. Furthermore, a spatial coincidence of SS model involving the area of the object, attribution, topology Driving characteristics are proposed for the implementation of Image restore based on sample scenes. In addition, a system prototype. Which uses a thick to thin recovery scheme is implemented with high recovery accuracy. The experimental results show that the proposal the method is suitable for spatial modeling of the SS, in particular geographical Modeling SS, and behaves well in the resemblance of the space scene matching [12].

III. Open Issues

Lot of work has been done in this field because of its extensive usage and applications. In this section, some of the approaches which have been implemented to achieve the same purpose are mentioned. These works are majorly differentiated by the algorithm for CBIR systems.

Supervised remote detection based on conventional content Image recovery systems (RS) require a large number of Images already noted to train a classifier to stand up recovery accuracy. Most systems assume that every training image

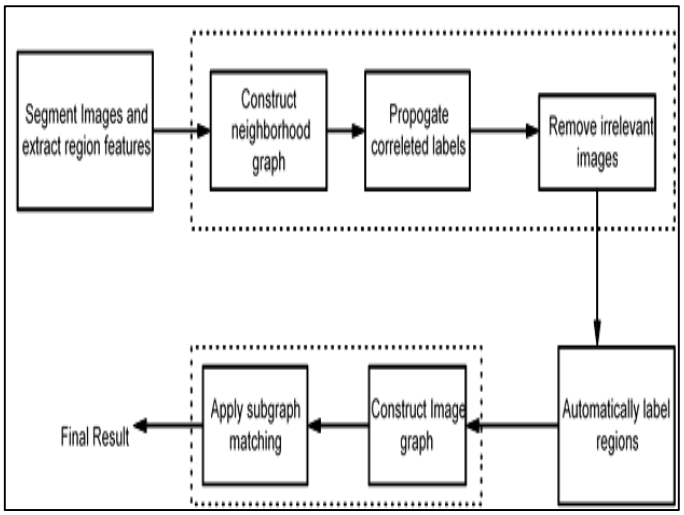
It is annotated by a single label associated with the most significant semantic content of the image. However, this hypothesis does not it fits well with the complexity of RS images, where an image could have multiple land cover classes (e.g. multilabels). Moreover, annotating images with multilabels is expensive and time-consuming.

IV. DISCUSSION

To overcome the above-mentioned critical issues, in this paper, we propose a semi supervised graph-theoretic method in the framework of multilabels RS image retrieval problems. The proposed method is based on four main steps: 1) image segmentation and feature extraction; 2) multilabels image categorization; 3) automatic region labelling; and 4) image retrieval[1]. The method requires that the user initially selects a small fraction of images in the archive as training images, assigns multiple class labels to each image depending on the primitive classes present in it, and also annotates a few regions of those images with the corresponding labels. Then, the first step segments each image in the archive into semantically meaningful regions and extracts features from these regions. The second step aims to automatically assign multilabels to each image in the archive using a graph-based semi supervised algorithm. In this algorithm, a neighbourhood graph is initially constructed taking all the images in the archive, where the nodes represent the images and the edges represent the neighbours of the images in terms of similarity. Then, the class labels of the training images are propagated using a correlated label propagation method to the unlabelled images to associate them with multiple labels.

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System Architecture:



V. CONCLUSIONS

In this paper, author have introduced a theoretical method of semi-supervised graphs in the framework of multi-label remote sensing image retrieval, which requires only a small number of multi-level training images. The proposed method consists of four main phases. The first step includes image segmentation and extraction of characteristics from segmented regions. The second step exploits the underlying tag maps of different land cover classes and uses an algorithm based on semi-tracked graphs to associate each image of the file with multilabel by propagating the training image tag information to unlabeled images. In the third phase, a few training area image labels are used to associate each region of training images (and subsequently images without tags) with a particular class label. In the fourth step, these labels are used to create a RAG for each image, which is then used in the graphic mapping algorithm to calculate the similarity of the image.

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A Survey on Content based Image Retreival by Using Convolutional Neural Network Algorithm

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***Abstract*- This paper proposes Content Based Image Retrieval via Convolutional neural network. The problem is to extract the image features that represent the image contents in a database. Such kind of extraction requires a evaluation of retrieval performance of features of image. Related work is the foundation for understanding and improving more knowledge regarding precise field. Content Based Image Retrieval is a technique for extracting features of images like color, shape, texture, blob detection, edge detection, contour detection and etc. That sort of work of extracting features from image will be done by convolutional neural network here. Once features are extracted from a query image then same procedure will be used for extracting features of database images. For comparing features of both images Euclidian distance can be used to produce the best result. The key part of retrieval system is feature extraction. Until now, the only way of penetrating these collections was based on keyword indexing, text, or just by browsing. In this paper we survey some practical aspect of current CBIR texture, and shape for exact and efficient CBIR after doing the study of related works.**

Keywords— CBIR, CNN, Features, Image Retrieval, Classification, Neural Network

I. INTRODUCTION

In the recent past the advancement in computer and multimedia technologies has led to the production of digital images and cheap large image repositories [6]. Size of image set has increased rapidly due to this, including digital libraries, medical images etc. To tackle this rapid growth it is required to develop image retrieval systems which operate on a large scale. The primary aim is to build a robust system that creates, manages and query image databases in an accurate manner. CBIR is the procedure of automatically indexing images by the extraction of their low-level visual features, like shape, Color, and texture, and these indexed features are solely responsible for the retrieval of images [2]. Thus, it can be said that via navigation only, browsing, query-by-example etc. we can calculate the similarity among the low-level image contents which will be used for the retrieval

Of same images. Images are a representation of Points in a high dimensional feature space and a metric are used to measure the similarity or dissimilarity between images on this space. Hence,

Those images which are closer to the query image are similar to it and are accessed. Representation of

The Image feature and similarity measurement are very essential to calculate retrieval performance of a CBIR system and from decades researchers have studied them extensively [4]. A variety of techniques image pixels captured by machines and high level semantic concepts perceived by humans. Such a problem poses fundamental challenge of Artificial Intelligence from a high-level perspective that is how to build and train 2 intelligent machines like human to tackle real-world tasks [3]. One promising technique is Machine Learning that attempts to address this challenge in the long-term. In the recent years there have been important advancements in machine learning techniques [6]. Deep Learning is an important breakthrough technique, which includes a family of machine learning algorithms that attempt to model high-level abstractions in data by employing deep architectures composed of multiple non-linear transformations.

II. LITERATURE SURVEY

Inventors have already proposed different methods to improve the system of content based image retrieval.

1. Surbhi Jain, Joydip Dhar proposed applications of CNN towards solving classification and retrieval problems. For retrieval of similar images, they agreed on using transfer learning to apply the GoogleNet deep architecture to their problem. Extracting the last-but-one fully connected layer from their training of GoogleNet CNN model served as the feature vectors for each image, computing Euclidean distances between these feature vectors and that of their query image to return the closest matches in the dataset in Image Based Search Engine Using Deep Learning.
2. Pakkruddin B, Ravi G. H. proposed Color and texture features based image retrieval system. In this paper author worked on Wang database contains 1000 JPEG images. From result analysis of those proposed system authors got Precision of 100% at recall worth is 5% and the quality reduction to 47.57% at 50% recall.
3. Mushtaq Ali, Le Dong, Yan Liang, ZongyiXu, Ling He, Ning Feng the creators presented one image feature, for example, weighted average of colourful image. This feature portrays the probability of the sum of the color values of any of the relating pixels of the three planes in the given RGB image. There are four steps to

find this feature, First include comparing pixel of the three planes of shading picture, Second figure the sum of the occurrences of all different values in the result array, Third find the probability distribution function of the occurrences of each different value in the result array, Finally calculate the weighted average using different values and their related probabilities. Major goal of this paper is to compare the average retrieval time of proposed system with color averaging technique. Hence, the proposed system retrieves the desired images very quickly. The average precision, recall and F_measure of the results are generated.

4. H. B. Kekre, Kavita Sonawane the authors proposed color histogram based bins approach in RGB, XYZ, Kekre's LXY and L'X'Y' color spaces. The proposed technique contains seven steps as follows: First take the input as RGB image, Second convert the input RGB image to XYZ, LXY and L'X'Y' color spaces, Third divide the image into three planes of individual color spaces, Forth calculate the histograms for each of the three planes of the image from each color space, Fifth dividing each histogram into two parts by computing the Centre of gravity and perform the "8 bins formation" procedure, Sixth bins formation: Seventh eight bins obtained after execution of step sixth.. According to Kekre transform features vectors are calculated by using a combination of row mean and column mean of input image and database images. Similarly HSV color space quantifies the color space into different regions, by calculating the precision and recall parameters of choosy images from the database, contrast among the two algorithms and the efficiency of the mixture of both the algorithms can be calculated.
5. Venu Shah, Pavan Bhat, Mahesh Dasarath, Shipra Gupta and Jackie Bhavsar the author proposed three image indexing technique for retrieval of images. The query procedure algorithm is used to find the features of the query image. The Indexing procedure is used to find the features of the database images and Finally Semantic Indexing algorithm is used to find the features of the collected images. In this approach medical images are used as a database which is available in Google search engine.
6. Ahmed J.Afifi and wesam M.Ashour proposed a content- based image retrieval method using color and texture feature. To extract the color feature from the image the colour moments has calculated where the image will be in the HSV colour space. To extract the texture feature the image to be in gray–scale and ranklet transform is performed on it.

III.APPLICATIONS

There are varieties of applications for content based image retrieval it can be used for architectural and engineering, digital libraries, art collections(museums,..), crime prevention(security filtering,..), intellectual property, medical diagnosis(X-ray, CT, MRI,..), commerce(fashion, catalogue,..), entertainment(personal album,..), military(radar, aerial,..) and etc.

IV. ADVANTAGES

1. CBIR has become a very active area research for two major research communities, Database Management and Computer Vision.
2. Feature Extraction methods are easy, effective and less expensive.
3. Time requires is less to find those entire related image.
4. More than one related outcomes occur by only one search (If more than one equally likely image present in the database).
5. CNN is very helpful to process on image, text or video.
6. It will do feature extraction automatically developer don't need to write code for it.
7. CNN is more efficient in case of memory utilization.
8. CNN is super simple means very low complexity in case of feature extraction.

V. CONCLUSION

This our proposed concept focuses on Content Based Image Retrieval by using convolutional neural network. Problem here is to extract the image features that effectively represent the image contents in a database. Such an extraction requires a detailed evaluation of retrieval performance of image features. CBIR is used to search a specific image from a large database.CBIR performs interactive searching of images from the dataset. Up to now CBIR is not the most accurate technique for finding desired outcomes. But by using Convolutional neural network it works good.

One promising technique is Machine Learning that attempts to address this challenge in the long-term. In the recent years there have been important advancements in machine learning techniques. Finding more features and extracting that from query image is the very complex term in CBIR but as because of CNN it becomes little bit easy and so we have thought of using CNN for more accurate result. Convolutional neural network is an important breakthrough technique, which includes a family of machine learning algorithms this technique is still in research state for finding more better and accurate output. At present this technique is implemented by Google.

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pplication of Convolutional Neural Network for Content Based Image etrieval

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ABSTRACT

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Medical Data Sharing for Protection and Intrusion Avoidance in Cloudlet

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ABSTRACT: Health Record of an individual personal is a vital way that can be utilized for keeping track of patient data in accurate, reliable as well as complete manner. For all intents and purposes, restorative information sharing is a basic and testing issue. Consequently in this paper, we develop a novel human services framework by using the adaptability of cloudlet. The elements of cloudlet incorporate security insurance, information sharing and interruption location. In the phase of information accumulation, we initially use Number Theory Research Unit (NTRU) technique to scramble client's body information gathered by wearable device. That information will be transmitted to adjacent cloudlet in a vitality proficient form. Furthermore, we exhibit another trust model to enable clients to choose trustable accomplices who to need to share put away information in the cloudlet. The trust display additionally causes comparable patients to speak with each other about their sicknesses. Thirdly, we isolate clients' medicinal information put away in remote billow of healing facility into three sections, and give them appropriate insurance.

KEYWORDS: Privacy Protection, Data Sharing, Collaborative Intrusion Detection System (IDS), Healthcare.

I. INTRODUCTION

This medical data on the social network is beneficial to both patients and doctors, the sensitive data might be leaked or stolen, which causes privacy and security problems without efficient protection for the shared data In Cao et al, an MRSE (multi-keyword ranked search over encrypted data in cloud computing) privacy protection system was presented, which aims to provide users with a multi-keyword method for the cloud's encrypted data [1]. Although this method can provide result ranking, in which people are interested, the amount of calculation could be cumbersome. A priority based health data aggregation (PHDA) scheme was presented to protect and aggregate different types of healthcare date in cloud assisted wireless body area network (WBANs). The article investigates security and privacy issues in mobile healthcare networks, including the privacy-protection for healthcare data aggregation, the security for data processing and misbehavior [2]. Describes a flexible security model especially for data centric applications in cloud computing based scenario to make sure data confidentiality, data integrity and fine grained access control to the application data. It gives a systematic literature review of privacy-protection in cloud-assisted health care system.

a) Background

It is challenging issue to personalize specific healthcare data for various users in a convenient fashion. Previous work suggested the combination of social networks and healthcare service to facilitate the trace of the disease treatment process for the retrieval of real time disease information. Healthcare social platform, such as Patients-Like Me, can obtain information from other similar patients through data sharing in terms of user's own findings. Though sharing medical data on the social network is beneficial to both patients and doctors, the sensitive data might be leaked or stolen, which causes privacy and security problems without efficient protection for the shared data. We use trust model to evaluate trust level between users to determine sharing data or not. Considering the users' medical data are stored in remote cloud, we classify these medical data into different kinds and take the corresponding security policy. In addition to above three stages based data privacy protection, we also consider collaborative IDS based on cloudlet mesh to protect the cloud eco system.

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Prediction of gainer & looser of stocks Artificial neural network algothim.

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ABSTRACT

Investors in stock market want to maximize their profits, it would be beneficial for them if the market movement can be predicted beforehand. Machine learning approaches such as ANN, PSO algorithm has been used herein to predict the gainer and looser shares of the market. In this paper, we used ANN algorithm is implemented for prediction purpose and finally result is compared for all these algorithms. This prediction model is used with some common indicators to maximize the return and minimize the risk for the stock market. Historical data of the some stocks has been used for building and training the models. Later, testing file is generated with the real data to ascertain the accuracy of the model and to predict the gainer and looser share of the market.

1. INTRODUCTION

Stock markets are trading institutions where stocks (equity) and other financial instruments such as bonds are offered for trade. For stocks, the market generally operates a willing-buyer, willing-seller" trade, where buyers and sellers prices are matched for a fit. If there is no match, then no trade takes place and waits for a future match or expires. In most stock exchanges, the common and easily accessible market is the equity market (stocks), where the entry investment can be as low as USD1. The equity market is therefore more active, having many players and hence a segment worthy of further study. The performance of stock markets is measured on a daily basis by some key indicators such as share index, which is a measure of the performance of some stocks picked from the different sectors of the market. Such an index is important in not only gauging the performance of trades in the stock exchange but also the economic performance of the particular country as a whole.

Shareholders however do not directly execute the trade, nor is there any meeting between buyers and sellers for negotiations. Shareholders trade by giving instructions to their Stockbrokers, who in turn execute the orders. Stockbrokers usually also advise clients on where to trade. In their advisory role, some Stockbrokers base their advice on the fundamentals of the various stocks or undertake technical analysis. However, none of these predictive methods have assurance of profit as they usually just indicate a future trend and a likely up or down price movement and not the real expected future stock price. Stockbrokers need to be empowered, through better predictive tools, to enable them have some capability to provide the best advice to their clients. A predictive tool that Stockbrokers can use to guide on exact price movements, as a basis of investment, is therefore desirable. This can be an artificial intelligence (AI) system based on neural networks. Complex relationships between inputs and outputs may not always allow us to find patters. ANN is gaining much attention these days because of its capability of solving such problems. It has robust ability to discover relationship in the input data set without a priori assumption of the knowledge of relation between the input and the output data. It can be used to build model that identify unknown hidden patterns in data which can be further used for prediction purposes. Neural Network has already been successfully applied in the fields related to finance, econometrics, medicine and engineering. In the chaotic system, like stock market, in which many known as well as unknown factors affect the stock price, there is no significant mathematical relation between the factors and the price can be found. There is no law exists which governs the stock prices using the underlying factors. Taking this into consideration, application of neural networks would be very beneficial in predicting stock market. In this paper, multilayer perceptron algorithm is used for the prediction(gainer/looser).

2. LITERATURE REVIEW

In [1] proposes the utilization of Artificial Neural Network that is feed forward multi layer perceptron with error back propagation and builds up a model of setup 5:21:21:1 with 80% training information in 130,000 cycles. The examination

builds up a model and tests it on 2008-2012 data from stock exchanges e.g. Nairobi Securities Exchange and New York Stock Exchange, where prediction comes about show MAPE of between 0.71% and 2.77%. Approval finished with Encog and Neuroph acknowledged comparable outcomes.

In [2] show an Artificial Neural Network way to deal with anticipate stock exchange files. They layout the outline of the Neural Network model with its saliant highlights and adjustable parameters. Number of activation capacities are actualized alongside with option for cross approval sets. They finally test their algorithm on the Nifty stock file dataset where they anticipate the qualities based on values from the past n days.

In [3] feed forward neural system is actualized for prediction purpose. It has been seen that aftereffects of neural system is more encouraging in predicting stock value that actually isn't surely predictable.

In [4] proposes a stock value forecast demonstrate, which extracts features from time series information and social organizations for prediction of stock costs and evaluates its execution. In this system, they utilize the features for example, numerical dynamics of news and remarks, overall senitment analysis of news and remarks, and technical examination of

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historic cost and volume. They demonstrate the stock value movements as a component of these information includes and tackle it as a regression issue in a Multiple Kernel Learning regression system.

In [5] build up a two-stage multiple kernel learning algorithm by incorporating sequential minimal optimization and the gradient projection strategy. By this calculation, advantages from various hyperparameter settings can be joined and general framework execution can be made improved. Additionally, the client require not indicate the hyperparameter settings in advance, and experimentation for deciding suitable hyperparameter settings can then be avoided.

In [6] artificial neural system is utilized alongside windowing administrator; which is very effective for working with time series information for predicting stock exchange cost and pattern. This examination is done on Wal-Mart Stores Inc. (WMT) a recorded organization of New York Stock Exchange. Five years authentic dataset (2010-2015) is utilized to attempt the analyses of this investigation. As indicated by the aftereffect of this examination Artificial Neural Network (ANN) can create a balanced outcome with a little mistake.

In [7] set forward another technique called HLP as data preprocessing to process the stock information. By HLP technique we can get the stock high low point with various recurrence and amplitude. The extracted information depicts the feature of stock value development. After that they build ANN models to forecast the stock development direction and cost. The HLP strategy and ANN models offer help to financial specialists.

In [8] introduce the accessible capacity calculation display in light of the artificial neural network for lead acid batteries in an electric vehicle. Contrasting and the techniques based on the Peukert condition, which is regularly utilized for the computation of the accessible limit with regards to lead acid batteries in EVs, this model is more exact.

In [9] proposes genetic algorithm way to deal with feature discretization and the assurance of association weights for artificial neural network to anticipate the stock value record. Past research proposed numerous hybrid models of ANN and GA for the technique for training the system, feature subset selection, and topology optimizations. In the vast majority of these examinations, in any case, GA is just used to enhance the learning algorithm.

3. PROPOSED APPROACH

A. Proposed System Overview

The main goal of the proposed system is to predict the gainer or looser shares. Initially online data about share market is extracted. Preprocessing is done on the extracted data and old dataset of the shares. In preprocessing process, similar attributes are check, in this process we keep the similar attributes and remove all the attributes. Training file is generated from the preprocessing method, the details about the dataset is discussed in the next section. After generating training file classification process is done.

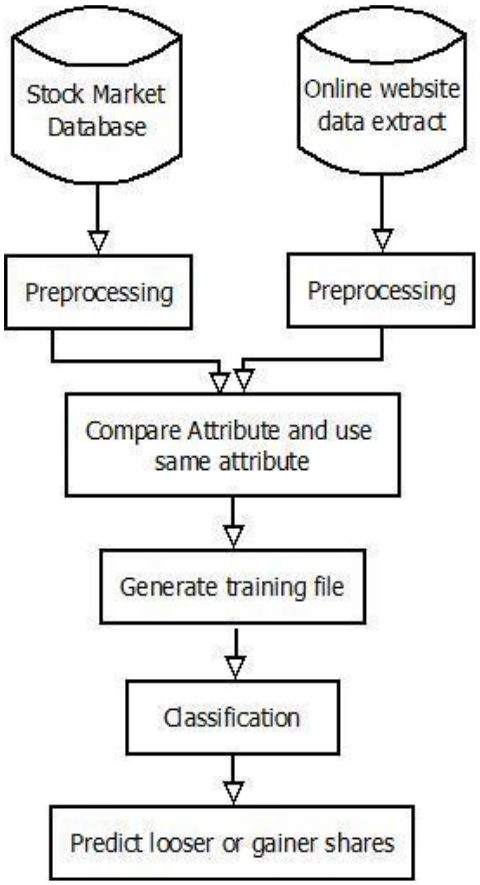


Figure 1.Proposed System Architecture

4. IMPLEMENTATON

Algorithm

Process:
1) Create test file using dataset.
2) Take query as input & creating training file related to query.
3) Pass training & testing file to multilayer perceptron.
4) Matching query on test data & assigning class
5) If query match then
6) class =1(Gainer)
7) else
8) class =0 (Looser)
9) Predict looser share= 1 training file
10) End

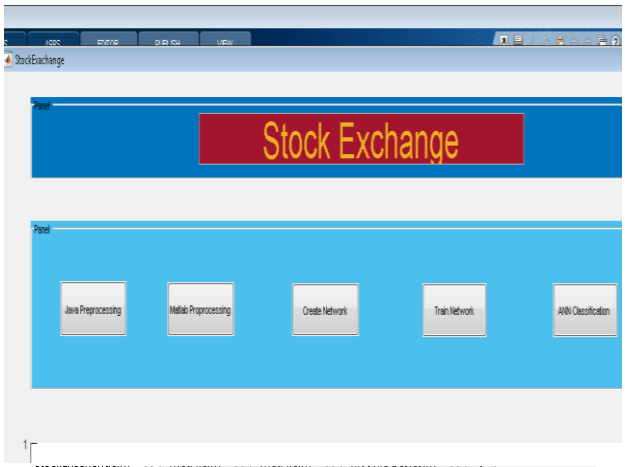
Dataset used

In this system we used stock market dataset and online web stock dataset, after the preprocessing process the training file is generated, the attributes of the training files are:
1. Previousclose
2. Open
3. Currentclose
4. High
5. Low
6. Change

and the classes are:
1. Gainer
2. Looser

Total records are: 250

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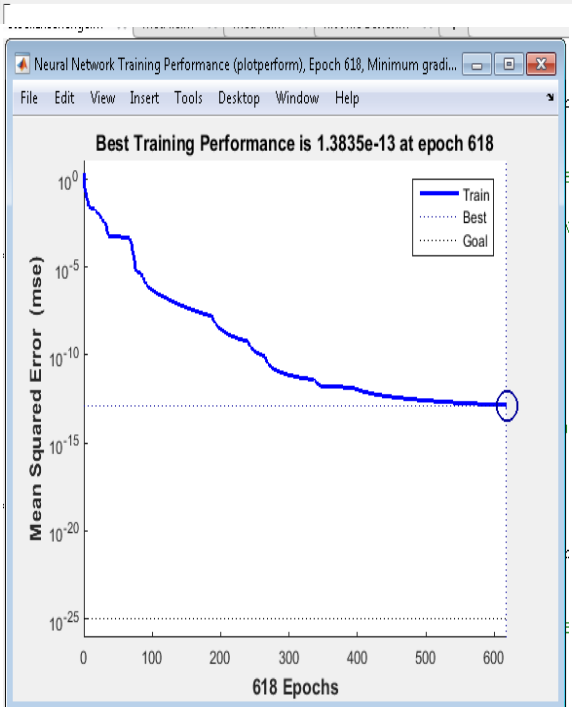


Figure 2.Performace of Training Set

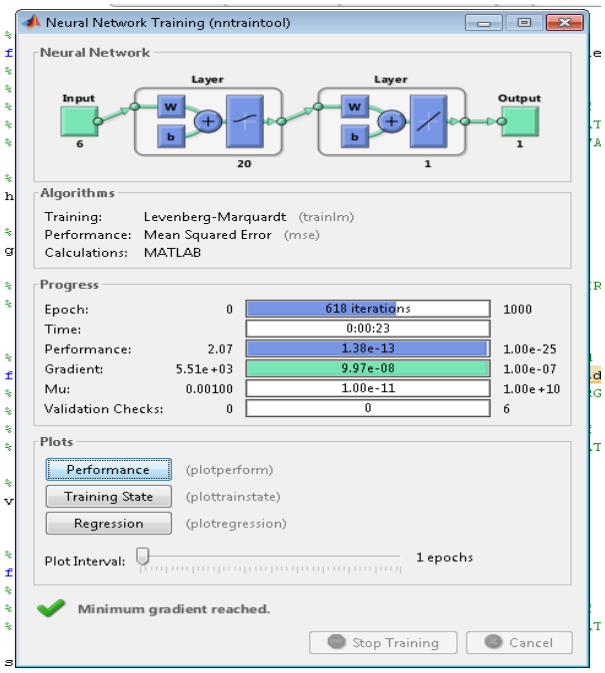


Figure 2.Training Set using ANN algorithm

5. CONCLUSION AND FUTURE SCOPE

In this paper, proposed the method which predict the gainer/looser shares. We use stock market dataset and online website data as an input dataset. For the classification process, multilayer perception algorithm is used for classification process. Finally system will predict the looser or gainer shares.

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Stock Market Prediction System Using Machine Learning Technique

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***Abstract*—Stock market decision - making is a very difficult task to predict financial data. Stock market prediction with high precision the movement of return benefits for stock investors. Due to the complexity of the financial data of the stock market, the development of efficient models for prediction decision is very difficult, and must be precise. This study attempted to develop models for stock market prediction and to decide whether to buy or hold stocks using machine learning techniques. In this paper we propose an combination of Artificial Neural Network (ANN) and Fuzzy Neural Network (FNN) algorithm for implementing the prediction models. The Swarm intelligent technique, Particle Swarm Optimization algorithm (PSO) is also used to develop a forecasting model for predication of stock market. The stock market dataset and online websites dataset used as input to the prediction model. Based on the data set, these models are able to generate purchase / retention signal for the stock market as output. The main objective of this project is to predict the gainer or looser shares.**

***Keywords*— ANN, FNN, PSO, Swarm optimization techniques, Stock market prediction, machine learning.**

I. INTRODUCTION

Today it is a common notion that large amounts of capital are traded through stock markets around the world. National economies are strongly and heavily influenced by the performance of their stock markets. Moreover, markets have recently become a more accessible investment tool, not only for strategic investors, but also for ordinary people. Therefore, not only are they related to macroeconomic parameters, but they influence life I asked in a more direct way. They therefore constitute a mechanism that has significant and direct social impacts. A common feature of all stock markets is the uncertainty associated with short-term and long-term future conditions. This feature is undesirable for investors, but it is also inevitable whenever the stock market is chosen as an investment tool. One of the best you we do are to try to reduce this uncertainty. Stock market prediction (or forecasting) is one of the means of this process. The task of stock market forecasting divides researchers and scientists into two groups: those who believe that we can develop market forecasting mechanisms, and those who believe that the market is effective, and whenever new information appears, the market absorbs it, correcting itself, thus there is no place for forecasting (EMH). Also, they believe that the stock market follows a random walk, which means that the best forecast you can have about tomorrow's value is today's value.

Several methods have been used in the literature to predict stock market yields. These methods can be grouped into four main categories: (i) technical analysis methods, (ii) fundamental analysis methods, (iii) traditional time Series forecasting and (iv) Machine learning methods. The technical analysis, known as chartists, tries to predict the market by means of conscious patterns that come from the study of graphs that describe historical market data. Fundamental analysis studies the intrinsic value of an action and invests in it if they consider that its present value is less than the intrinsic value. In the traditional prediction of Time Series, an attempt is made to create linear prediction models to trace patterns in historical data. These linear models are divided into two categories: univariate regression models and multivariate models, depending on whether they use one of the more variables to approach the time series of the stock market. These methods use a set of samples and try to trace patterns in it (linear or non-linear) in order to approximate the underlying function that generated the data [1].

In this paper we propose a combination of ANN and FNN algorithm for implementing the prediction models. The Swarm intelligent technique, Particle Swarm Optimization algorithm (PSO) is also used to develop a forecasting model for predication of stock market. Artificial neural network (ANN) is a system derived from a model of Neurophysiology. In general, it consists of a set of simple non-linear computes the elements whose inputs and outputs are tied together to form a network. The learning algorithm of ANN is generally three different types: supervised, unsupervised, and hybrid learning. ANN is gaining much attention these days because of its capability of solving such problems. It has robust ability to

discover relationship in the input data set without a priori assumption of the knowledge of relation between the input and the output data. It can be used to build model that identify unknown hidden patterns in data which can be further used for prediction purposes. Neural Network has already been successfully applied in the fields related to finance, econometrics, medicine and engineering. In the chaotic system, like stock market, in which many known as well as unknown factors affect the stock price, there is no significant mathematical relation between the factors and the price can be found. There is no law exists which governs the stock prices using the underlying factors [2] [5]. Taking this into consideration, application of neural networks would be very beneficial in predicting stock market. The FNN system is used for Intelligent Systems. Automatic control, pattern recognition, human-machine interaction, expert system, modelling, medical diagnosis, economics, etc is the application of these systems. Obviously, the technology of each it has its own advantages and disadvantages. It is a fuzzy rule than performing comprehensive language knowledge and reasoning representing the ability of the fuzzy system. But the mechanism that provided the fuzzy system adjusts these rules. FNN, on the other hand, is an adaptive system that can be trained and tuned from a set of input / output data sets [3].

PSO is a new evolutionary computing technique first introduced by Kennedy and Eberhart in 1995. It is a stochastic optimization approach, based on the social behaviour of animals such as a flock of birds, a school of fish, or a swarm of bees or a group of people pursuing a common goal in their lives. PSO is a population-based search procedure in which individuals, called particles, are grouped in a swarm. Each particle in the swarm represents a solution candidate for the optimization problem. In a PSO system, each particle is" blown " through the multidimensional search space, adjusting its position in the search space according to its own experience and that of the neighbouring particles. The main strength of PSO is the simulated fast convergence compared to many global optimization algorithms like genetic algorithm (GA). Applications of PSO are, function approximation, clustering, optimization of mechanical structures, and solving systems of equations [4] [10].

II. LITERATURE REVIEW

In paper [1], the prediction model of the stock market was developed using data mining and machine learning technology, and it was tried to decide whether to purchase / hold the stock. For the development of predictive models, machine learning techniques such as Naive Bayes, K-nearest neighbour (k-NN), support vector machine (SVM), Artificial neural network (ANN) and random forest are used. The technical indicators are calculate from the prices of stocks on the basis of the data of the timeline and are used as inputs in the Prediction models proposed. Ten years of stock market data have been used for stock signal prediction. Based on set of data, these models are able to generate buy / hold signal for the stock market as an output.

Since the dominant country in society is that wealth brings comfort and luxury, it is difficult to predict the stock index by conventional time series analysis so buy or sell signals can be generated for a particular stock. Artificial neural networks have the ability to extract useful information from large amounts of data. In this paper [2], the author present a review of the literature application of artificial neural networks for stock market forecasts, and from this literature Artificial neural network is very useful for predicting the world's stock markets.

Neural networks and genetic algorithms are currently attracting attention, among other things; from scientists, engineers and statisticians two sophisticated machine learning they have gained popularity in recent years. This paper introduces the present state of the research on the optimization of the neural network by the genetic algorithm search. Optimization aims to depart from the limitations caused by neural networks, to solve complex and difficult problems. Application domains, design problems of neural networks using genetic algorithms, types of neural networks, and genetic algorithms this study is based on the concept of neural networks. Evolutionary neural networks that help to select the appropriate values of the genetic algorithm operators for applications in specific problem areas further research directions, not received much attention from scholars, have been published [3].

For over a decade the swarm intelligence is concerned with designing intelligent systems by taking inspiration from the collective behaviour of social insects. Swarm intelligence is surrounded by a complex problem group with a paradigm algorithm of success. This paper focuses on the procedure of the most successful method of the optimization method, which is guided by the ant colony optimization (ACO) and particle group optimization (PSO). And, the comparative analysis of PSO and ACO for the data clustering was also carried out [4].

In paper [5], the prediction of the future stock closing price of Sensex & NSE using the hybrid ANN model proposed by the functional link fuzzy logic model, a share exchange is found. Sensex & NSE stock exchange's historical raw data are pre-

processed in the (0-1) range. After the input is pre-processed, it is transferred to the function extension function that performs the neural action. The activation function of the neuron has a fuzzy set to indicate the range of the future closing price of the Sensex & NSE stock exchange. The model is trained using previously processed past data, and the prediction rate (performance and error rate) of the hybrid model proposed by the functional link fuzzy logic neural model is calculated in the test stage using the performance index (MAPE&RMSE).

Stock price forecasts have always been the subject of interest for most investors and financial analysts. Nevertheless the best time to buy or sell is left for a very difficult task because investors have many other factors impact on stock price. In this paper, the effect of hybrid market indicators is being investigated for improved stock price prediction. The hybrid market index consists of technical, fundamental, and expert opinion variables as an input to an artificial neural network model. The empirical results obtained using the published stock data of Dell and Nokia from the New York Stock Exchange show that this model is effective for improving the accuracy of the stock price prediction [6].

Stock price prediction is essential for making informed investment decisions, and is attracting increasing attention especially for its practical application. It is very difficult to predict the stock market because it depends on several unknown factors. Conventional predictive models are unable to achieve satisfactory predictive effects in nonlinear systems and non-stationary financial problems on the other hand; data preparation is an important step for complex data analysis and has a significant impact on forecasting success. Here, the author propose a fusion model of prediction in combination with the following the data creation tool as wavelet is a neural network with fuzzy theory. To compare the simulation error of the stock market return between the proposed models, the stock price of Tehran is used as a sample data set. From the experimental results, it was found that the Fusion model achieved better prediction accuracy than either model [7].

The financial system is generally a very complex system. Therefore, it is very difficult to predict its data. For example, predicting the stock market is a difficult task. In this paper, a new prediction method based on a new evolutionary neural network is proposed from the analysis of the mathematical description of the stock market system. This new evolution neural network tradition BP algorithm and new Bionics algorithm, the proposed author of the algorithm combines continuous immunization of ant colonies algorithm. Stock market to verify this new prediction method the data of the Shanghai market in 1996 was used. The results show that our new method is very good in practice [8].

Stock index forecast is a hot issue in the financial sector. The movement of stock indices is non-linear, and many internal and external factors are affected, which makes them a major challenge for researchers trying to predict them. In order to train the data, we selected a radial basis function neural network (RBFNN). And to predict the Shanghai Stock Exchange stock index. An artificial fish group algorithm (AFSA) for optimizing RBF was introduced. In order to improve the prediction efficiency, they optimize the K-Means clustering algorithm by AFSA in the learning process of RBF. In order to verify the usefulness of this algorithm, the prediction results of RBF optimized by AFSA, genetic algorithm (GA) and particle group optimization (PSO) and the prediction results of Arima, BP and support vector machine (SVM) are compared. This experiment shows that the RBF optimized by AFSA is an easy-to-use algorithm with considerable accuracy. Among all the combinations tested in this paper, BIAS6+MA5+ASY4 are an optimal group with minimum error [9].

Optimization is a mathematical technique related to the finding of the maximum or minimum value of a function in several executable areas. There is no business or industry involved in solving optimization problems. A variety of optimization techniques are required to find the best solution. Particle swarm optimization (PSO) is a relatively new, modern and powerful optimization technique that has been empirically shown to perform well on many of these optimization problems. It is widely used to obtain global optimal solutions in complex search spaces. This paper not only provides a review and discussion of the most established results on the PSO algorithm, but also gives an initiative for future work and provides an opportunity for practitioners to share their findings.

The paper is introduced the theoretical approach and detailed description of the PSO algorithm, merit and demerit, effect and selection of various parameters. In addition, the following are discussed: study of boundary condition by invisible wall method, control of convergence behaviour of PSO, discrete value problem, application of multi-objective PSO and PSO. Finally, with the recent progress in the development of the PSO, some improved versions are introduced, and future research subjects are also described [10].

III. PROPOSED APPROACH

A. *Proposed System Overview*

The main goal of the proposed system is to predict the gainer or looser shares. Initially online data about share market is extracted. Pre-processing is done on the extracted data and old dataset of the shares. In pre-processing process, similar attributes are check, in this process we keep the similar attributes and remove all the attributes. Training file is generated from the pre-processing method, the details about the dataset is discussed in the next section. After generating training file classification process is done.

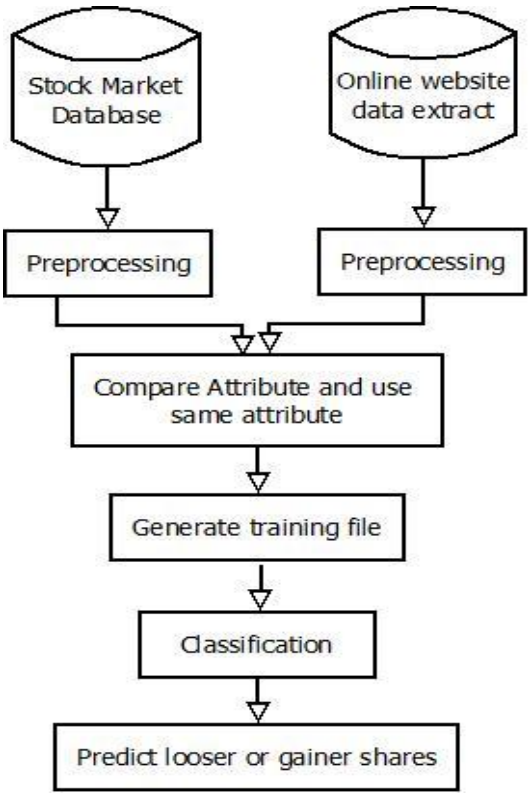


Figure 1.Proposed System Architecture

B. *Algorithm*

1) System algorithm:

Process:
1) Create test file using dataset.
2) Take query as input & creating training file related to query.
3) Pass training & testing file to multilayer perceptron.
4) Matching query on test data & assigning class
5) If query match then
6) class =1(Gainer)
7) else
8) class =0 (Looser)
9) Predict looser share= 1 training file
10) End

2) Artificial Neural Network Algorithm (ANN):

1) for i = 1 to n do
2) Compute the output $o_i = a_i$
3) end for
4) for i with i = n+1 to MNN do
5) Get connections by using individuals $x_{l,i}$
6) Get connections vector z for neuron i from w_i
7) Get synaptic weights s for neuron i from w_i
8) Get the bias b for neuron i from w_i
9) Get the transfer function index t for neuron i from w_i
10) Compute the output of neuron i as $o_i = f_t \sum_{j=1}^{i} s_j . z_j . o_i + b$
11) end for
12) for i = MNN – m to MNN do
13) Compute the ANN output with $y_{i-(MNN-m+1)+1} = o_i$
14) end for

3) Particle Swarm Optimization algorithm (PSO):

Input: Randomly initialized position and velocity of the
Particles: Xi (0) and Vi (0)
Output: Position of the approximate global optima X
1) while terminating condition is not reached do
2) for i = 1 to number of particles do
3) Evaluate the ¯ tness: =f (Xi (t));
4) Update P (t)and g(t);
5) Adapt velocity of the particle using Equation 2;
6) Update the position of the particle;
7) end for
8) end while

C. Dataset used

In this system we used stock market dataset and online web stock dataset, after the preprocessing process the training file is generated, the attributes of the training files are:

1. Previousclose
2. Open
3. Currentclose
4. High
5. Low
6. Change

And the classes are:

1. Gainer
2. Looser

Total records are: 250

IV. CONCLUSION

In this paper, proposed the method which predict the gainer/looser shares. We propose a combination of Artificial Neural Network (ANN) and Fuzzy Neural Network (FNN) algorithm for implementing the prediction models. The Swarm intelligent technique, Particle Swarm Optimization algorithm (PSO) is also used to develop a forecasting model for predication

of stock market. We use stock market dataset and online website data as an input dataset. For the classification, Multilayer Perception algorithm is used for classification process. Finally system will predict the looser or gainer shares.

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An Investigation Into The Use Of Neural Networks for The Predication of The Indian Stock Exchange

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***Abstract*—**

In case of a stock market the shares are issued and traded through exchanges by taking the help of various indices. Stock market constitute an invaluable asset for the economy of any nation. For the long term investors it acts as a door to purchase business which is expected to do well in the near future. As far as the short term investors (traders) are concerned they get a quick profit out of the trading in the stock. As more and more money is being invested, the investors get anxious of the future trends of the stock prices in the market. But the stock price data are very chaotic, nonlinear, and non-seasonal as well as very volatile in nature and political events, internal developments, inflation and exchange rates as well as world events are some of the factors that are responsible for its non-stationary nature. Therefore it has always been remained as a challenge for the common investors, stock buyers/sellers, policy makers, market researchers and capital market role players to gain knowledge about the daily stock market price values. There are many techniques available to predict the stock prices namely fundamental analysis, technical analysis, statistical techniques. However these techniques fail to draw out the hidden non-linear pattern of the stock market data. On the other hand neural networks have been found to be successful in discovering the non-linear pattern inside the data and to adopt accordingly. The aim of this paper is to investigate the use of artificial Neural network (ANN) methodologies for the predication of the Indian stock exchange.

***Keywords*— *Artificial neural network; stock market prediction; Indian stock market; stock index*.**

I. INTRODUCTION

Stock markets are hard to predict. Driven by supply and demand, macroeconomic changes such as inflation or political instability can affect whole markets, while local events like company financial announcements or product releases impact individual stocks.[1] Traders also look for signals in the price development that may indicate future prices. Because some trading is based on these indicators, price movement by itself can also trigger trading activity, causing further price adjustments. Investors and traders should ideally consider all these factors when evaluating a stock, however market participants are often partitioned into two groups: Traders that make decisions based on news, facts and numbers are known as fundamental analysts, while those who look for signals in price history are using technical analysis. Technical analysis on the other hand, uses only the trading history of a given stock, otherwise known as a time series. In statistics, time series prediction is a well-known problem, accompanied by numerous mathematical models[2]. As a result of an increased interest surrounding machine learning however, other kinds of models have also been applied in the context of technical analysis. Early attempts include, and more recently.

From a research point of view, predicting stock prices in this manner is still a relatively new concept, and recent advances in machine learning leave much to be explored When studying financial markets the main issue is of course predicting price movements, but these are very noisy systems, being influenced by economical and political factors such as companies' earnings, political issues, news or natural disasters.[3] As such they are extremely hard to predict, nonetheless investors widely use market analysis techniques to study and forecast market movements. These methods are technical analysis which studies the price and volume of the assets, using past information to predict the future behaviour, and fundamental analysis that deals with various economic and politic factors, looking down from the global economy all the way to the company itself. Time-series forecasting is a special type of classification on which we concentrate. Specifically, for any financial time series related to the performance of an individual stock, the goal is to predict the value of the time series k steps into the future[4].

Therefore, stock market prediction is the act of trying to determine the future value of a company stock or other financial instrument traded on a financial exchange. In the literature study, the different techniques were proposed like SVM, ARIMA, GA, NN, Association Rule mining & different machine learning technique for prediction of stock market. Among these techniques, there are some hybrid mehods which are combination of the features of GA & NN for stock price prediction[5-7].

This Paper shows the review study of Neural Network to predict the future behaviour of stocks which are listed in Indian

stock exchange. The reminder of this paper is as follows : The Indian stock exchange is describe in section II. Section III provides the details information about the artificial Neural Network. The next section provides the Literature survey on different methods and applications of ANN with details of predication of stock prices. Last section that is section V concludes the paper with future scope.

II. INDIAN STOCK EXCHANGE

A. FINANCIAL FORECASTING

A financial forecast is a fiscal management tool that presents estimated information based on past, current, and projected financial conditions. This will help identify future revenue and expenditure trends that may have an immediate or long-term influence on government policies, strategic goals, or community services[11]. The three basic forecasts used by financial managers are qualitative, or judgmental forecast, the time series forecast and casual forecast.

B. JUDGMENTAL FORECASTING

Although last decade has witnessed much growth in mathematical and statistical forecasting. Forecasting does not have quantitative. Many successful organizations make decisions based on forecast derived mostly from judgment and experience. Mathematical and statistical only supplement sound business judgment.

C. TIME SERIES FORECAST

A time series is tracking of particular variable over time. It assumes that basic forces underlying a time series (economical, political,or behavioral) are stable. Analyzing the pattern of a time series in the past makes it possible to create the model that will predicate its future movement[14]. Time series particularly useful in the studying variable that have predicable, recurring patterns, such as seasonal swings.

D. CASUAL FORECAST

In time series analysis, the financial analyst does not explicitly identifies the factors that casus the movement of particular financial variable over time. When the analyst, using judgment and experience, sees the changes in the time series that are caused by the one or more variables , then additional avenue of forecasting is open which is called casual forecast.

E. INDIAN STOCK EXCHANGE

Indian Stock Market is one of the oldest Stock Market in Asia. Bombay stock exchange (BSE) and National stock exchange (NSE) are associated with Indian stock exchange. The National Stock Exchange of India Limited (NSE) is located in Mumbai. NSE was established in 1992 as the first demutualized electronic exchange in the country. NSE was the first exchange in the country to provide a modern, fully automated screen-based electronic trading system which offered easy trading facility to the investors spread across the length and breadth of the country. NSE has a market capitalization of more than US$1.65 trillion, making it the world’s 12th-largest stock exchange as of 23 January 2015. NSE's flagship index, the CNX Nifty, The 50 stock index, is used extensively by investors in India and around the world as a barometer of the Indian capital markets.

The financial market crisis has led to the collapse of major financial institutions. Nevertheless, crashes and/or crises are not devoted to only developed markets and developing countries including India, are not excluded from this rule and it may face such a condition. The sharp decline of Sensex price index from its closing peak of 20 873 on January 8, 2008, to less than 10 000 by October 17, 2008, in line with similar large declines in other major stock markets. similar to Sensex During 2008-12, CNX Nifty 50 Index share of NSE market capitalization fell from 65% to 29% due to the rise of sectoral indices like CNX Bank, CNX IT, CNX Mid Cap, etc. Volatility as a measure of risk plays an important role in many financial decisions in such a situations. FOREIGN DIRECT INVESTMENT (FDI) also plays an important role in the volatility of stock market.

Therefore it has always been remained as a challenge for the common investors, stock buyers/sellers, policy makers, market researchers and capital market role players to gain knowledge about the daily stock market price values.

III. ARTIFICIAL NEURAL NETWORK

An Artificial Neural Network (ANN), often just called a neural network, is a set of interconnected links that have weights associated with them. The concept of ANN was derived from biological neural networks. Neural networks open up a new foray into the field of making efficient and usable predictions in order to optimize profits. Artificial Neural Networks are being used in numerous areas, as it is an irrefutably effective tool that aids the scientific community in forecasting about probable outcomes[16,19]. Any ANN can be thought of as a set of interconnected units broadly categorized into three layers. These three layers are the input layer, the hidden layer and the output layer. Inputs are fed into the input layer, and its weighted outputs are passed onto the hidden layer.

The neurons in the hidden layer (hidden neurons) are essentially concealed from view. Using additional levels of hidden neurons provides increased flexibility and more accurate processing[21]. However, the flexibility comes at the cost of

extra complexity in the training algorithm. Having more hidden neurons than necessary is wasteful, as a less number of neurons would serve our purpose just fine.

On the other hand, having less hidden neurons than required would cause reduced robustness of the system, and defeat its very purpose. An illustration of a neural network is shown in Figure

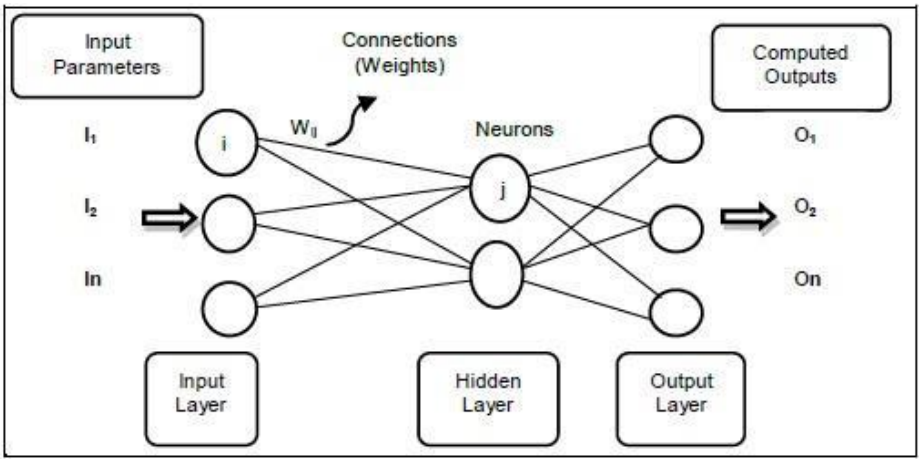


Figure 1: ANN Architecture

A. MLP Neural Network

Multi Layer perceptron (MLP) is a feedforward neural network with one or more layers between input and output layer. MLP maps sets of input data onto a set of appropriate outputs. Feedforward means that data flows in one direction from input to output layer (forward). An MLP consists of multiple layers of nodes in a directed graph, with each layer fully connected to the next one. Except for the input nodes, each node is a neuron (or processing element) with a nonlinear activation function[22]. This type of network is trained with the backpropagation learning algorithm. MLPs are widely used for pattern classification, recognition, prediction and approximation. Multi Layer Perceptron can solve problems which are not linearly separable. MLPs separate classes via Hyperplanes. MLPs use distributed learning. MLPs have one or more hidden layers.

B. Basic Steps to ANN Implementation

Steps are provided by researchers to assist and to guide others to conduct experiment in ANN forecasting. The first step is the data preparation where the output and the results are validated[24]. There are two common guidelines that can be used as reference to conduct experiment in ANN forecasting. These steps was proposed by William Remus and Marcus O'connor in. The steps are as follow:

I. Clean the data prior to estimating the NN model.

II. Scale and de-seasonalize data prior to estimating the model. Scaling is used to normalize the raw data used as input for the ANN. De-seasonalizing data is to remove the seasonal component in the time series for analyzing non-seasonal trends in the data.

III. Use appropriate methods to choose the right starting point.

IV. Use specialized methods to avoid local optima.

V. Expand the network until there is no significant improvement in fit.

VI. Use pruning techniques when estimating NNs and use holdout samples when evaluating NNs.

VII. Take care to obtain software that has in-built features to avoid NN disadvantages.

VIII. Build plausible NNs to gain model acceptance by reducing their size.

IX. Use more approaches to ensure that the NN model is

C. Bio-Inspired Algorithm & ANN

Bio-inspired algorithm has shown tremendous success in the field of AI. Many researchers have shown that applying bio-inspired algorithm has greatly improved the research domain result. These algorithms include ANNs, evolutionary

computation, swarm intelligence, artificial immune systems, and fuzzy systems[25]. ANN is a form of bio-inspired algorithm which is model based on the central nervous systems of the brain.

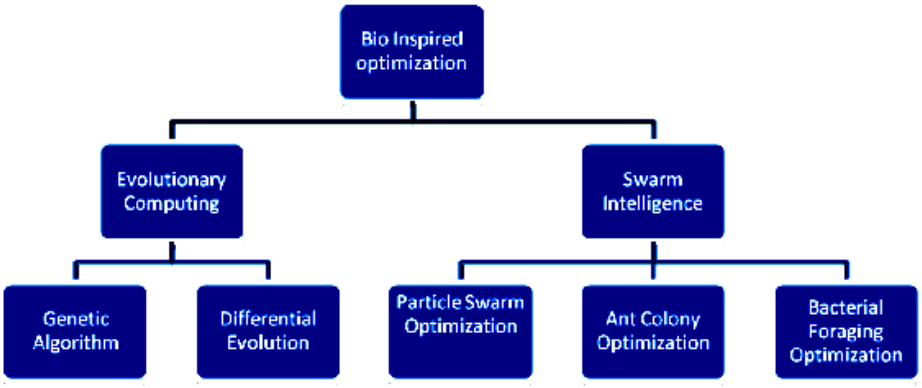


Fig 2: Classification of bio-inspired computing techniques

D. ARTIFICIAL NEURON MODEL

An artificial neuron is a model of a biological neuron. Fig.3 shows a biological neuron. The artificial neuron receives signals/input from other neurons or the environment. This signal will be fired on certain condition, thus, transmitting the signal to all other connected artificial neurons. Fig.1 is a representation of an artificial neuron. A numerical positive and negative are associated with each neurons to either inhibit or excite the input with each connection to the artificial neuron. An activation function is used to control the firing of an artificial neuron. The artificial neuron collects the incoming signals by computing its net input signal as a function with the associated weights. These net input signals then serves as input to the activation function which calculates the output signal of the artificial neuron(s).

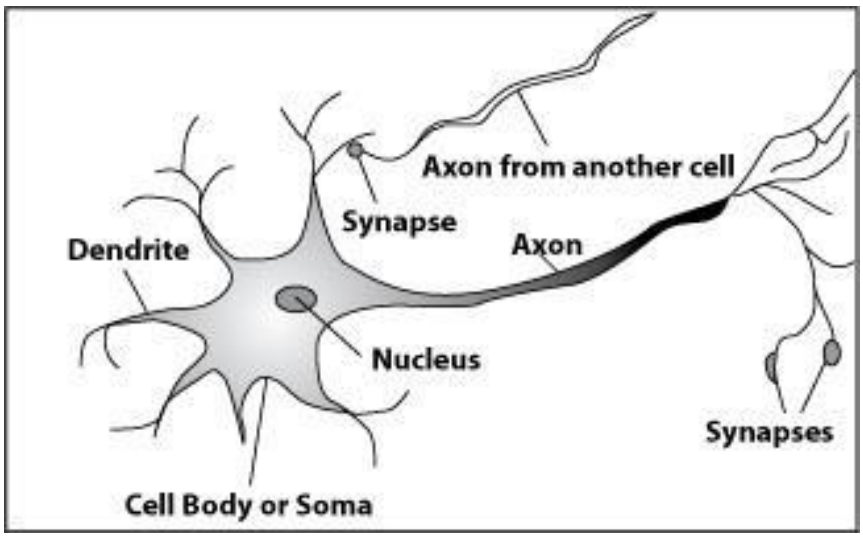


Figure 3. Biological Neurons

Several ANN architectures have been developed such as feedforward NN, recurrent NN, and spiking NN. In addition, there are also different types of NNs such as single-layer NN, Multi-Layer Perceptron (MLP), temporal NNs, radial basis function NN, self-organizing NNs and others.A wide range of applications and researches have been tested and applied with NNs, including diagnosis of diseases, speech recognition, data mining ,image processing, forecasting, robot control and many others.

IV. LITERATURE REVIEW

Although, the origins of neural network models dated back to McCulloch and Pitts's study in 1943, the first significant study on the application of the neural network models for stock market applications was White's study in 1988. This study was questioning the validity of the efficient market hypothesis by examining the forecasting accuracy of the neural network models on IBM stock's daily returns. Following the White's study, many other studies were conducted in order to examine the forecasting effectiveness of the neural network models in international stock markets.

While some studies were concentrated on measuring forecasting performance of neural network models based on several statistical and financial performance measures, there were some other studies, which compared the forecasting performances of neural network models with other statistical forecasting methods[26]. The literature, which compared the forecasting performances of the neural network models and benchmark models, presented mixed evidence on the superiority of one model over the others. The superiority of neural network models over other models in terms of different performance measures was reported in some studies. However, some other studies argued that the forecast performance of neural network models were subject to change over time, and the neural network models were superior to regression only in highly volatile market conditions, and superiority of the neural network models over other models was not significant . Moreover, Desai and Bharati[27] documented that GARCH was conditionally efficient than neural network models. Kanas reported that Markov regime switching models and NN presented similar results in terms of forecast accuracy but Markov regime switching model was better in terms of forecast encompassing tests Besides the studies, which examined only the neural network models' forecasting performance, there were some other studies that compared forecasting performances of the neural network models with other statistical forecasting techniques.

All of these studies utilized the linear regression model as a benchmark model. Among this type of studies, Altay and Satman compared the forecast performances of neural network models with the linear regression for ISE-30 and ISE-All indexes. The forecasting performance of the backpropagation neural network model with different architectures investigated for daily, weekly and monthly data. The findings of the study showed that the forecasting performance of neural network models on the basis of statistical performance measures for daily and monthly data were failed to outperform the liner regression model, however the neural network models were able to predict the direction of the indexes more accurately. Moreover, when the returns calculated from a hypothetical portfolio, neural network models were able to beat the linear regression and buy-and-hold strategy[31,32].

Stock price forecasting is an important task for investment and financial decision making. Researches and practitioners have given it considerable amount of attention. Stock market is most volatile and highly risky investment. Many approaches have been used for forecasting stock price such as traditional and fundamental methods. Forecasting stock price or financial markets has been one of the biggest challenges to the AI community. Following section shows the techniques used by researchers and input features used by them for prediction.

Methods for predicting stock markets can be categorized into four groups, namely fundamental analysis, technical analysis, time series analysis and machine learning. Economists may use fundamental and technical analyses. Fundamental analysis involves using leading economic indicators such as the gross domestic product (GDP), consumer price index, interest rates and exchange rates ("The Stock Exchange of Thailand", 2007). However, each of these economists may interpret the significance of information quite differently.

Technical analysis involves plotting past data to identify trends and recurring patterns of stock prices to assist with future predictions. The data used are generally past open, closed, highest, and lowest prices and trading volume Technical analysts basically use trading rules such as single moving trend, composite moving trend, and channel breakout (Deboeck). The channel breakout can be used as a guide for buying or selling. By using a price channel composing of a price line, a high price line and a low price line, the channel breakout occurs when the price line crosses the high or low price lines ("Price channels"). However, the outcomes from technical analyses may not be robust as their statistical validity has not been confirmed (Yao et al.) [6-9].

In addition, this approach may also be seen to be subjective as charts can be interpreted differently Owing to an ability to learn non-linear mappings between inputs and outputs, artificial neural networks (NNs) are one of the more popular machine learning methods used for predicting stock market prices (Egeli, Ozturan & Badur) [11]. Other techniques employed in predicting stock markets include fuzzy logic (Hiemstra), genetic algorithms (Lin, Cao, Wang, & Zhang,) [13] and Markov models (Hassan & Nath). Normally, a training set consisting of different types of historical data is used to obtain a predictive model which is then used for future prediction.

Many researchers have also conducted experiment to compare ANN with linear model in predicting the stock market price. [29] carried out a comparison study on the volatility of the BSE Sensex 30 and NSE Nifty 50 using statistical models such as

GARCH, EGARCH, GJR GARCH, IGARCH with MLP models. Generalized autoregressive conditional heteroskedasticity (GARCH) developed by Bollerslev [30] is an extended version of AutoRegressive Conditional Heteroskedasticity (ARCH) developed by Engle [31].

ARCH is an econometric approach to analyse volatility of time series in financial markets, GARCH is developed to overcome the limitation of ARCH in violation of non-negativity constraints by using specific conditional variances. Exponential GARCH (EGARCH) is another extension of GARCH framework to model volatility under the conditions of asymmetric reaction of the investors / leverage effect proposed by Nelso [32]. Integrated Generalized Autoregressive Conditional Heteroskedasticity (IGARCH) is 2013 IEEE International Conference on Control System, Computing and Engineering, 29 Nov. - 1 Dec. 2013, Penang, Malaysia 479 another extension of the restricted version of the GARCH model, where the persistent parameters sum up to one, and therefore there is a unit root in the GARCH process. Glosten- Jagannathan-Runkle GARCH (GJR–GARCH) model is another extension of GARCH model which takes additional term added to account for possible asymmetries [13]

In order to improve the result further, some researchers used the hybrid backpropagation approaches such as in [23]. They applied Levenberg-Marquardt backpropagation algorithm in a three layered feedforward NN to predict the index of Shanghai stock exchange. The paper showed that the Levenberg-Marquardt backpropagation NN performed better in stock data prediction. Some researchers went on to apply evolutionary computation with backpropagation. [24] compared the backpropagation NN and genetic based backpropagation NN to predict the stock price of the day. Genetic Algorithm based backpropagation NN predicted more accurate price than the backpropagation NN.

The data set used in the experiment is the Maruti stock from Jan 2004 to Dec 2006 for training and 2nd Jan 2007 to 30th Mar 2007 for testing. They stated that the accuracy achieved by Genetic Algorithm's based backpropagation NN system was 98.31% while conventional backpropagation NN only achieved an accuracy of 93.22%. Yet, there are also other algorithms that generated interesting result such as in [25]. The authors showed the performance comparison between MLP feedforward with backpropagation and Group Method of Data Handling (GDMH) with Genetic Algorithm in predicting the stock price index in Tehran Stock Exchange (TEPIX) using the moving average crossover. The result showed that GDMH with Genetic Algorithm performed better than MLFF with backpropagation NN.

Vaisla and Bhatt (2010) identified that neural network would perform well in statistical technique to forecast the prices in the stock market [24]. They have indicated that the proposed method would be used for forecasting the daily price for stock using neural network and outcome of neural network prediction is compared with the outcome of statistical forecasting [25]. They have indicated that when neural network is trained with enough data, proper architecture and proper inputs could predict the prices in the stock market. Even though statistical technique is well built their potential in predicting is minimized as the series become complicated. Neural network could be used as an alternative technique to forecast the daily prices in the stock market [11].

Tiwari and Gulati(2011) carried out an investigation to predict the stock market from stream data time series pattern using decision tree and neural network. Unlike the time-series patter mining could give reasonable prediction for the next phase of trends in the stock price and the accuracy of the outcomes maximizes while the correlation maximizes, since the stock analyzing system subject is subjective investors [14]. The proposed study uses the integration of neural network and decision tree to predict the following day's stock market. Neural network and decision tree for classification have equivalent and similar property. Thus a decision tree could be used for providing a systematic neural network design method.

Preethi and Santhi (2012) carried out a survey to analyze the techniques in the stock market forecasting. This study examined the data mining, neural network, Markov model and Neuro-fuzzy system in predicting the stock market [16]. The Markov model and neural network has potential to extract useful data from the set of databases. They play a vital role in predicting the stock market. Such approaches are used for controlling, monitoring the whole fluctuation and price behavior in the stock market. This paper proposed a forecasting method for providing better results with more accuracy than conventional method.

Wilton et al (2008) proposed computation neural network for predicting the global stock indexes. Two learning algorithms encompassing neural network SBP (standard back propagation) and linear regression were tested and compared. Findings of the study indicate that a model of neural network with enhanced learning technique is a prominent methodology for predicting the stock market indexes [17]. It was noted that the model of neural network achieves close prediction regarding MAC and RMSE metrics.

II. V. CONCLUSION & FUTURE SCOPE

The Stock Market is affected by many complex events such as business cycles, monetary policies, interest rates and political situations. Volatility in stock prices plays an important role in many financial decisions, Many investor not only from rural area but also metro cities lost money due to lack of knowledge and awareness. On the other hand Foreign Direct Investor (FDI) making profit from the stock market. Due to volatility and non-stationary characteristics involved in the stock market data, it is difficult to build an accurate forecasting model but even then different financial forecasting methods have been proposed in the literature, each of which has its own merits and limitations

This paper provides a review on the application of ANN in Indian stock market prediction. The Indian Stock exchange is the world's 12th-largest stock exchange having high volatility. Although NN has shown acceptable results, many researchers are still trying to improve the accuracy of the stock market prediction by using a hybrid method, and by taking into account more external factors in order to generate more accurate prediction. This paper can be used as an introductory material to those who are interested to work on Indian stock market prediction using Artificial neural Network (ANN).

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Research on Data Recovery using Cloud Mirroring Technique with Load Balancing

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Abstract **:** Data storage is primary concern. The data is get stored on user's system and there are many more chances that data could get overwrite due to data's load. That's why we have to balance the loads .RAM may exceed the memory or hard disk can get corrupted , balancing the loads the data have to get stored on clouds. And due to corruption data may get lost so we have to recover the data by cloud mirroring.

IndexTerms **– Cloud computing ,Storage , data , loss , monitoring , backup , load balancing , recovery**.

I. INTRODUCTION

A Load balancing is the process of improving the performance at different servers. It can also generally be described as anything from among processors, or a system that divides many client requests among several servers. The growth in the popularity of the web in particular has increased the requirement for load balancing in managing different servers at different systems. The increase of online websites and online business. As a result of the popularity of the web, providers of web sites want to ensure the availability of access to information for their users and the guarantee that requests are processed as quickly as possible.

Cloud Mirroring: The main aim of clued mirroring is to stored data in backup. Taking backup is much more to user so that user could get the data whenever user required. Cloud mirroring is done after the monitoring of load. In mirroring one fundamental is get used this is known as "Main Server". Initially data is get stored in main from main it will further get for "Mirroring Server".

II. MONITOING THE LOAD

For monitoring load the threshold value has been assigned(Say 80%),along with this threshold value load on system will get managed."Load Balancing algorithm" plays an important role in monitoring. The general growth of monitoring the data is has been as online business and e-commerce websites . As a result of the popularity of the web, providers of web sites want to ensure the availability of access to information for their users and the guarantee that requests are processed as quickly as possible.

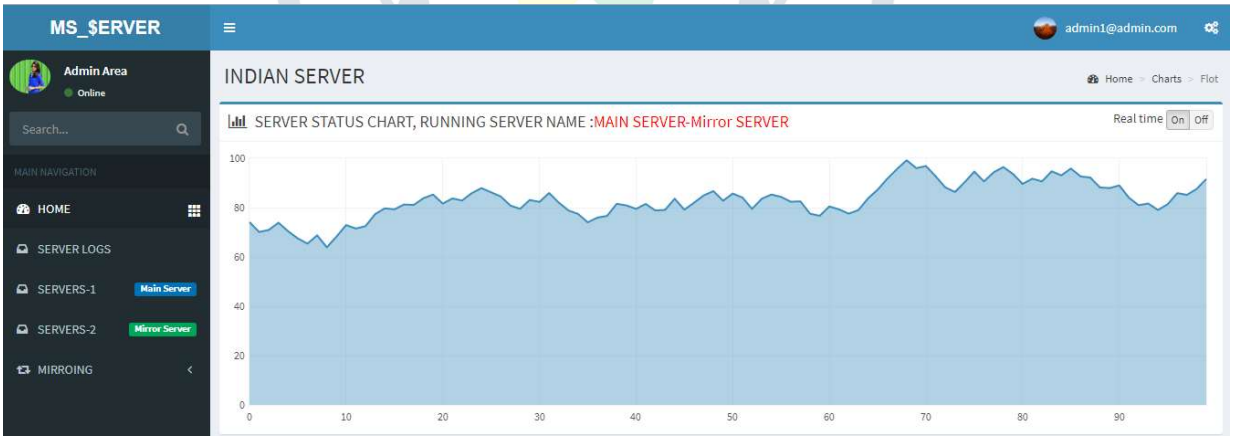


Figure 1 : Threshold

Suppose if load crosses 80% then the will start storing on the cloud which are created to balance the system's loads. There are two servers are given shown as follows:

1.Main server-which is also known as local server.

2.Mirror server-which is also known as cloud server.

Main server will access current data base by default. There are situations where main server. Main server can failed manually or disastrously. It considerably if one server is failed then another will work automatically.

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Survey on Data Recovery Techniques such as HS-DRT, Parity Cloud Service and Mirroring Technique for Lost Data in Cloud Computing

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Keywords: Cloudcomputing ,Storage , data , loss , encryption , backup , key , distributed.

ABSTRACT

Storing the data on the cloud is one of the methods for the computation and data saving. Data has been saved by clients to the one or multiple servers via web. While saving those data over the servers or clouds there are many chances that data could get deleted or get lost. If the data is corrupted. There are many more disastrous or manmade chances for data corruption. Some of these corruptions are able to get recovered but some can't get recovered. So for theses reason there should be have some backup of lost data for clients whenever the client requires. The recovery of the data is main aim to get backup of lost data.

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ABSTRACT

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Modeling & Simulation of Proposed 25 KW Solar PV Power Plant for SSGMCE, Shegaon

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Abstract— This paper represents the Modeling and simulation of 100 kW Grid connected Solar PV Power Plant (Installed in SSGMCE Shegaon Campus) on MATLAB. Solar energy is one of the renewable energy which is available in abundant form. Hence it is necessary to utilize solar energy in a proper manner to get the maximum output of it. It is necessary to use more renewable sources to fulfill increasing load demand. Due to change in environmental parameters, PV array gets influenced and conversion efficiency becomes low. So maximum power tracking known as MPPT technique is used. MPPT detect peak power in order to increase energy production. In this paper, the development of PV array model, their synchronization with grid and SIMULINK-MATLAB implement is described. This system consists of the Solar PV array, IGBT inverter, grid connection. Performance of the power plant is also described.

Keywords: MATLAB Simulation, Solar PV Power Plant, MPPT Technique

I. INTRODUCTION

Energy plays a pivotal role in our daily activities. The degree of development of a country is measured by the amount of utilization of energy by human beings. Energy demand is increasing day by day due to increase in population, urbanization and industrialization. The world's fossil fuel supply will be depleted in a few hundred years. The rate of energy consumption increasing day by day, supply is depleting resulting in an energy crisis. This is called an energy crisis. Hence alternative or renewable sources of energy have to be developed to meet future energy requirements.

A PV system depends on a highly transient energy source & which influence short term and strong variations in output. A storage system is required to store generated energy. Storage batteries are available to store generated energy. This battery storage system has a disadvantage that they lose 1 to 5 percent of energy per hour. This disadvantage of the battery can be overcome by connecting the Solar PV Power Plant to the grid. This is done with the three-phase inverter and synchronizing output of inverter with the grid. Thus, the best way to utilize maximum generated power is the connection of the system with the grid. A various modeling study of PV power system has been conducted to develop a grid-connected solar power plant model using MATLAB.[1]-[3].

Solar energy is one of renewable energy source which is most important. Due to tremendous progress in science and technology our day to day life became more comfortable, easy as well developed, with the increase in development our energy demand also increased; since most of our energy need in day to day life fulfilled by fossil fuel and another conventional source of energy, excess use of this conventional sources arose series questions of environmental pollution, fossil fuel declination and much other serious concern. So to avoid this all ill impact of conventional energy sources, it became an immense necessity of today's era to shift towards clean, green& renewable form of energy.

Location of India is on the equatorial sun belt of earth. Due to which abundant radiant energy from the sun falls in India. In India, solar radiation and daily sunshine hours are measured by India Meteorological Department (IMD) having a nationwide network of radiation stations. 250-300 days of a year clear sunny weather is experienced in India. The annual global radiation is 1600 - 2200 kWh/ sq. m. which is as good enough as in the tropical and subtropical regions. About 6,000 million GWh of solar irradiance is received in India per year. Government of India is trying to improve the share of energy generation from solar energy and launched Jawaharlal Nehru Solar Mission. Under the First Phase of Jawaharlal Nehru National Solar Mission (JNNSM) to be implemented between 1st April 2010 and 31st March 2013 MW capacity equivalent off-grid solar PV systems and 7 million square meters solar thermal collector area to be installed in the country.[3]-[4].

II. OVERVIEW OF GRID CONNECTED SYSTEM

Grid-connected solar systems are the most common and widely used. These systems do not need batteries for storage purpose and they use common solar inverters and are connected to the utility grid. Any excess solar power that you generate is exported to the electricity grid and we usually get paid credit for the energy we export. Unlike hybrid systems, on-grid solar systems are shut down during a blackout due to safety reasons. Due to Electrical system damage blackouts usually occurs. If the damaged grid is feeded with solar inverter would risk the safety of the people repairing the faults in the network. The hybrid solar system consists of both storage batteries and grid connection system. During the blackout the hybrid system is able to isolate solar power plant from the grid and supply through batteries.

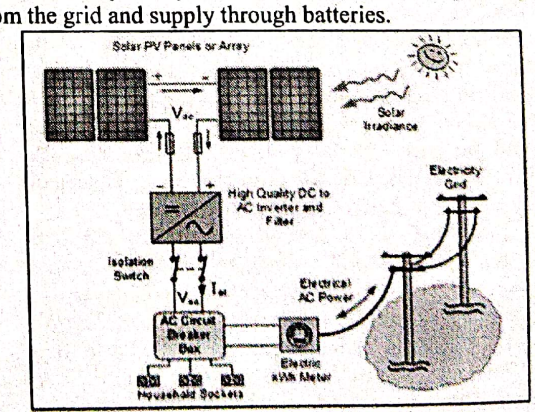


Fig. 1: Block diagram of proposed system

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The filtered waveform is shown in Fig.7. shows voltage and current waveform at bus B1.

For the implementation of a grid-connected solar power plant, it is important to create a grid as available in SSGMCE campus. MSEB provided three phases 11 kV HT line to SSGMCE campus with sanctioned load of 500 KW. Hence in MATLAB simulation a three-phase source with specification 11 kV,630 KVA, 50 Hz is connected. KVA rating of source is chosen 630 KVA such that Step down transformer available in Campus is of 630 KVA rating.

HT supply is stepped down through Three phases 50 Hz, 630 KVA, 11KV/415V Transformer. Secondary of transformer is synchronized with solar power plant as well as all load of SSGMCE campus connected at this terminal through an available bus in a powerhouse.

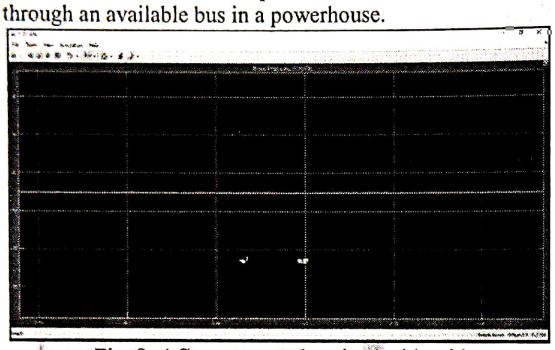


Fig. 8: AC power synchronized with grid

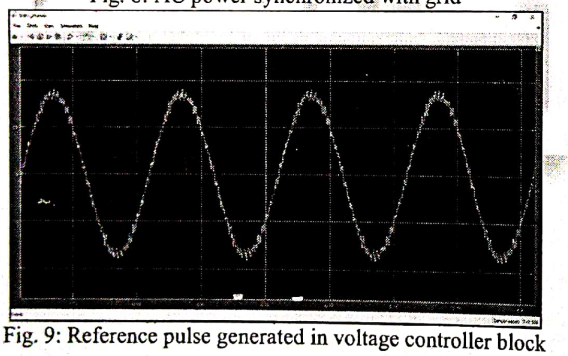


Fig. 9: Reference pulse generated in voltage controller block

V. Conclusion

This paper proposes modeling and simulation of 25 kW PV solar power plant based on the MPPT technique. MATLAB-SIMULINK R17a is used for the simulation of the proposed system. Simulating 25 kW model simply give us an idea about import and export of power from the solar power plant to the grid and to the system from the grid. Also, the simulation shows synchronization of the solar power plant power with the grid with the help of a voltage controller block. Various graphical results are obtained to understand the nature of voltage, current, the power generated.

Installation of 25 kW grid-connected PV solar power plant in SSGMCE Shegaon campus reduces consumption of energy from a utility grid. Whenever load connected in the campus is greater than the generation capacity of solar power plant then the excess amount of energy is absorbed through the utility grid. In another case when load connected is less than the generated capacity of solar power plant then the excess amount of energy generated will be supplied to the utility grid. This system helps in reduction of the energy crisis. Installation of 25 KW in SSGMCE Shegaon college campus helps to reduce energy crisis inside college campus but also helps in the reduction of pollution.

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Discrimination of Power Quality Events using Power Modal Signal

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Abstract-Power utility companies strive to provide their ustomers anuninterrupted power supply with sinusoidal oltage of constant magnitude. However, achieving this bjective has become an uphill task as number and size of on-linear and poor power factor loads like adjustable speed-rives, computer power supplies, furnaces and traction drives re increasing apace. At the same time deregulation in power ıdustry has fuelled the demand for high quality power. So, ıe frequent Power Quality disturbances must be detected in rder to carry out the mitigation action. The purpose of this ork is to propose the signal processing based approach to lassify the Power Quality events. Sliding window technique used here to calculate the RMS value of voltage sag, voltage well and voltage interruption. Power modal signal is enerated for the classification of power quality event by sing statistical parameters such as kurtosis, maximum, andard deviation and variance.

Keywords: Power Quality Events, Sliding Window echnique, RMS, Standard Deviation.

I Introduction

Quality of power is nothing but the interaction of electrical ower with electrical equipment(Electrical power can be assified as of good quality when an equipment operates rrectly and reliably without getting damaged. Whereas if the uipment malfunctions or get damaged the during the normal e the power supply is said to be poor. In the developmental ase of the electrical power system the main concern of the ectrical engineers was to keep the lights on. Engineers signed the power systems to deal with the power outages. ey strived the prevent the frequency deviation from 50Hz ter outages[12]. The main concern of the consumers until 60s was continuity of the supply or the reliability of the pply. However, consumers these days ask not only for the liability but also the quality of the power supply[13]. oltage sags has been the main topic of concern relating to the wer quality among the suppliers, customers and the anufacturers.With rise in use of the highly sophisticated ectronics and microelectronic processors in variety of uipments like computer terminals, programmable logic ntrollers and diagnostic systems the demand for the quality power has been steadily increasing [4].Of late, most of the modern loads whether on industrial

or domestic scale are inverter based such as adjustable-speed drives (ASDs), air conditioner, voltage controlled power supplies etc. Owing to the usage of sensitive load, the efficiency, energy saving, and high controllability can be increased. The increment can cause the electrical disturbances. The missing voltage technique can be used to evaluate the voltage disturbance by comparing the RMS and voltage missing voltage algorithm. The statistical approach is used in [3] for Fast Online Detection of Fault-Induces Voltage Dips. In Voltage sag detection- A survey''[4]many methods have been introduced to measure and voltage sags. Among these are RMS Value

The increment can cause the electric power disturbances . The disturbances can stimulate the sensitive equipment damage and are costly to repair. The cost of repair causes severe financial losses.The voltage sag is the most frequently occurring power quality disturbance as compared to the voltage swell. Voltage sags account for the highest percentage of equipment interruptions, i.e. 31%. Voltage sags are also major power quality problem that contributes to nuisance tripping and malfunction of sensitive equipment in industrial processes.The impact of voltage disturbances on sensitive equipment has called for focus on detection of them [8]. While detecting the sag and swell the important parameter is its detection time. While in quantification of voltage sag and swell, the most important parameters are magnitude and duration.Much of the research in recent years has focused to improve the power quality. By using sliding window algorithm for the detection of sag and swell, andby measuring updated RMS voltage, every sample is developed[1].Evaluation, Peak Value Evaluation, Missing Voltage technique and Hysteresis Voltage Control technique. In this paper we have proposed the signal processing based approach for classification of Power Quality events. A Sliding Window algorithm is proposed to calculate RMS ofthe signal and statistical parameters are used to classify the power quality events. The paper is organized as follows:The PQ disturbances are in section II. The Sliding Window Technique algorithm in section III. The experimental setup is presented in section IV and section V contains the resultand discussion of PQ investigations. Finally, some conclusions are summarized in section VI.

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Fig 8 shows the combined voltage RMS signal for all types of disturbances which we have taken i.e. voltage swell, voltage sag and voltage interruption.

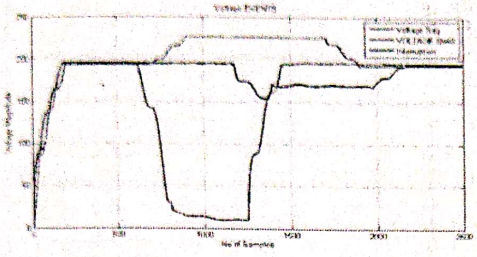


Fig.8: Voltage RMS signal of voltage sag, swell and interruption event

Table 2: Classification of Power Quality Events by Variance

Reading Number	Power Quality Events		
	Voltage Sag	Voltage Swell	Interruption
1	176.6612	286.504	1061.706
2	163.6764	301.1025	904.3593
3	163.413	284.7717	1312.464
4	169.7145	269.943	1141.738
5	169.7145	273.38	1191.57
6	158.3021	260.6999	1392.276
7	126.6064	266.4621	1089.931
8	155.7264	286.186	1218.549
9	154.3937	253.3378	1054.746

VII Conclusion

In this paper, the successful classification of power quality events such as voltage sag, voltage swell and voltage interruption through Sliding Window Technique is carried out for calculating RMS and generating the power modal signal. It observed that, the event can be classified at exact point on wave occurrence of it. The statistical parameters are calculated for the classification of Power quality events. The Variance is the only one successful parameter from four statistical parameter used to classify the power quality events and other parameters are not that much suitable to classify the power quality events.This method is very simple, easy to implement and faster, which requires only three samples for detection. The strength of algorithm is that it works on experimental setup data which consist of more noise and not as ideal as Simulink block model.

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Monitoring of Solar Power Plant and Load Control

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ABSTRACT: The solar energy is lots available in world so we will utilize this for solar power generating purpose. The currently used energy sources are not renewable. In this project renewable energy sources used because they cannot damage natural surroundings, renewable and free of cost. If these natural resources is solar power and there are several ways to use it. The work of remote data monitoring is highly useful, thereby decreasing the manual work and the errors in ling. In this system we used Ethernet module as trans receiving system.

The objective of this work is to develop a power management system for optimum utilization of generated power from Solar PV power plants. So this increase efficiency of solar power plant as well as monitoring the system. The features of the proposed scheme are automatic load switching, advanced remote metering & control, and priority based switching.

KEYWORDS: *Renewable energy, IoT, Cloud, monitoring, load control, solar power optimization.*

I. INTRODUCTION

Today's industry works with conventional energy sources like coal, oil, natural gases or uranium. Meanwhile, we will have two big problems with them; they produce several kinds of pollutions. If we do not care atmospheric pollution, climate change or nuclear waste can endanger our living condition on the earth.

On the other side, the renewable energy sources use natural flows. These renewable energy sources only use a small part of the flow due to which they cannot damage natural surroundings. One of these natural resources is solar power and there are several ways to use it. This will produce electricity, how the photovoltaic technologies work, and then will show an implementation of the hardware developed for collecting the data (voltage, currents etc.). The solar power pack is long lasting, cost effective and trouble free power solution. As a result of proven technology, they are highly efficient with low maintenance. With just one time investment, solar power packs eradicate non-availability of grid power, unpredictable power Cuts & rising electricity bills worries. They are eco-friendly too.

The term "Photovoltaic" (PV) is a combination of two words- "photo", meaning light, and "voltaic", meaning electricity. Thus PV technology is the scientific term that used to describe the solar power and the generation of electricity from light. Here, solar cells arrays convert light from the sun directly into electricity. Solar power systems are like any other power generating systems. In solar power systems, different equipment is used than the conventional electromechanical power generating systems.

To overcome these problems we design the system to distribute the load on non-renewable resources to renewable resources (solar). With this data acquisition through the internet of things, control the system or load. This proposes system is for monitoring of solar power and load control using internet of things.

II. LITERATURE REVIEW

R. Nagalakshmi, B. Kishore Babu, D. Prashanth have suggested Solar arrays can also have a higher level of sophistication, in terms of optimizing their performance, extending their active life and increasing their residual value. Unfortunately, the technology to do this doesn't come with the basic package [1].

Haider-e-Karar I, Aziz AltafKhuwaja, Abdul Sattar have proposed Using Arduino boards for data acquisition is considered as one of cost effective solution and easily available. In this paper our aim is to monitor and control DC power produced by solar panels and consumed by load through computers locally and remotely using simple and cost effective hardware like Arduino board [2].

Alvin O. Converse presented the solar power pack is long lasting, cost effective and trouble free power solution. As a result of proven technology, they are highly efficient with low maintenance. With just one time investment, solar power packs eradicate non-availability of grid power, unpredictable power Cuts & rising electricity bills worries [3].

Hong Insung, Kang Byeongkwan, and Park Sehyun were proposed Non-availability of grid power, unpredictable power cuts, rising power bills and maintenance worries are the major concerns for today's consumers [4].

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SIMULATION OF FAULT CURRENT LIMITER (FCL) FOR VOLTAGE SAG MITIGATION

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Abstract:-Fault current levels in power grid is approaching , and may eventually exceed, the short-circuit current limits of existing protection devices. Fault Current limiters (FCL) provide more cost-effective solutions to prevent old protection devices and other equipment on the system from being damaged by excessive fault currents. Short circuit faults are often the origin of voltage sags at the point of common coupling (PCC) in a power network, the extent of the voltage sag is proportional to the short circuit current level, reducing the fault current level within the networks can reduce voltage sags during faults and protect sensitive loads that are connected to the same PCC. The proposed structure prevents voltage sag and phase-angle jump of the substation PCC, will have good power quality. In this paper the system implementing FCL is created and simulation in MATLAB SIMULINK. The simulation results show that FCL can limit the fault current effectively.

.***Keywords*** *- - Fault current limiter (FCL), point of common coupling (PCC), power quality (PQ), semiconductor switch, and voltage sag.*

1. INTRODUCTION

A fault is an unintentional short circuit, or partial short-circuit, in an electric circuit. A variety of factors such as lightning, downed power lines, or crossed power lines cause faults. During a fault, excessive current called fault current flows through the electrical system often resulting in a failure of one section of that system by causing a tripped circuit breaker or a blown fuse.

Power quality disturbance can be defined as the deviation of the voltage and the current from its ideal waveform. Faults at either the transmission or distribution level may cause voltage sag or swell in the entire system or a large part of it. Also, under heavy load conditions, a significant voltage drop may occur in the system. Voltage sag and swell can cause sensitive equipment to fail, shutdown and create a large current unbalance. These effects can incur a lot of expensive from the customer and cause equipment damage. Power quality problems are becoming more and more important for electric utilities due to growing number of sensitive loads. Among all the problems, voltage sag and momentary outage are the most serious ones faced by industrial and commercial customers.

About 80–90% of customer's displeasure is due to voltage sags that mainly caused by short circuits in distribution network. The distribution network topology is one of the important factors for the determination of the fault current magnitude and voltage sag. In the parallel feeders, which are connected to the Point of Common Coupling (PCC), the downstream faults in one of feeders could result in large fault current flow that might damage the series equipments. This voltage drop can affect other loads on parallel feeders connected to PCC. But, some sensitive loads are expected to continue their parallel operation with utility network without tripping during the fault or momentary outage, in order to avoid frequent and unnecessary disconnection from utility power network. The sensitive loads can be protected from voltage sag by DVR and UPQC. These devices can only compensate the voltage sag of sensitive loads. But they cannot affect the fault current. Since the voltage sag during the fault is proportional to the short circuit current, an effective fault current limiter, connected to the beginning of feeders, not only limits the large fault current but also improves the reliability, stability, and the system power quality.

In recent years, various types of fault current limiter such as, solid state fault current limiter, resonant circuit and SFCL (Superconducting Fault Current Limiter) have been proposed and developed. The main aim of this work is to develop and design a Fault Current Limiter to compensate voltage sags, of three phase three wire distribution systems.

A proposed lossless FCL component should have the following characteristics:

1 At normal operation maintained as zero resistance/impedance
2 No power loss at fault conditions
3 Operated as large impedance way during fault conditions
4 Appearance of system impedance during fault is very responsible & quick
5 Fast reverse recovery after fault eradication
6 Reliable operation
8 Low maintenance cost.

proposed methodology were evaluated. In this design the diodes will be in conduction just when sag happens thus, in typical condition current directs through the switch by disposing of the diode loss in ordinary working conditions. Moreover, this sort of FCL, with the straight forward control circuit and ease is helpful for the enhancing the voltage-quality during fault conditions.

The models of three phase system without FCL and with FCL are observed by using Matlab /Simulink. When fault occurs on three phase system without FCL, the voltage sag is created at the point of common coupling. The power quality of the system is degraded. When the Fault Current limiter (FCL) is connected in series with the feeder where the fault occurs the voltage is mitigated. The power quality of the system is improve.

5. ACKNOWLEDGMENT

We would like to convey our sincere thanks to Department of Electrical Engineering, Shri Sant Gajanan Maharaj College of Engineering, Shegaon,for their inspiring guidance and invaluable suggestions that they have given through out the project.

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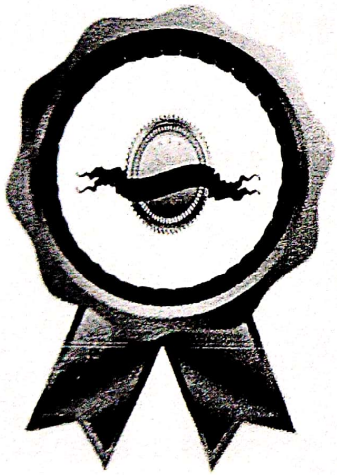


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Editor

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ANN Based Health Monitoring of Three Phase Induction Motor Using Vibration Analysis

Dr. Mrs. A. U. Jawadekar*, Akshay Laxman Ingle, Sumit Narendra Zoting*****
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Abstract- *Induction motor especially three phase induction motors are the heart of the industry due to their advantages over other electrical motors. Therefore, there is a strong demand for their reliable and safe operation. The health monitoring of induction motor is an emerging technology for online detection of incipient faults. If the fault is about to occur in the motor, then there is change in vibration of the motor. By analysis the vibration of the motor fault can be detected before it actually occurs. The fault like bearing fault (Inner Race and Outer Race fault) and inter-turn fault induces significant change in vibration of the motor. The vibration signature of particular fault is different. The on-line health monitoring involves taking measurements on a machine while it is in operating conditions in order to detect faults with the aim of reducing both unexpected failure and maintenance costs. This project work is comprised of identification of bearing fault and inter-turn fault.*

Keywords- *Health Monitoring, Online fault detection, Three phase induction motor, Vibration Signature etc.*

I. INTRODUCTION

The Squirrel cage induction motors are most widely used electrical machines for industrial, domestic and commercial applications. These motors have advantages such as robustness, simplicity of its construction and highly reliable.

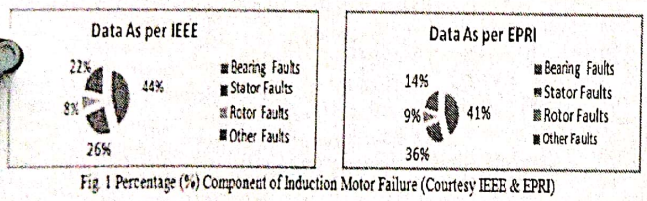


Fig 1 Percentage (%) Component of Induction Motor Failure (Courtesy IEEE & EPRI)

According to the IEEE standard 493-1997, the most common faults and their statistical occurrences are shown in fig (1). A 1985 statistical study of the EPRI provides similar results as also shown in fig.1. From the fig 1 it may be clearly observed that the major occurrences of induction motor faults are bearing fault as well as stator winding fault i.e. inter-turn fault.

The health monitoring of the induction machine can be done by various techniques. Those monitoring techniques are:

(i) Vibration monitoring
(ii) Noise monitoring
(iii) Magnetic flux monitoring
(iv) Voltage monitoring
(v) Current monitoring

For this project vibration monitoring technique is used. This analysis is done using ANN (Artificial Neural Network) tool.

II. EXPERIMENTAL SETUP

This experimental setup of the project consists of 2 horse power, 1380 rpm, 3 phase induction motor having full load current of 3.8 A. It is base mounted motor coupled to DC shunt generator connected to resistive load bank for loading. In this experiment accelerometer ADXL 335 is used to capture the vibration data which is mounted on one end of the motor as shown in fig. In order to collect the data from the accelerometer it is coupled with ARDUINO UNO board (microcontroller) which compatible to MATLAB 2013 where data can be captured.

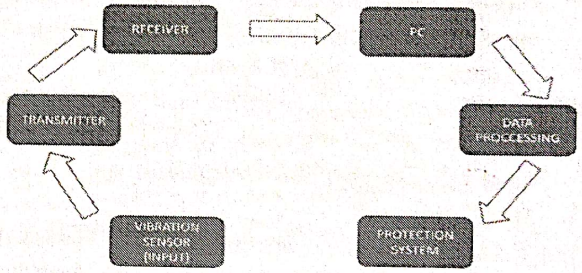


Fig. 2.1) Overall System Block Diagram

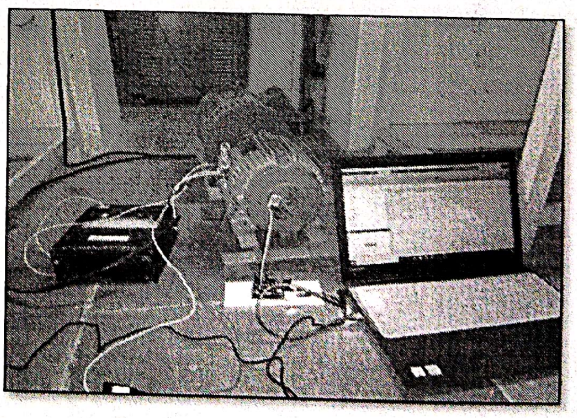


Fig. 2.2) Experimental Setup

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The success and final outcome of this work required a lot of guidance and assistance from many people and I am extremely fortunate to have got this all along the completion of my project work. Whatever we have done is only due to such guidance and we would not forget to thank them. We respect and thank Dr. Mrs. A. U. Jawadekar for giving us an opportunity and inspiration to do the work on "ANN based Health Monitoring of Three Phase Induction Motor using Vibration Analysis".

It was her support and guidance which made us complete the project on time. We are extremely grateful to her for providing her support and guidance in spite of her busy schedule. Her extra effort in checking our research on a weekly basis helped to keep us on track and finish our work on time.

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REACTIVE POWER MANAGEMENT USING TSC-TCR

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Abstract - Day by day power systems are becoming more complex to operate and system is becoming less secure for riding through major outages. As the loads connected to the system are either inductive or capacitive in nature. When heavy inductive load is connected to system it causes lagging power factor and during light load condition due to shunt capacitance present causes a Ferranti effect and causing leading power factor both the condition imbalances reactive power. In order to attenuate such issue this paper presents the concept of hybrid model of TSC-TCR with control strategy in MATLAB environment for efficient management of reactive power.

Keywords - Reactive Power, Power Factor, TSC-TCR

I. INTRODUCTION

Reactive power compensation is defined as the management of reactive power to improve the performance of ac power systems. The concept of reactive power compensation embraces a diverse field of both system and customer problems, especially related with power quality issues, since most of power quality problems can be attenuated or solved with an adequate control of reactive power [1].

Due to widespread of power system the problems such as large power flows with inadequate control, excessive reactive power in various parts of system, real power congestion, large dynamic swings between different parts of system arising. In order to attenuate such issues we need a efficient management of reactive power [2]. With a recent development in power electronics, using FATCS controllers can be employed in system as a reactive power compensator, for damping oscillation, to maintain voltage profile. TSC-TCR is a subset of SVC provides better regulation and also one of the cost effective solution to compensate the reactive power.

II. THYRISTOR SWITCHED CAPACITOR AND THYRISTOR CONTROLLED REACTOR

Thyristor Switched Capacitor and Thyristor controlled Reactor are variable impedance type Static VAR generator. TSC-TCR was developed primarily for dynamic compensation of power transmission systems with the intention of minimizing standby losses and providing increased operating flexilbility.
The Single Phase TSC-TCR is shown in Figure 1.For a given capacitive output range, it typically consists of n TSC branches and one TCR. The number of branches, n, is determined by practical considerations that include the operating voltage level, maximum var output, current rating of the thyristor valves, bus work and installation cost, etc. Of course, the inductive range also can be expanded to any maximum rating by employing additional TCR branches.

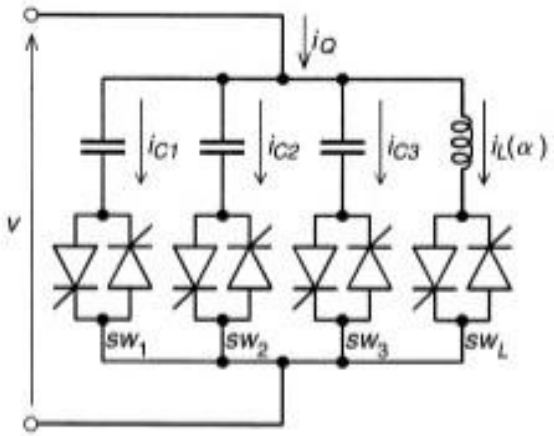


Figure 1: Basic TSC-TCR type Static VAR Generator

By being able to switch the capacitor banks in and out within one cycle of the applied ac voltage, the maximum surplus capacitive var in the total output range can be restricted to that produced by one capacitor bank, and thus, theoretically, the TCRshould have the same var rating as the TSC.However, to ensure that the switching conditions at the endpoints of the intervals are not indeterminate, the var rating of the TCR has to be somewhat larger in practice than that of one TSC in order to provide enough overlap (hysteresis) between the "switching in" and "switching out" var levels. TSC-TCR has continuous control from lagging or leading to unity ,flexible in operation and control. It practically generates no transients, has low losses and also low generation of harmonics. The operation of switched capacitor is in perfect coordination with switched reactor.

III. TSC-TCR CHARACTERISTICS

The var demand versus var output characteristic of the TSC-TCR type var generator is shown in Figure

can be used for dynamic compensation. TSC-TCR is most versatile among all SVC configurations and also cost effective solution. Also because of its flexibility TSC-TCR can be employed not only in transmission and distribution system but also for domestic purpose.

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★★★

IDENTIFICATION OF SYMPATHETIC INRUSH CURRENT OF A TRANSFORMER

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Abstract:-This paper presents a preliminary study of sympathetic inrush - a phenomenon when an already energized transformer experiences unexpected saturation during the energizing of another transformer connected in parallel. Power transformer can be saturated, giving rise to transients which leads to overvoltage and overcurrent. With the increase of distributed generations that can exaggerate more switching events, transients will become prevalent in such an operating environment. Simulation model is developed to observe the sympathetic inrush interaction and wavelet transformation is used to identify sympathetic inrush current in the power transformers. The data obtained from the simulations are given to the wavelet transform for computing the coefficients of the signals which differentiate the magnetizing inrush current and sympathetic inrush current of transformer.

Keywords *- Sympathetic inrush current, magnetizing inrush current, power transformer.*

1. INTRODUCTION

In any electrical supply network, the stability and reliability are the most important concern. Some of the issues that could pose a problem is the voltage and current disturbance triggered by transformer energization, unbalanced loading, transformer tap changing, lighting strokes, load switching, power system faults, etc. Conceptually, power transformer can be saturated and give rise to a number of transient issues which leads to overvoltage and overcurrent[1]. With the increase of distributed generations that can exaggerate more switching events, transient could become prevalent in such a complicated electrical environment. This can also cause power quality variation.

Energization of the transformer malfunctioning the transformer differential protection or generator differential protection. The reason is that when transformer energise during no load will produce excitation current which passes the system resistance causes asymmetrical fluctuation of the busbar voltage, resulting in saturations generating sympathetic inrush current in adjacent transformer. Sympathetic interaction between transformers can cause significant inrush currents that may lead to voltage sags. It often happened that transformer energization draws large inrush current, and then decays down to a small magnetizing current. The decay duration for the inrush current is dependent on the circuit resistance, circuit reactance, and magnetizing reactance of the transformer. Since the transformer's magnetizing inductance is high, the inrush current will take a longer time to reach its steady state. It was suggested that smaller transformers have higher inrush currents and decay more quickly, while larger transformers have smaller inrush currents and decay more gradually.

A transformer inrush event is actually magnetizing inrush current. The windings in a transformer are linked magnetically by the flux in the transformer core. The exciting voltage drives the flux in the core. An increase in the exciting voltage therefore increases the flux. To maintain this additional flux, which may be in the saturation range of the core steel of the transformer, the transformer draws more current which can be in excess of the full load rating the transformer windings. This additional current is the inrush current necessary to supply the magnetizing branch of the transformer [8].

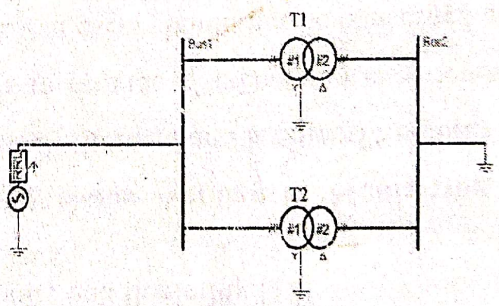


Fig. 1: simplified one line diagram for parallel connection of transformer

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Impact of Distributed Generation on Short Circuit Level

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Abstract

This paper describe effect of Distributed Generation on short circuit level. Distributed generation attracting in medium voltage transmission and distribution power system. As the Nonrenewable sources are on the way of exhausting, so we need to generate more electricity from renewable sources. These sources are used in distributed generation so there is more importance of distributed generation in power system. Insertion of DG has some impact on power system. This Paper deals with the evaluation of impact of DG on short circuit level of power system by simulating LG, LL and LLLG faults at different inception angles. The work presented in this paper consists of a two bus radial power system simulated in PSCAD/EMTDC software. Monitoring of fault current, load current and bus voltages is done in the simulation.

Keywords: Distributed Generation, Renewable Energy, Incepation Angle

I. INTRODUCTION

As the power demand is increasing day by day the utility has to feed power in the grid to fulfill the demands. In order to maintain this power balance use of renewable sources is increasing using a DG technology. Also this DG's is used in areas where the grid is nonexistent. Increase in the use of DG will have some impacts also there are several problems with the interconnection of DG with the grid. The performance of distribution system is affected by distributed generation of various ways. As DG is related to renewable energy for lowering environmental impact on power generation indicate a large scope for DG in future [1] [2]. DG improves voltage profile of a system. The losses in the circuit can be minimized if the DG is connected near to the load. Inserting DG will have an effect on short circuit level, transient stability [4] of system, voltage control [8], power quality, which can give a proper operation and protection over power system. In order to increase the penetration level of DG in power system, study of its impact on power system and to determine remedies against it.

II. DISTRIBUTED GENERATION

Distributed Generation (DG) is one of the new technologies which is focused on last few years and day by day its use for distribution networks is increasing [5]. It is presented in many forms such as solar (PV), wind (wind farms) with small scale ratings up to 10MW. It is referred to generate electricity and supplying this electricity to customers with their locations, it can also be interconnected with the utility grids. There are so many exemptions from a DG given to the customers. This privileges various types of advantages to install a DG rather than constructing new distribution lines. DG can be used to provide electric supply of customers during peak load hours, it can satisfy a consumer demand apart from the grid, thus it can also support to an intentional islanding [7]. One of the major problems that have to be considered to achieve a safe and effectively use of DG its interconnection between the utility grids [6].

III. IMPACT OF DISTRIBUTED GENERATION ON POWER SYSTEM

Insertion of DG in distribution systems has several impacts on it. These impacts may be positive or negative in power System [3].and they can be considered as the advantageous and disadvantageous of the distributed generation. This part is addressing the effects of DG on different features of the network.

1) Impact of DG on Voltage Regulation
2) Impact of DG on Losses
3) Impact of DG on Harmonics
4) Impact of DG on Power Quality
5) Impact of DG on Short Circuit Levels of the Network

Penetration of DG in a network has a direct impact on the short circuit levels of the network; it causes an increase in the fault currents when compared to the normal network conditions at which the substation is the only generating unit. This increase will be obtained even if the DG is of small generating capacity [6].The contribution to DG to faults depends on some factors such as the generating capacity of the DG (size of the DG), the distance from the DG from the fault location and the type of DG.

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VI. CONCLUSION

Distributed Generation has various advantages though it is important the study of its impact on power system Simulation result to confirm that fault current increases to interconnection of DGs in existing systems.

The work presented in this paper leads to the conclusion that by adding DG at bus 2 it is observed that the current drawn by the load is the sum of both source current and DG current. It is also observed that DG contributes to the fault current so, in table II and III it is found that the magnitude of fault current i.e. Short circuit level increases in the insertion of DG in different instant 0° and 90^0. By comparing the magnitude of fault currents in case of LG, LL, and LLLG faults it is found that the magnitudes of fault current i.e. short circuit level is maximum in case of LLLG fault and minimum in case of LL fault is clear shown in case IV and V with different instant. As the short circuit level increases the short circuit MVA increases so in order to protect the system we need to change the rating of circuit breaker.

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Case Study on Energy Conservation In Lighting Audit

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Abstract- *Lighting constitutes a major portion of electricity consumption in commercial and industrial sector. The minimum used of light energy has become the necessary aspect of concern today. The demand of an electrical energy is increasing to fulfill this demand, need to generate more electricity and which required the huge investment with this concern the government of India has to make mandatory the energy audit for all industrial users. Energy conservation is well accepted solution to fulfillment of demand in future. Recently the use of electronics load is increasing very fast. The most of the energy wasted by the inefficient use of the consumer electronics. Specially a light take a great part of the total energy consumption .The current various light control system are exist in the market are outdated and energy inefficient .Therefore this paper propose LED lighting system considering energy efficiency and users satisfaction. The aim of this paper is that to analyze the strategies that allow to the energy efficiency of sector.*

Keywords- Urgent Replacement (U.R); Installed Load Efficacy Ratio (ILER); Sufficient (SUF)

I. INTRODUCTION

Energy wastage is one of major problem in the world. Energy is the prime factor for development of the technology. Proper utilization of energy is one of the major view point of any developing country. Now a days use of energy has increased greatly in order to meet the demand of ever increasing consumption of it. This energy wastage problem will be solved through energy conservation and use of energy efficient equipment.This paper is an attempt to carry out energy audit of Ganesh Oil Mill, MIDC Khamgaon. It has been identified that electricity conservation has a huge potential in the industrial sector due to loss in production because of the load shedding and continuous increment of electricity price, industrial sector is in under financial pressure hence energy conservation provide benefits to the company and environment. In order to maximum the energy conservation in manufacturing industries, regular audit of plants is highly recommended.

II. LITERATURE REVIEW

Energy audit is a verification survey and analysis of energy flows. It includes process to reduce the amount of energy input into the system without negatively affecting the output. Energy audit is the first step in identifying opportunities to reduce energy expense. Energy audit is a fastest and cheapest solution to fulfill the gap between energy demand and supply. The demand of electrical energy increasing due to fast progress in industrialization. Energy audit is first step towards understanding how energy is consumed in selected premises as it indicated where the scope for energy conservation and where the waste can occurs. For energy audit starting is to find existing lighting scheme. With this input audit provides detailed information on replacing of existing luminaries, with complete cost of project, annual energy saving and payback calculation. After study and calculation it is verified that the luminance level on working area before and after changeover to make sure for sufficient level are maintained after modification of lighting.

III. ENERGY AUDIT METHODOLOGY

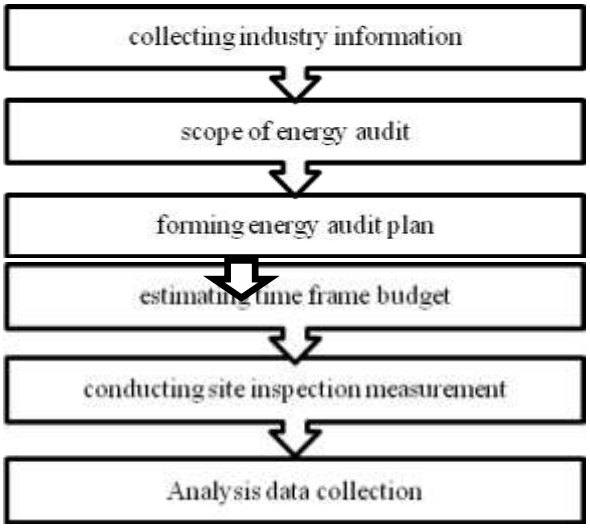
Effective energy audit is a process that consists of three steps
.

3.1. Pre-Audit Activities

In the pre-audit activities manage the informal interview with the plant manager and done the walk through audit. Identify lack of awareness on energy audit. It is not clear about existing level of operation and efficiency due to lack of instrumentation and non availability of energy consumption data. The illumination was not proper as mounting height of lamp, less number of lamp than required. Light and accessories was not clean no use of proper natural light by using translucent sheet.

3.2. Audit phase

For energy Auditing of industry. It is necessary to analysis of consumption of electrical energy of previous year and analysis of annual energy bill and energy consumption pattern and we conducted motor survey and lighting survey.



IV. STEPS TOWARDS ENERGY CONSERVATION IN LIGHTING

From ILER calculations it is observed that many sections of industry are suffering from improper illumination level. ILER(installed load efficacy ratio)is the average maintained luminance provided on a horizontal working plane per circuit watt with general lighting of an interior.

ILER= Actual Lux/W/m² / Target Lux/W/m² [4]

1. ILER calculation

- Floor Area in m^2 = 25.8920
- R. I. = L*W/H (L+W) = 0.7691

Where
L = Length of interior
W = width of interior
H = height mounting
RI = Room Index

Table 1.Sectionwise ILER Calculation[4]

SR. NO.	SECTION	TOTAL WATTAGE (WATT)		LUX (LUMEN)		ILER		ACTION
		DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	
1	MAIN OPERATION UNIT	279	399	156	33.86	0.43	0.066	UR
2	LOADING SECTION	130	210	181	20.5	1.09	0.140	UR
3	CHALNA SECTION	66	66	1401	23	2.52	0.177	UR
4	DRAYER SECTION	40	40	42	10	0.33	0.130	UR
5	OFFICE	180	180	170	90	.....	.....	SUF
6	OUTDOOR	..	142		15.5	.....	0.391	UR

- Total circuit watts of installation = 399 w
- Watt/m^2 = 399/25.892 = 15.41 watt/m^2
- Average maintained illumination by using lux meter = 33.86
- Lux/w/m^2 =33.86/15.14 = 2.1972.
- Target lux for type of application and RI from standard table = 33 Target Lux /w/ m^2
- ILER = Installed Load Efficiency Ratio.
- Calculate ILER = 2.1972/33 = 0.06658

Table 2.Indicator of Performance[4]

ILER	ASSESSMENT
0.75 or over	Satisfactory to Good
0.51 – 0.74	Review suggested
0.5 or less	Urgent action required

V. RECOMMANDATION

Energy Conservation Measures Identified

1) Replacement of T-8 Fluorescent Lamp of 51 Watt by T-5 Crompton LED Tube
2) Provide Translucent Sheets in the loading Section Area and avoid Artificial Light during day time.
3) Occupancy sensors can be used to avoid unnecessary lighting-up of office when nobody is there.
4) Provision of Solar street light in place of flood light.
5) Installation of Eco Ventilator in Place of Exhaust Fan.

6) Regular Maintenance and Cleaning of Luminaire to reduce depreciation in order to increase illumination efficiency.

VI. CONCLUSION

After making complete study of Oil mill sections in Ganesh Oil Mill energy conservation measures recommended are replacement of rewound motor by energy efficient motor and replacement of T8 51-Watt Fluorescent lamp by T5 Crompton LED tube. The project has completed with two phases of Audit. Third phase of audit is about implementation of energy saving measures recommended to the Management and monitoring as well as analyze the progress of the energy conservation measures if it is implemented by the authority of industry.

Sr. No	Energy Saving proposal	Annual Saving in Rs/Lakhs	Investment required in Rs/Lakhs	Simple Payback in Month
1.	Replace 36 W Tube Light by 18 W LED Tube Light	0.13	0.046	4.28

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Energy Audit in Oil Mill: Considering Motor Load

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***Abstract*: Day by day energy demand keeps rising as there is a limited amount of resources that can help us to generate electricity. So that it is essential to reduce energy consumption. The main aim of paper is to perform an in-depth study in industry in order to reduce energy consumption. For finding the scope for conservation of energy the best option is energy audit. Energy audit is a process to determine how and where energy is being used and to identify opportunities to reduce energy usage. This paper is based on energy audit performed for an industry Ganesh oil Mill, specialized in producing oil as a main product and by product as cotton seed cake. Main objective is to evaluate used of energy in above industry for energy conservation in motors and determine opportunities for energy saving with efficient techniques to reduce monthly electricity bill. Calculation of payback period for each recommended action has been made. The result of this activities are documented. Execution of audit in oil mill can develop the plant efficiency.**

***Keywords*: Textile Industry, Energy audit, three phase motor, Efficiency.**

1. Introduction

Energy audit is verification, monitoring and analysis of energy use including submission of technical report containing all recommendations with cost benefit analysis and action plan to reduce consumption. The energy audit was conducted at Ganesh Oil Mill of Khamgaon MIDC, Buldhana. The above industry produces cotton seed oil and by product as cotton seed cake whose annual input is 1 lakh 70 thousand quintal in form of cotton seed and annual output is 17 thousand quintal oil and 1 lakh 40 thousand quintal cotton seed cake. It is under the category of HT-1(A) Industry-General having Transformer of 250 KVA, 11Kv/433v, connected load at 433v is 200 Kw and actual load is 197 Kw which comprises of lightning as well as motor load. It has sanctioned maximum demand of 190 Kw. It has many types of equipment and heavy machinery like oil expeller, oil extracting pump, oil neutralizer, dryer etc. As heavy load of industry is motor load therefore paper majorly focused on it.

2. Methodology

Methodology includes the discussions with the plant officials to identify the areas for energy conservations. Energy audit team visits the site, and collects data of operations and distribution of load within the plant. This collected data is then analyzed and measures are identified to get best possible energy conservation opportunity. Detailed energy auditing is carried out in three phases:

1. Phase I: Pre Audit
2. Phase II: Audit Phase
3. Phase III: Post Audit

The information to be collected during detailed audit includes energy consumption in various sections and major equipment, energy cost and tariff.

1) Pre-audit phase

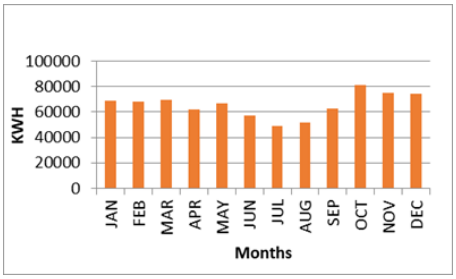


Fig. 1. Monthly Unit Consumption in KWH

Table 1
Sectioned Wise Motor load

Sr. No.	Sections	No. of Motors & Ratings
1	Storage & Dryer	3 HP (2 Nos.) 2 HP (6 Nos.)
2	Cleaning	5 HP (3 Nos.) 3 HP (2 Nos.)
3.	Production	25 HP (8 Nos.) 3 HP (2 Nos.) 5 HP (1 Nos.)
4	Oil Section	3 HP (1 Nos.) 5 HP (2 Nos.)
Total motor load		263 HP (196.19 kW)

In pre-audit phase includes Informal Interview with Plant Manager, Walk through Audit. Schedule of operation of industry is about 12 hrs. Daily for 20 days of month. By conducting the survey total motor load is calculated as 196.19

kW as shown in Table1. From the analysis of annual energy bill, it was observed, during the month October to February energy consumption is more as compared to other month which is represented in the form of graph as shown in figure1.

2) Pre-audit phase

From the collected data it was found that the major power saving regions are replacing old rewound motors with newer energy efficient motor. Energy conservation for motor load is basically perform by major two ways.

1. Replacing existing 25 Hp motor by lower wattage
2. Efficiency Improvement that is replacing existing old motor by newer energy efficient motor with higher efficiency.

As the plant is using 25 Hp motor for expeller while normally expeller for extracting oil work on 30 Hp motor. Considering this statement there is no scope for reducing Hp rating of motor. Hence second option is chosen toward energy conservation in motor. Total motor load of industry is about 196 kW. Major motor load of industry is occupied by Production unit having 3 phase Squirrel Cage Induction Motor of 25 Hp (18.6 kW). In observation it was found that motors are too old and rewound many times hence to know the operating efficiency of motor experimentation is carried out to measure the parameters. In order to find out energy conservation opportunity by replacing the existing motors with energy efficient motor 18.65 kW, 91% efficiency, following procedure is followed.

- Selection of rewound motor.
- Measurement of motor parameter.
- Calculation of motor losses & efficiency.
- Selection of energy efficient motor.
- Analyzing the motor for energy saving.

3. Analysis

1) Calculation of parameters

The parameters of three phase induction motor are measured by using tong tester and Multi-meter as shown in table 2. These Parameters are used to calculate the power losses of motor and motor efficiency is calculated by using formulas as listed below. Variation in efficiency of 8 motors is between 80% to 82%.

Table 2
Measured Parameters

Type of motor	3 phase squirrel cage induction motor
Rating of motor	25 Hp (18.65 kW), 50 Hz
No of pole	4 pole
No load speed	1449 Rpm
Line voltage	430 V
Loading percentage	75 %
No load current	20.4 A
Operating speed	720 Rpm
Current on load	28 A

- I/P Power = 1.73 * Vl * I1 * Pf
- Copper Loss = INL2 * R
- Constant loss = I/P Power – Copper Loss
- Output power = (HP Rating) * 746
- Resistance per phase = 1.2*0.9
- Copper loss = IFL2 * R
- Loading condition = 75%
- Power output= (Output Power) * 0.75
- Input power= output power + (copper loss + constant loss)
- Efficiency % = (output/input) * 100
  Efficiency % = 80.28 %

2) Selection of energy efficient Motor

As per the market survey and cost benefit analysis, profile of newer energy efficient motor is Kirloskar 25 Hp (18.5 kw), 430 V, 4 pole, 50 Hz, 1500 Rpm, 3 phase foot Mounted Squirrel Cage Induction Motor,91% efficiency, power factor 0.83 of cost Rs 55000. Analysis of replacement of total 8 motor has been done as shown in table 3. And payback period is about 20 months.

Table 3
Analysis of Implementation

Difference in efficiency	10%
Energy difference	19 kWh
Total energy consumption of 8 motors	152 kWh
Monthly energy consumption	3043 kWh
Monthly cost saving	Rs 21492.8
Yearly Cost saving	Rs 2,57,913

- Prize of Energy Efficient Motor = Rs 55000
- Total Investment = Prize of Motor * Total No of Motor = 55000*8 = Rs 4,40,000
- Payback Period= (Investment/Yearly Cost Saving)*12
  = (440000/257913) *12
  = 20 Month

4. Conclusion

In this article, case study depicts that there is a large scope of energy savings in oil mill by replacing the old rewound/ faulty motors by energy efficient motors, there is scope for saving of energy, cost with less payback time of 20 months. The implementation of energy saving measures suggested in this paper is solely dependent on the decision of the industry. Technical Result is as shown in table 4. Energy saving proposals for Oil mil gives approximately saving of Rs. 2.57 Lakhs.

Table 4
Technical result

S. No	Energy Saving proposal	Annual Saving in Rs/Lakhs	Investment required in Rs/Lakhs	Simple Payback in Month
1	Replace Re-Winded Motors by Energy Efficient Motor	2.57	4.40	20

The project has completed with two phases of Audit. Third phase of audit is about implementation of energy saving measures recommended to the Management and monitoring as

well as analyze the progress of the energy conservation measures if it is implemented by the authority of industry.

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Grey Wolf Optimization Algorithm for Generation Rescheduling In Deregulated Power System for Congestion Management

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Abstract—
The practitioners and researchers has received considerable attention solving complex optimization problems with metaheuristic algorithms during the past decade. Many of these algorithms are inspired by various phenomena of nature. One of the promising solutions for secure and continuous power flow in the transmission line is rescheduling based congestion management approach but the base problem is rescheduling cost.. To solve the congestion with minimized rescheduling cost , a new population based algorithm, the Grey Wolf Optimization (GWO) Algorithm, is introduced in this paper . The basic motivation for development of this optimization algorithm is based on special lifestyle of grey wolf and their cooperation characteristics. Based on some benchmark Grey Wolf Optimization(GWO) Algorithm is compared with the existing conventional algorithms such as Particle Swarm Optimization (PSO), Genetic Algorithm (GA), Artificial Bee Colony (ABC), and Firefly (FF) by analyzing the convergence, cost, and congestion. In IEEE-14 and IEEE-30 bus system experimental investigation is carried out and the obtained results by the proposed algorithm GWO (Grey Wolf Optimization) Algorithm in comparison to the other algorithms used in this paper.

Keywords— *Rescheduling; Congestion Management; Optimization Algorithm; GWO, flexible AC transmission systems.*

1. Introduction

Restructuring of the electricity supply industries is a very complex exercise based on national energy strategies and policies, macroeconomic developments and national conditions, and its application varies from country to country . It is important to point out that there is no single solution applicable to all countries and there is a broad range of diverse trends. Liberalization, deregulation (or reregulation) and privatization are all processes under the general label of market reform. Reregulation is a more accurate term than deregulation. Privatization is the sale of government assets to the private sector, by itself, privatization is not sufficient to introduce competition into a reformed sector . Competition will be the result of careful regulation of the privatized entities to allow new entrants access to the market. Competition is fundamental to most market reforms and it is introduced in order to reduce costs and increase efficiency. There is considerable variation in the extent of the competition which is introduced.

8. Conclusion and Future Work

In a deregulated power systems congestion management is one of the major technical issue. The OPF based congestion management is considered here and the results are compared with both conventional and nonconventional methods (GWO algorithm). Conventional methods not provide the optimized results. The GWO algorithm (non-conventional method) give the good results on the basis of cost analysis, convergence analysis, congestion analysis, statistical analysis, best solution generation. Thus, it is concluded that the performance of the GWO-based rescheduling strategy is superior to the existing conventional methods by minimized rescheduling cost in computation. By removing congestion from deregulated power system by minimizing cost of rescheduling of generator the society get constant voltage, stable system and continuous interrupted power. The efficiency of the system is increases, so the production of product also increases. In future the congestion management will be done with different recent intelligent techniques in a higher order IEEE test bus systems.

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CONGESTION MANAGEMENT USING FIREFLY ALGORITHM IN DEREGULATED POWER SYSTEM FOR IEEE-30 BUS SYSTEM

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Abstract—**In competitive electricity market, congestion is a serious economic and reliability concern. Congestion is a common problem that an independent system operator faces in open access electricity market. This project presents a reliable and efficient meta-heuristic based approach to solve congestion problem. The proposed approach of the present work employs Firefly algorithm (FFA) for alleviation of transmission network congestion in a pool based electricity market via active power rescheduling of generators. FFA is a new meta-heuristic approach based on flashing patterns and behaviour of fireflies. Various important security constraints such as load bus voltage and line loading have been taken into account while dealing with congestion problem. The proposed methodology may help in removing the congestion of line with minimum rescheduling cost. The numerical results of modified IEEE 30-bus test power systems are illustrated.**

Keywords—Firefly algorithm, Particle swarm optimization, congestion

I. INTRODUCTION

Deregulation is a new paradigm in the electric power industry. The goal of deregulation is to enhance competition and bring consumer's new choices and economic benefits. Power system security, congestion management, power quality and power regulations are major concepts that draw the attention of power researchers in deregulated surroundings. In deregulated electricity market, most of the time power system operates near its rated capacity as each player in the market is trying to gain as much as possible by full utilization of existing resources. Congestion in the transmission lines is one of the technical problems that appear particularly in the deregulated environment.

In the deregulated power system, the challenge of Congestion Management (CM) for the transmission system operator is to create a set of rules that ensure sufficient control over producers and consumers (generators and loads) to maintain an acceptable level of power system security and reliability in both the short term (real time operation) and the long term (transmission and generation construction) while maximizing the market efficiency. The system is said to be congested when the producers and consumers of electric energy desire to produce in amounts that would cause the transmission system to operate beyond one or more transfer limits. Congestion has direct impact on security and reliability of the system. Discrete changes in system configuration may result, due to some contingency or outage rendering the system, into an unsecured state and make other lines to undergo congestion too, resulting in dynamic congestion. Congestion Management (CM), that is controlling the transmission system so that the transfer limits are observed, is perhaps the fundamental transmission management problem [1].

When a generator is a price taker, it can be shown that maximizing its profit requires bidding its incremental cost. When a generator bids other than its incremental costs in an effort to exploit imperfections in the market to increase profits, its behaviour is called strategic bidding. If the generator can successfully

increase its profits by strategic bidding or by any other means than the lowering costs, it is said to have market power and one of the main cause of market power is congestion. Various approaches have been presented in the literature for solving the CM problem. The general methods adopted to relieve the congestion involve the rescheduling of generator power outputs, providing the reactive power support, and curtail the load demands/transactions [2].

II. CONGESTION PROBLEM STATEMENT

The objective function of the proposed method is to find an optimal profile of active power generation so as to minimize the total congestion cost, while satisfying network constraints. Based on the bids submitted by the generators for congestion management, the optimal rescheduling values of generators are computed by solving the following optimization problem. The objective function of the proposed problem is define as:

$$Minimize \sum_{g}^{Ng} IC_g(\Delta P_g)\,\Delta P_g$$

Subjected to the following constraints;

Operation Limit Constraints:

$$\Delta P_g^{min} \le \Delta P_g \le \Delta P_g^{max}; \quad g = 1,2,\ldots..Ng$$

Where,

$$\Delta P_g^{min} = P_g - P_g^{min}$$

$$P_g^{max} = P_g^{max} - P_g$$

Line Flow Constraints:

$$\sum_{g-1}^{Ng}\left(\left(GS_g^{ij}\right)\Delta P_g\right) + F_l^0 \le F_l^{max};\ l = 1,2,\ldots\ldots,n_l$$

Where ICg(ΔPg) is the incremental or decremental bid submitted by GENCO. ΔPg is the real power adjustment at GENCO. Ng represents the number of GENCOs in the sensitive zone. $F_l^0$is the power flow caused by all contracts previously settled on line-l. $F_l^{max}$is the line flow limit of line-l connecting buses. The generators in the system under consideration have different sensitivities to the power flow on the congested line. A change in real power flow in a transmission line-l (connected between bus i and bus j) due to a change in power generation by generator g can be termed as generator sensitivity (GS) to the congested line. Mathematically, GS for line connected between buses i and j can be expressed as:

$$GS_g^{ij} = \frac{\Delta P_{ij}}{\Delta P_{c_g}} = \frac{\partial P_{ij}}{\partial \theta_i}\frac{\partial \theta_i}{\partial P_{c_g}} + \frac{\partial P_{ij}}{\partial \theta_j}\frac{\partial \theta_j}{\partial P_{c_g}}$$

The power flow equation on the congested lines can be calculated by

$$P_{ij} = -V_i^2 V_{ij} + V_i V_j G_{ij}\cos(\theta_i - \theta_j) + V_i V_j B_{ij}\sin(\theta_i - \theta_j)$$

The differentiations of the equations with respect to $\theta_i and \theta_j$ are;

$$\frac{\partial P_{ij}}{\partial \theta_i} = -V_i V_j G_{ij}\sin(\theta_i - \theta_j) + V_i V_j B_{ij}\cos(\theta_i - \theta_j)$$

$$\frac{\partial P_{ij}}{\partial \theta_j} = V_i V_j G_{ij}\sin(\theta_i - \theta_j) - V_i V_j B_{ij}\cos(\theta_i - \theta_j)$$

The active power delivered at bus-s referring to any bus in system can be calculated as:

$$P_s = |V_s|\sum_{t=1,t\neq s}^{n}\{(G_{st}\cos(\theta_s - \theta_t) + B_{st}\sin(\theta_s - \theta_t))|V_t|\}$$

$$P_s = |V_s|^2 G_{ss} + |V_s|\sum_{t=1,t\neq s}^{n}\{(G_{st}\cos(\theta_s - \theta_t) + B_{st}\cos(\theta_s - \theta_t))|V_t|\}$$

Differentiating with respect to θ_t,

$$P_s = |V_s||V_t|\{(G_{st}\sin(\theta_s-\theta_t) + B_{st}\cos(\theta_s-\theta_t)\}$$

$$P_s = |V_s|\sum_{t=1,t\neq s}^{n}\{(-G_{st}\sin(\theta_s-\theta_t) + B_{st}\cos(\theta_s-\theta_t))|V_t|\}$$

The relation between the change in active power at any bus and voltage phase angles can be written as,

$$[\Delta P]_{nx1} = [H]_{nxm}[\Delta\theta]_{nx}$$

$$[H]_{nxn} = \begin{bmatrix} \frac{\partial P_1}{\partial\theta_1} & \frac{\partial P_1}{\partial\theta_2} & \cdots & \frac{\partial P_1}{\partial\theta_n} \\ \frac{\partial P_2}{\partial\theta_1} & \frac{\partial P_2}{\partial\theta_2} & & \frac{\partial P_2}{\partial\theta_n} \\ \vdots & & \ddots & \vdots \\ \frac{\partial P_n}{\partial\theta_1} & \frac{\partial P_n}{\partial\theta_2} & \cdots & \frac{\partial P_n}{\partial\theta_n} \end{bmatrix}_{nxn}$$

Given, $[M] = [H]^{-1}$

$$[M]_{nxn} = \begin{bmatrix} 0 & 0 & \cdots & 0 \\ 0 & \frac{\partial\theta_2}{\partial P_2} & & \frac{\partial\theta_2}{\partial P_n} \\ \vdots & & \ddots & \vdots \\ 0 & \frac{\partial\theta_n}{\partial P_2} & \cdots & \frac{\partial\theta_n}{\partial P_n} \end{bmatrix}_{nxn}.$$

Thus, $[\Delta\theta] = [M][\Delta P]$

Since bus 1 is the reference bus, the first row and first column of [M] can be eliminated. Therefore, the modified
[M], is written as

$$[\Delta\theta]_{nx1} = \begin{bmatrix} 0 & 0 \\ 0 & [M_{-1}] \end{bmatrix}_{nxn}[\Delta P]_{nx1}$$

III. PARTICLE SWARMOPTIMISATION METHOD

All PSO is a simple and efficient population-based optimization method proposed by Kennedy and Eberhart[12]. PSO consists of a swarm of particles and each particle flies through the multi-dimensional search space with a velocity, which is constantly updated by the particle's previous best performance and by the previous best performance of the particle's neighbours. The position and velocity of each particle are updated at each time step (possibly with the maximum velocity being bounded to maintain stability) until the swarm as a whole converges to an optimum. Particles update their velocity and position through tracing two kinds of 'best' value. One is its personal best (pbest), which is the location of its highest fitness value. In global version, another is the global best (gbest), which is the location of overall best value, obtained by any particles in the population. Particles update their positions and velocities according to equation:

$$V_{id}^{K+1} = \omega V_{id}^{K} + c_1 rand_1(p_{id}^{K} - x_{id}^{K}) + c_2 rand_2\left((p_{gd}^{K} - x_{id}^{K}\right)$$

$$X_{id}^{K+1} = X_{id}^{K} + v_{id}^{K+1}$$

Here, V_{id}^{K+1} is the velocity of dth dimension of the ith particle in the Kth iteration, X_{id}^{K} is the corresponding position and p_{id}^{K} and p_{gd}^{K} is personal best and global best respectively. Finally, the position of the ith particle for dth dimension is updated by equation written above. Here w is the inertia weight parameter which controls the global and local exploration capabilities of the particle. A large inertia weight helps in good global search while a smaller value facilitates local exploration.

PSO is an optimization algorithm that falls under the soft computing umbrella that covers genetic and evolutionary algorithmic techniques. In PSO, the selection operation is not performed and it can generate a high-quality

solution within shorter calculation time and stable convergence characteristic than other stochastic methods. Generally, in population-based optimization methods, it is desirable to encourage the individuals to wander through the entire search space, without clustering around local optima, during the early stages of the optimization. On the other hand, during the latter stages, it is important to enhance convergence toward the global optima, to find the optimal solution efficiently.

A. Advantages of the basic particle swarm optimization algorithm [1]:

1. PSO is based on the intelligence. It can be applied into both scientific research and engineering use.
2. PSO have no overlapping and mutation calculation. The search can be carried out by the speed of the particle. During the development of several generations, only the most optimist particle can transmit information onto the other particles, and the speed of the researching is very fast.
3. The calculation in PSO is very simple. Compared with the other developing calculations, it occupies the bigger
4. Optimization ability and it can be completed easily.
5. PSO adopts the real number code, and it is decided directly by the solution. The number of the dimension is equal to the constant of the solution.

B. Disadvantages of the basic particle swarm optimization algorithm [1]:

1. The method easily suffers from the partial optimism, which creates less exact results for regulation of its speed and the direction.
2. The method cannot work out the problems of scattering and optimization
3. The method cannot work out the problems of non-coordinate system, such as the solution to the energy field and the moving rules of the particles in the energy field

IV. FIREFLY METHOD

The Firefly Algorithm was developed by the author (Yang 2008, Yang2009), and it was based on the idealized behaviour of the flashing characteristics of fireflies. For simplicity, we can idealize these flashing characteristics as the following three rules;

- All fireflies are unisex so that one firefly is attracted to other fireflies regardless of their sex;
- Attractiveness is proportional to their brightness, thus for any two flashing fireflies, the less bright one will move towards the brighter one. The attractiveness is proportional to the brightness and they both decrease as their distance increases. If no one is brighter than a particular firefly, it moves randomly;
- The brightness or light intensity of a firefly is affected or determined by the landscape of the objective function to be optimised.

For a maximization problem, the brightness can simply be proportional to the objective function. Other forms of brightness can be defined in a similar way to the fitness function in genetic algorithms. In the FA, there are two important issues: the variation of light intensity and formulation of the attractiveness. For simplicity, we can always assume that the attractiveness of a firefly is determined by its brightness or light intensity which in turn is associated with the encoded objective function.

In the simplest case for maximum optimization problems, the brightness, I of a firefly at a particular location x can be chosen as;

$$I(x) \propto f(x)$$

However, the attractiveness β is relative, it should be seen in the eyes of the beholder or judged by the other fireflies. Thus, it should vary with the distance rij between firefly i and firefly j. As light intensity decreases with the distance from its source, and light is also absorbed in the media, so we should allow the attractiveness to vary with the degree of absorption.

V. SIMULATIONAND RESULTS

The IEEE 30-bus system has been used to show the effectiveness of the proposed algorithm. The IEEE 30-bus System consists of six generator buses and 24 load buses.In the paper, FFA for CM is implemented using MATLAB software. To verify the effectiveness of the proposed FFA in solving CM problem, simulations are carried out on modified IEEE 30-bus test systems. The bus data and line data are entered in the software. Generation rescheduling cost is calculated for the simulated cases and is compared with results of other research. Details of simulated cases carried out on the two test systems are given in Table I.

Congestion is created in lines for the simulation purpose by overloading the lines. In this paper, line overloads are created either by reducing the capacity of lines as to the compared standard limits or by considering generator or line outage. The proposed FFA has been executed for 100 independent trial runs, out of which the best solution set is presented here.

The values of α and γ are taken in the range of 0 to 1, while the value of β_0 is kept constant at 10. It has been found that population of 40 fireflies is sufficient in solving the CM problem of the present work. The maximum number of iteration is set to 150 for all the test cases. The major observations of the present work are documented as results.

The modified IEEE 30-bus test system is taken for consideration. It has forty-one transmission lines, twenty-fourload buses and six generator buses. The total active and reactive power of load for this test system is 283.4MW and 126.2 MVAR, respectively. Generation and load values, are taken as the initial market clearing values for P_G and P_D, respectively. Contingencies like unexpected line outage and increase in system load are considered for the simulation purpose. Two different cases of this example viz. case 1A and case 1B are considered for this example.

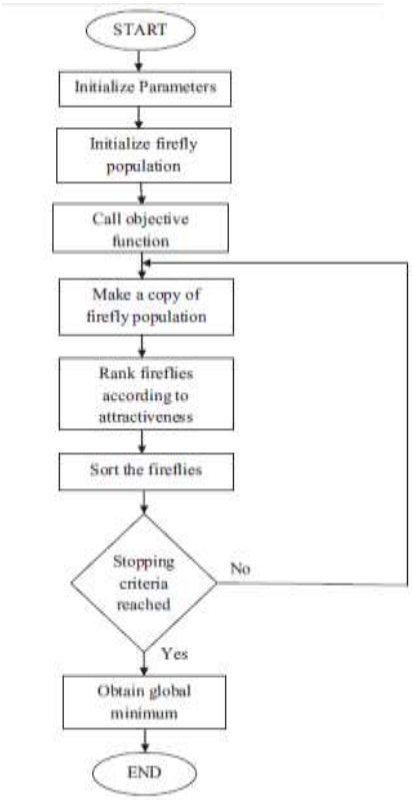


Fig.1. FFM Algorithm

TABLE I. CONTINGENCY ANALYSIS

Test system	Test case	Contingency considered
Modified IEEE 30-bus	1A	Outage of line 1–2
	1B	Outage of line 1–7 with increase in load at all buses by 50%

1. Case 1A

In this case, congestion is created by considering outage of line number-1 connected between bus-1 and bus-2. Due to outage of line 1, congestion occurs in linesnumber-2 and -4, connected between buses 1–7 and 7–8, respectively. Optimal power flow results reveal that powerflows in those lines become 147.463MW and 136.292MW, respectively, against the line flow limit of 130MW for both lines. Details of the congested lines are presented in Table II. Hence, the congestion has to be alleviated by the optimal rescheduling of active power generation of generators. The results, obtained by employing the proposed FFA for the solution of CM problem for case 1A, are tabulated in Table III.

TABLE II. POWER FLOWIN CONGESTED LINES

Test case	Congested lines	Actual flow (MW)	Line limit (MW)
1A	1-7	147.463	130
	7-8	136.292	130

For comparison purpose, the results obtained fromPSO techniques reported in are also included in the same table. From Table 3 it may be concluded that the results obtained by proposed FFA is the best, providing minimum rescheduling cost compared to other methods reported in the literature, without overloading the other lines. The total system loss before CM was 16.023 MW while the same is decreased to 13.10 MW after CM. A comparative pictorial representation of active power rescheduling and congestion cost offered by different methods like PSO. The convergence profile of fitness function for this test case, as yielded by the proposed FFA, is shown in figure below.

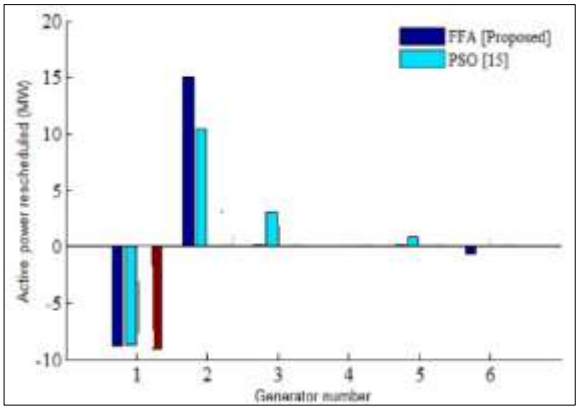


Fig. 2. Comparative active power rescheduling of generators for modified IEEE 30-bus test system

2. Case 1B

For this case, congestion is created by considering outage of line number-2 connected between bus-1 and bus-7 accompanied by increase of load at all the buses by 50%. This considered contingency causes overloading of lines connected between buses 1–2, 2–8 and 2–9 with power flow of 310.917 MW, 97.353 MW and 103.524 MW, respectively, which are beyond the limits of their maximum power flow limits (130 MW for line 1–2 and 65 MWeach for both the lines 2–8 and 2–9).

TABLE III. IMPLEMENTATIONOF FFA TO POWER FLOW IN CONGESTED LINES

Test case	Congested lines	Actual flow (MW)	Line limit (MW)
1B	1-2	310.917	130
	2-8	95.35	65
	2-9	103.524	65

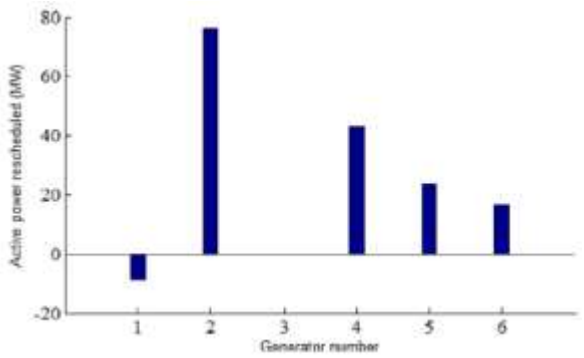


Fig. 3.FFA based active power rescheduling of generators for modified IEEE 30- bus test system corresponding to Case 1B.

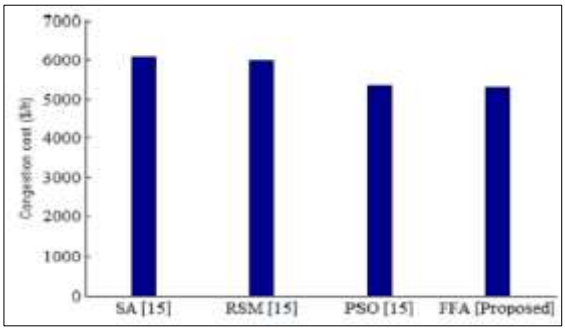


Fig.4.Congestion cost offered by different algorithms for modified IEEE 30-bus test system corresponding to Case 1B

It is worth indicating out that the distance defined above is not restricted to the Euclidean distance. We can define other distance in the n-dimensional hyperspace, contingent on the type of problem of our interest. For example, for job scheduling problems, it can be defined as the time lag or time interval. For complicated networks such as the Internet and social networks, the distance can be defined as the amalgamation of the degree of local clustering and the average proximity of vertices. In fact, any measure that can effectively characterize the quantities of interest in the optimization problem can be used as the distance. The archetypal scale should be concomitant with the scale concerned in our optimization problem. If it is the typical scale for a given optimization problem,for a very large number of fireflies n >>m where m is the number oflocal optima, then the initial locations of these n fireflies should distribute comparativelyhomogeneously over the entire search space. As the iterations proceed,the fireflies would converge into all the local optima (including the globalones). By comparing the best solutions among all these optima, the globaloptima can easily be achieved. Our recent research suggests that it is possibleto prove that the firefly algorithm will approach global optima when n —► 00and ί> 1.An additional improvement of FFA is that dissimilar fireflies can work almost autonomously, it is thus predominantly suitable for parallel implementation.

It is even better than genetic algorithms and PSO because fireflies aggregate more closely around each optimum. It can be expected that the interactions between different sub regions are minimal in parallel implementation.

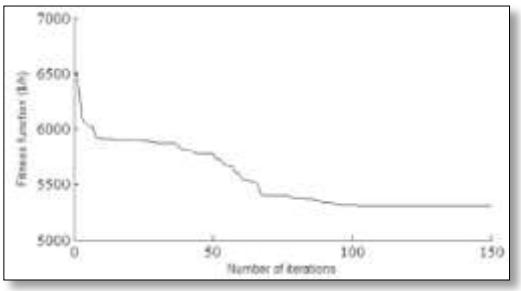


Fig.5. FFA based convergence profile of fitness function value for modified IEEE 30- bus test system corresponding to Case 1B.

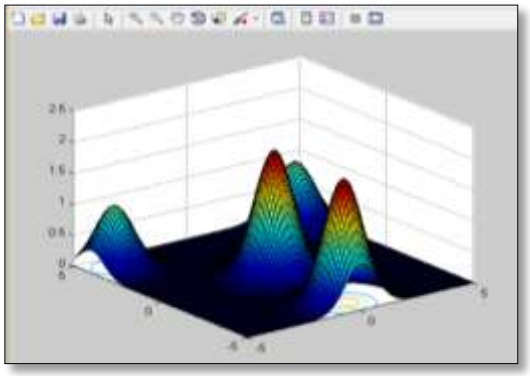


Fig.6.Two Equal Optima achieved for firefly function

In order to demonstrate how the firefly algorithm works, we have implemented it in MATLAB, where we have used a simple function

$$f(x,y) = (|x| + |y|)\exp[-0.06250(x^2 + y^2)$$

which has four equal peaks at (- 2 , - 2) , (-2,2), (2,-2) and (2,2). This function can easily extended to any higher dimensions. In order to show that both the global optima and local optima can be found simultaneously, we now use the following four-peak function. This function has four peaks. Two local peaks and two global peaks as shown in figure 5. We can see that all these four optimacan be found using 25 fireflies in about 20 generations (see figure 7). So, the total number of function evaluations is about 500.

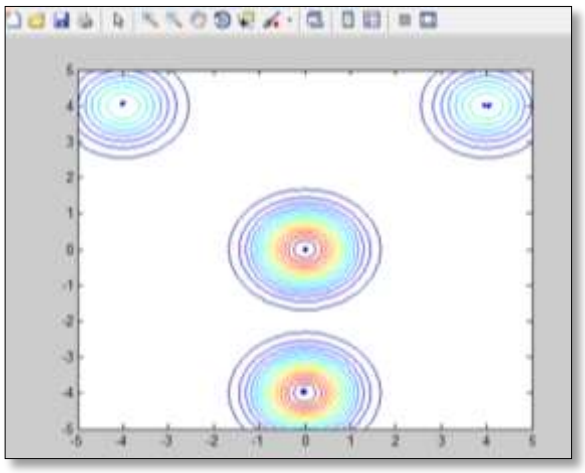


Fig.7. Final locations of 25 fireflies after 20 iterations (right).

CONCLUSION

This paper demonstrates a novel optimization technique for solution of the CM problem in open access electricity market. FFA is, successfully, implemented to minimize the rescheduling cost for alleviating congestion completely. Contingencies like line outage and sudden load variation are considered in this work. The proposed method is implemented on modified IEEE 30 –bus systems and the results are compared with random search method, simulated annealing and PSO. It is observed that the proposed FFA effectively relieves congestion, and rescheduling cost obtained is much lower than the costs reported by the other approaches. Moreover, total amount of rescheduling and losses are also found to be lower.

From all the considered simulated cases, it may be observed that FFA is a potential tool to solve a non-linear, multimodal problem. Compared to other optimization algorithms like PSO, SA and RSM, FFA has added advantage of random reduction, lesser time to produce optimum value and automatic subdivision among the fireflies. Apart from the self-improving process within the current space, the FFA also includes the improvement among its own space from the previous stages. Thus, it may be concluded that FFA is a powerful and strong approach to solve optimization problems, providing most economical, reliable and secure operating conditions. Use of sensitivity analysis for selection of participating generators along with rescheduling may be the direction of future research work. FFA may be recommended as an effective optimization tool for some other power engineering optimization applications.

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3.3.2 - Number of research papers per teachers in the Journals notified on UGC website during the year **2018-19.**

SR.No.	Title of paper	Name of the author/s	Department of the teacher	Name of journal	Year of publication	ISSN number	Link to the recognition in UGC enlistment of the Journal /Digital Object Identifier (doi) number		
							Link to website of the Journal	Link to article / paper / abstract of the article	Is it listed in UGC Care list
1.	Automated e-billing & Power control system through power line communication	D.L.Bhombe, Dr.D. D. Nawgaje	Electronics and Telecommunication engineering	Global Journal of Engg. Science & researches	Aug. 2018	2348-8034	http://www.gjesr.com	http://www.gjesr.com/Issues%20PDF/NC-Rase%2018%20(Recent%20Advances%20in%20Science%20and%20Engineering)/Track-6/26.pdf	NO
2.	A survey on parallel imaging in magnetic Resonance imaging	Dr. K. B. Khanchandani V. K. Bhangdiya	Electronics and Telecommunication engineering	Journal of Emerging Technologies and Innovative Research	May-19	2349-5162	https://www.jetir.org/	https://www.jetir.org/papers/JETIR1905N86.pdf	NO
3.	Fake news Identification using machine learning	Dr. K. B. Khanchandani	Electronics and Telecommunication engineering	International Journal for Research in applied science & Engg.	May-19	2321-9653	https://www.ijraset.com/	https://www.ijraset.com/fileserve.php?FID=22722	NO

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Fax : 091-7265-252346
Email: principal@ssgmce.ac.in,registrar@ssgmce.ac.in
Website- www.ssgmce.ac.in

4.	IOT Based Smart Wireless Sensor Network for Industrial Automation: A Review	V. N. Bhonge	**Electronics and Telecommunication engineering**	International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering	Sept. 2018	2320 – 3765	http://www.ijareeie.com/	http://www.ijareeie.com/upload/2018/september/7_IOT.pdf	NO
5.	IOT Based Smart Wireless Sensor Network for Industrial Automation	V. N. Bhonge	**Electronics and Telecommunication engineering**	International journal of innovative research in computer and communication engineering.	Oct. 2018	2320-9801	https://www.ijircce.com/	http://ijircce.com/admin/main/storage/app/pdf/U1ti1R1mFQ9rDmbevlbPzoNlJN9BGozYSP46vfUW.pdf	NO
6.	A Wireless IOT System for GAIT Detection in stroke Patent	V. N. Bhonge	**Electronics and Telecommunication engineering**	JETIR	May-19	2349-5162	https://www.jetir.org/papers/JETIR2005206.pdf	https://www.jetir.org/papers/JETIR1905G51.pdf	NO
7.	EEG Spectral Analysis on OM Mantra Meditation: A Pilot Study	B. P. Harne	**Electronics and Telecommunication engineering**	Applied Psychophysiology and Biofeedback	June, 2018	1090-0586	https://www.springer.com/journal/10484	https://link.springer.com/article/10.1007/s10484-018-9391-7	YES

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Website- www.ssgmce.ac.in

8.	Survey on Om Meditation: Its Effects on the Human Body and Om Meditation as a Tool for Stress Management	B. P. Harne	**Electronics and Telecommunication engineering**	Psychological Thought	Apr-19	2193-7281	https://psyct.swu.bg/index.php/psyct	https://research.mitwpu.edu.in/pdf/publisher-pdf-fulltext-survey-on-om-meditation-its-effects-on-the-human	YES
9.	Explore the effect of Om mantra meditation on brain with wavelet analysis	B. P. Harne	**Electronics and Telecommunication engineering**	WSEAS TRANSACTIONS on SIGNAL PROCESSING	May, 2019	1790-5052	https://wseas.org/wseas/cms.action?id=18815	https://www.wseas.org/multimedia/journals/signal/2019/a105114-685.pdf	YES

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AUTOMATED E-BILLING AND POWER CONTROL SYSTEM THROUGH POWER LINE COMMUNICATION

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ABSTRACT

Now a days electricity is very important to carry out various work which need electricity. And because of that, proper utilization of this commodity is of immense important to us. That's why, it is required to measure power consumption. Previous system require an individual and agent to physically come and take down the readings and report to house hold or office the amount one has to pay. The objective of this paper is to measure and monitor the electricity consumed by consumers in a locality and transmitting the measured reading between the consumer and utility. The concept of Power Line Communication is used for the transfer of data between consumer and utility. Power Line Communication uses the high power line for the communication. The vital merit of this system is that no additional transmission line is needed for the transmission of data. It gives the useful functionality of switching the power ON or OFF to the user based on the signal sends to it from the controller.

Keyword: *PLCC:Power Line CarrierCommunicationmodem , EB: Electricity Billing , AMR: Automatic meter reading*

I. INTRODUCTION

A. Power line communication

Here the power line carrier communication modemis useful to send and receive serial data over existing AC power lines of the building. It has large immunity to electrical noise patience in the power line and built in error checking therefore it cannot give out corrupt data. The modem is in the form of a ready to use circuit module. It is capable of providing 9600 baud rate less rate bi-directional data communication. Due to small size it can be integrated and become part of the consumer's power line data communication system.

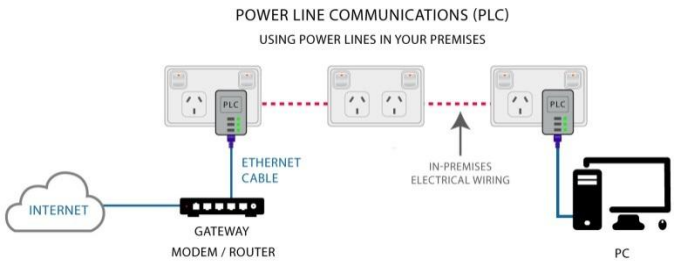


Figure1.PLC

B. Hardware required

1) Digital energy meter:
The Digital energymeter is a high-accuracy, fault-tolerant electrical energy measurement IC that is intended for use with 2-wire distribution systems. It is electrically fed and calm of electronic controllers. It assemble an interface for the data to be transmitted from the remote terminal to the isolator block.

2) Optocoupler:
In this project, an electrical isolation between energy meter and power line modem is very important. For this purpose an optocoupler is used.

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3)Microcontroller:
Then the microcontroller which has been used in project is AT mega 328, Flash, EEPROM, and SRAM are all integrated onto a single chip, removing the need for external memory in most applications. Some devices have a parallel external bus option to allow adding additional data memory. Almost all devices have serial interfaces, which can be used to connect larger serial EEPROMs or flash chips.

4) LCD:
LCD stands for Liquid Crystal Display. It is a display device which display the information provided to it. Its shape and size varies for different applications.

5) PLC modem:
Power line modem is useful to send andreceive serial data over AC mains power lines of the building.[1]

II. LITERATURE REVIEW

Inthe previous technologies for the automatic meter reading there are many factors which are missing that is speed and also due to the use of GSM the interference problem can be there .When there is the use of android technology for the automatic meter reading there is less memory storage. Also if the network connection is week then there may be the loss of data connection. Now the power line carrier communicationhas also been used as a technology but still there is only the advancement in automatic meter reading of each house from EB office.And the automatic power controlling is not present there so it is less advantageous than the system which has been proposed in this paper.

So here in our project the power line communication modem is used but for automatic meter reading as well as for the power supply controlling through GUI , if the bill has not been paid by the customer in time. And after the payment of bill automatically the power supply connection will be ON of that customer's house by the EB officer.

III. PROPOSED SYSTEM

C. System Description:

The customer section consists of digital energy meter. The output of the processor is a digital pulse which depends upon the load used. These digital pulses are given to the input of second section through the optocoupler. Hence the energy consumed by the consumer is measured digitally. The control section in customer section is the heart of the system which consists of the micro controller. For every 3200 pulse the micro controller receives it increases the number of units consumed by the consumer by 1 which is stored in the EEPROM. The vendor section consists of the PLC MODEM which is a transceiver i.e. it can receive as well as transmit data. The PLC modem receives the input from the microcontroller and transmits it to the EB office. These are received by the modem placed in the EB office.[1]

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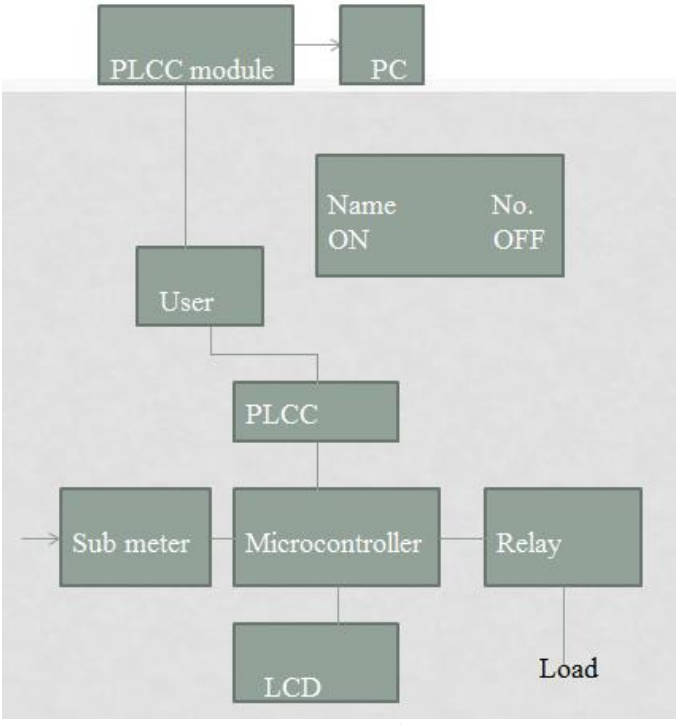


Figure2: Practical implementation of automatic meter reading

In the above system the microcontroller will first read the data ih the form of units present on the sub meter. Then the readings will get send in the forward direction towards the PLCC. In this project we required total two PLC modem. One for transmitter and another for receiver to decode the data. Afterwards the EB officer will save all the data in the PC of each house and accordingly he will send the amount of bill customer has to pay.

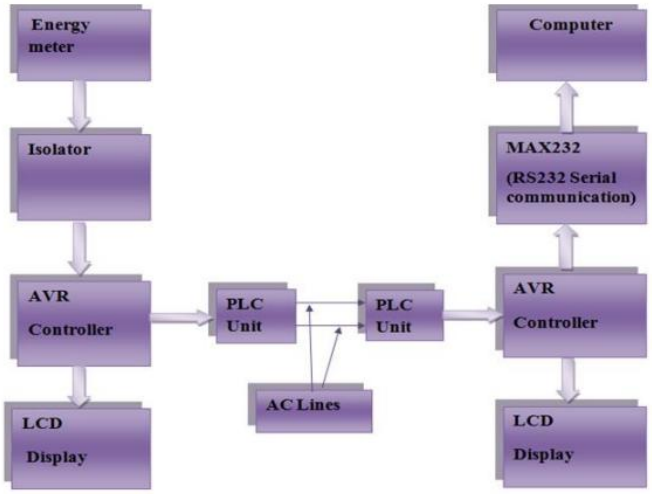


Figure3.Alternative diagram of Automatic meter reading

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D. AMR (Automatic Meter Reading)

Basically the AMR is apower measuring device , generally it is being used in measuring electricity , gas , water consumption in many countries on the world since it has a lot of advantages that the old analog meters doesn't have. It has advantages in safety , real time measuring and time save as well as it has a better user interface and digital data analysis . AMR appears in several types depends on measured data type and data transfer technologies . We can say that AMR is the best solution to measure,collect and analyze data for the big networks like the electricity transmission and distribution network in Egypt . In the year 1886 , the first AC transmission line was installed . Since this age , it was very important to measure the energy that consumers pay for . Hence , the first generation of power meters was found which we know as (Watt-Hour meter) . As most of us know , the first generation(traditional meter reading devices) is being used tell now in many places .It has a lot oflimitations that we will mention later . To overcome this limitation we have to modify a newreading system that provides remote reading, safety , on-time readings and a simple user interface . That is what AMR provides successfully.[2]

E. Description of customer and vendor unit

The first one is the customer section consists of digital energy meter and control system. The current transformer (CT) and voltage transformer (VT) of the specified rating are used. The output of the processor IC is a digital pulse, which depends upon the load used. These digital pulses are given as an input to the second section through the optocoupler. And that's why the energy consumed by the consumer is calculated digitally. The control system in customer section is the heart of the system which consists of the micro controller(ATMEGA328). For every specified number of pulse the micro controller receives it increases the number of units consumed by the consumer by 1, which is stored in the EEPROM. This is then displayed onLCD. The vendor unit consists of the MODEM which is a transceiver i.e. it can receive as well as transmit data. The modem receives the input from the microcontroller and transmits it to the EB side. These are received by the modem placed in the electricity billing side and sent to the PC. The tariffs are calculated using VB software by the PC and sent to the micro controller through the same pair of MODEM. Hence the number of units consumed andthe amount is displayed on the LCD panel.[3]

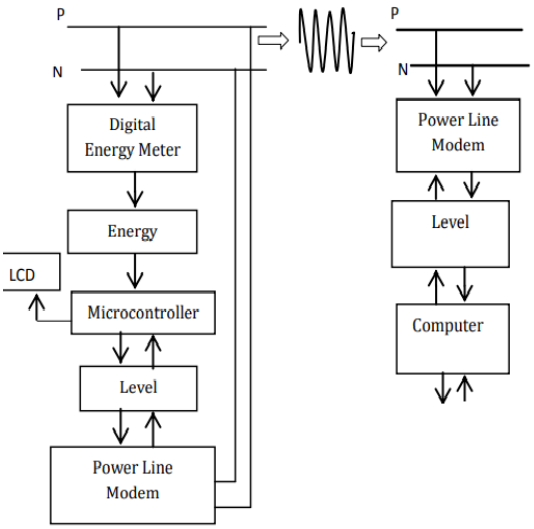


Figure 4. Customer and vendor unit

Though many technological innovations are taking place in this world, existing electricity consumption billing process seems in India to be very obsolete and does not meet the latest technology available. In this paper, the above said process is totally automated and the communication is made possible entirely through the power line. Not only the billing, even the control of system is fully automated by this technique i.e. when a consumer fails to pay his bill consumption within a given period of time the supply automatically gets cut off to his house and the

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restoration is done only when the bill is cleared. The currently usedsystem involves the user to go up to the EB office to manually pay his bills. The readings are taken using the analog meter present in the customer's house. The readings are taken using an employee working at the EB office. This system is having some of limitations like erroneous readings, easy manipulation, manual labor and time consuming. In the proposed system, the analog energy meters are replaced by digital meters which is advanced . The meter readings in the form of digital data are transferred from the customer end to the Electricity billing office through power line. [4]

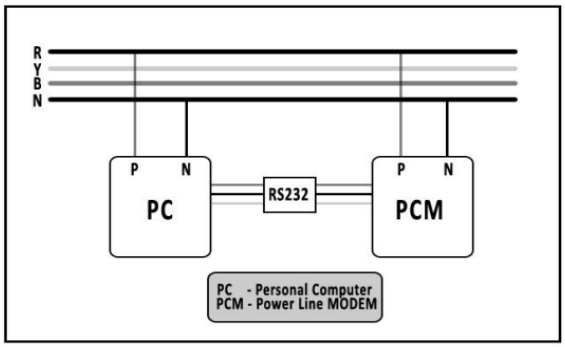


Figure 5: Connection between PLC and PC

F. Power line communication and computer connection

There is a cable which is used for serial data transmission. Thus the connection between the computer and the PLM is in the form of serial data transmission with a start byte and end byte attached to the data. In the prototype software a specially designed binary enables the power line modem to get the KWh readings from each energy meter on the consumer end. A protocol is sent from the PC to the meter requesting the meter reading. The meter in turn sends back the meter reading value. A data base management system is maintained in the PC to store the power consumption details of the customers. These details are processed to obtain the bill that is to be paid by the customers. As soon as the bill is generated the grace time for the consumer is given for paying the bill. The computer continuously monitors, whether the bill is cleared in time. If not, the PC sends the trip signal via concentrator, through the power line, to the node at the consumer end. The supply is again restored back only when the bill is cleared .[5]

We propose to create such energy meters, which will have the de multiplexer or decoder circuits to decode this information. This data will then be read by an AVR microcontroller circuit also built in the energy meter.

Based on the information, which is nothing but the billing status of the consumer, indicating whether he has paid his bill or not, the microcontroller circuit will trigger a relay based switching circuit, which controls the power supply to the customer.The information will source, or at the distributing local substation, by the electric company officials, by an encoding/multiplexing circuit. It will contain the information of all consumers, being retransmitted periodically. We will demonstrate this system with a single energy meter, due to budget constraints.[6]

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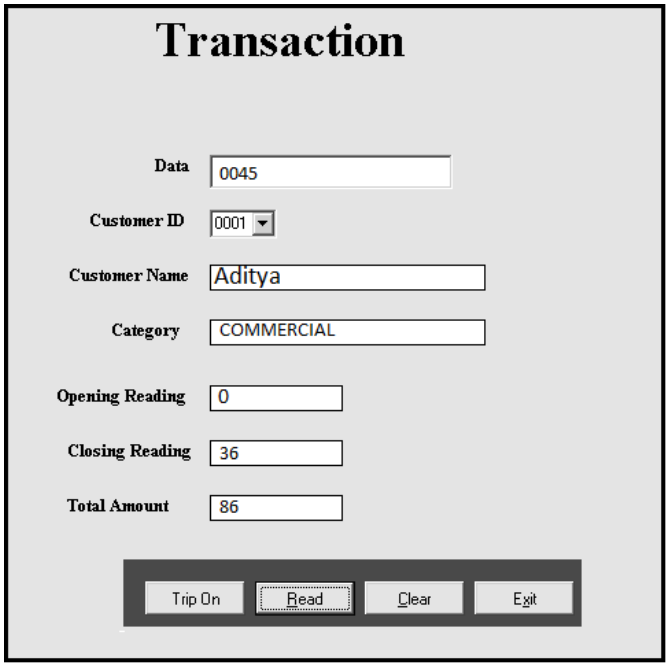


Figure 6: Billing form

Above figure is showing the billing form on which the amount which should be paid by the user is also shown. Many problems had encountered during implementation but finally design had been successfully implemented, simulated, and results are taken. It is also researched several ways to improve the system. The GUI could be used which is in built in the matlabto communicate with the low level instructions in the Power PC micro-controller to give a user-friendly interface for both transmitter and receiver.

IV. CONCLUSION

The system which has been proposed saves time and money, increases customer satisfaction, reduces complaints and worker injuries and can pay for itself in a handful of years. Utilities should look beyond basic meter reading expenses to determine how an automated system will drive efficiencies and savings throughout many departments in the organization. This proposed Automated EB model includes an office module which has a PC with its back end connected to a database. The other module is the customer home module which is present at the home this module is used to make note of the amount of power consumed by the customer and after a period of 1 month it sends to the PC in the EB office. This EB office module calculates the data and sends it to the customer along with the due date. The customer also gets details of the bill on his mobile phone through which he can pay the bill. If the customer fails to pay the bill the automated system, cut OFF the customer‟s supply and the restoration takes place only after the bill is cleared. Even though there are new modern methods of communication of billing data, the use of existing power line seems to be the most economically efficient.

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A SURVEY ON PARALLEL IMAGING IN MAGNETIC RESONANCE IMAGING

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Abstract: Parallel imaging is a vigorous method to accelerate the acquisition of magnetic resonance imaging (MRI) data. Parallel imaging works by collecting reduced data set for image reconstruction with the help of receiver coils array. The undersampling of data creates aliased image, to produce aliasing free image parallel imaging techniques can be used. The applications of parallel imaging is to reduced the acquisition time, improve the spatial resolution or both. In this paper basic physics for magnetic resonance imaging (MRI) is given also the structure of MRI machine is described. The focus of the paper is to introduce the parallel imaging techniques in MRI such as Generalized Autocalibrating Partial Parallel Acquisition, Sensitivity Encoding and Partially parallel Imaging with Local sensitivities are described.

Index Terms **-** MRI, Parallel Imaging, SENSE, GRAPPA

I. INTRODUCTION

MRI is popularly used technique which generates detailed image of tissues and organs of human body in presence of magnetic field and radio waves. With the help of MRI images doctor can get very small details of patient's body with the help of Nuclear Magnetic Response (NMR). Human body is made up of 70% of water i.e. H_2O. Hydrogen nucleus is form by combination of single proton and no neutron, as a spinning charge particle this produces a magnetic field known as magnetic moment. Normally the protons are oriented randomly after the application of magnetic field the protons get aligned parallel or anti parallel to the magnetic field. MRI uses the magnetic properties of hydrogen atoms to produce images. The components of MRI system are primary magnet, gradient magnet, radio frequency (RF) coils and a computer system. In the presence of primary magnetic field the hydrogen atoms body tissues get aligned parallel or anti parallel to the magnetic field. The atoms which are parallel to the magnetic field are low energy state atoms and the ones which are anti parallel are high energy state protons. A greater proportion aligns parallel than anti parallel to primary magnetic field. The gradient coils are placed inside the primary magnet and are used to generate secondary magnetic field. They are arranged in opposite to each other so that they can produce positive and negative pulse. MRI has capacity to image directionally in x, y and z axis due to the arrangement of gradient coils. There are three gradients named according to the direction they work. The z gradient runs along long axis to produce axial images, the y gradient runs along the vertical axes to produce coronal images and the x axis runs along horizontal axis to produce sagittal images. The radio frequency coils or RF coils are used to transmit the radio frequency signal and to receive the signal in MRI. RF coils are available in various designs suitable for body part of which image is to be taken. The computer systems are used to store the RF signal where it is converted to digital form. The signal representing the imaged body part is stored in the temporary image space or k-space.

K-space is an array of numbers where each number represents spatial frequencies in the MR signal. It is a grid of raw data in the form of (k_x, ky) which is directly obtained from a MR signal. The values in the k-space correspond to spatial frequency of image. Rows near centre of k-space grid corresponds to low-order phase encode steps and row near top and bottom corresponds to higher order phase encoding. Due to application of the gradients for phase and frequency encoding, the MR signal is in Fourier like format.

Parallel imaging uses the known placement and sensitivities of receiver coils to get the spatial location of MR signal. Due to this coils allow reduction in phase encoding steps during image acquisition which reduces the scan time. Parallel imaging is a reconstruction technique which can be used to reconstruct undersampled data from any type of pulse sequence. The methods for parallel imaging are Partially Parallel Imaging with Local Sensitivities (PILS), Sensitivity Encoding (SENSE) and Generalized Autocalibrating Partial Parallel Acquisition (GRAPPA)

II. PARAMETERS

Following parameters can be consider to check the image quality.

2.1 Mean Square Error (MSE)

It is the cumulative squares error between the reconstructed image to the original image. Low value of MSE indicates better system. It is calculated by mathematical expression,

$$MSE = \frac{1}{MN}\sum_{y=1}^{M}\sum_{x=1}^{N}[I1(x,y) - I2(x,y)]^2$$

2.2 Correlation

It is the measure of similarities between reconstructed image and reference image the maximum value of correlation is one. The correlation is calculated with the help of,

$$Correlation\ factor = \frac{\sum_i (x_i - x_m)(y_i - y_m)}{\sqrt{\sum_i (x_i - x_m)^2}\ \sqrt{\sum_i (y_i - y_m)^2}}$$

2.3 Peak Signal to Noise Ratio (PSNR)

PSNR is the measure of peak error. The maximum value of PSNR indicates the better results. Peak Signal to Noise Ratio is calculated as,

$$PSNR = 10 \log_{10} \frac{max^2}{MSE}$$

2.4 Acceleration factor (R)

Acceleration factor also known as reduction factor is the ratio of amount of fully sampled k-space data to the amount of undersampled k-space data. It is calculated by using,

$$R = \frac{(Amount\ of\ k - space\ data\ for\ fully\ sampled\ image}{Amount\ collected\ in\ accelerated\ acquisition}$$

2.5 Acquisition time

Total acquisition time is given by the product of repetition time and number of phase encoding lines. Repetition time helps to determine contrast in the image and phase encoding lines determine the resolution of image in phase encoding direction. Acquisition time is given by,

$$T_A = T_R \times N_{PE}$$

Where,

$T_A = Acquisition\ time$

$T_R = Repitation\ time$

$N_{PE} = Number\ of\ phase\ encodes$

III. PILS

Field of view (FOV) is the distance over which MR image is acquired or displayed. During acquisition smaller FOV images are acquired parallel to elements in array. The PILS takes the concept of reduced FOV acquisition in single coil and apply it to the array acquisition. Different coils in an array have different localized sensitivity. Each coil has sensitivity in some region and remaining region consists of zeros. Each coil will contain the information of different region of object. Periodically repeated images are formed due to accelerated acquisition. As the reduced FOV is larger than sensitivity region the position of sub image is lost and appear separated in the full FOV. With the help of exact position of each coil in array, the corresponding image at correct position is extracted. When all such sub images are obtained, they are combined to form full FOV image.

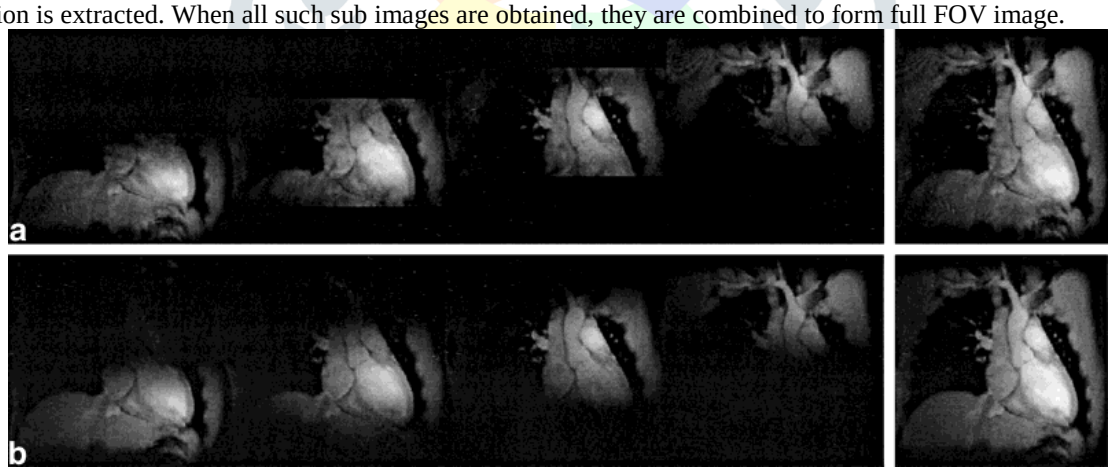


Fig 1 a: PILS reconstruction. b: Corresponding fully gradient reference images. The PILS image in a have comparable quality to those acquired in b[2]

It is Partial Parallel Acquisition imaging technique which is easy to implement in practice, easy to understand, requires minimal a priori information about the coil array and provide optimal SNR at all acceleration factors [2]. Small FOV images are acquired for each coil using the knowledge of position in bands. They are then positioned at proper location in image sized of full FOV.the result is then combined to get final image.

IV. SENSE

It is form of image domain parallel imaging. The known sensitivities of the coils are used to reconstruct the images. It can be use for cardiac and head images. The sensitivity maps are acquired during the prescan. There are basic four steps in SENSE. The coil sensitivities are obtained during the prescan (a separate acquisition before actual image scan begins). The undersampled k-space data is acquired with the help of accelerated scan. Small FOV images are constructed for each coil. When all partial images are available, they are combined by matrix inversion method. The most important step in sense is to measure the coil sensitivities correctly. Low resolution images are obtained from each coil; these images are divided by low resolution body coil image obtain normalized form. The coil sensitivity maps are obtain by applying filtering, point estimation on data. These maps quantify the relative weighting of signals from different points of origin within the reception area of coil.

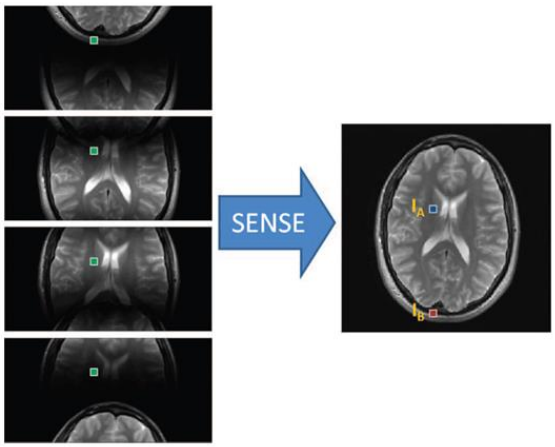


Fig2: Image reconstruction with SENSE[1]

V. GRAPPA

There are four major steps in GRAPPA viz. Data acquisition, estimation of missing line, generate individual coil images and combine the images. During data acquisition some phase encoding lines are left out, GRAPPA is used to create these left out lines of k-space. After the reconstruction of full k-space the Fourier transform is applied to get the image. The data which is available is used to get the missing lines. MR signal is digitized and demodulated to fill the k-space. Due to multiple phase encoding k-space lines got missed. The centre line of the k-space data is fully sampled and contains autocalibration region (ACS). Extra ACS lines are used to reconstruct image hence known as Autocalibrating. Appropriate combination of acquired points is used to estimate missing points. The data from ACS region is used to estimate weighting factors. Weighting factor represents how each coil distorts, smears and displaces spatial frequencies. Global weighting factors are combined with small region of local data (kernel) to find out missing k points. The kernel describes number source point to obtain fully sampled k-space. Missing data is estimated with the help of weighting factors and known data. Target points can be found by sliding the kernel throughout the ACS region. The mathematical relation between source and target points in ACS region is determine using the weight set. Once the weights are estimated the kernel is moved to under sampled region to fill the missing lines. After the availability of the full k-space data, individual coil images are generated by applying Fourier transform. When we have individual coil images then they are combined by using sum of square method to get one image.

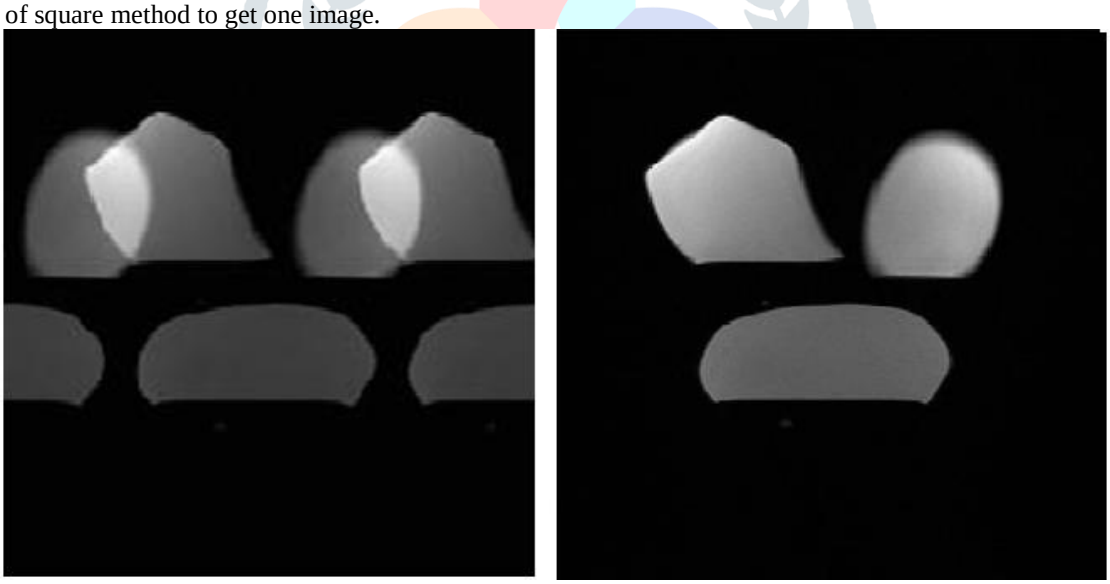


Fig 3: Aliased image obtain from undersampling and aliased free image after GRAPPA

The benefit of the autocalibrating process used in GRAPPA is that, besides using the ACS lines to determine the coil weighting factors, these extra lines can be integrated directly into the final image reconstruction to improve image quality[1].

VI. CONCLUSION

In this review three parallel imaging techniques are discussed. The time for collecting k-space data can be shorten by undersampling the k-space in phase encoding direction. Parallel imaging takes the help of array of coils and specialized algorithms to create full k-space resulting in the full FOV image. PILS requires minimal information about the coil array to obtain image. The incorporation of simple coil parameters into a localized Fourier transform allows reconstruction of full FOV images. SENSE uses the knowledge of coil sensitivity maps to perform the image reconstruction. GRPPA uses autocalibration signal and kernel in k-space to obtain aliased free images. Parallel imaging can be used to reduce acquisition time, improve temporal and spatial resolution and for betterment of image quality.

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Fake News Identification using Machine Learning

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Abstract: Fake news is nothing but junk news also we can say hoaxes that consists of disinformation spread via social media. Fake news is written and published usually with the intent to mislead in order to damage an organization or a person. Fake news can be spread via traditional print, broadcast news. Nowadays Controlling of fake news is become important issue. For that various methods are used. It is difficult to minimize 100% hoax from social media, but at least there is a technology which can reduce the hoax in social media. With the help of different classifier one can identify fake news. In this work I used two different classifiers which are SVM classifier and Naive Bayes Classifier With this classifiers I achieved 60.97% accuracy with the SVM classifier and a 59.76% with the naïve bayes classifier. This Paper shows the operational comparison of both the classifiers.

Keywords: SVM, NB, SVC, SGD, Hoaxes

I. INTRODUCTION

Fake news is now viewed as one of the greatest threats to democracy, journalism, and freedom of expression. It has weakened public trust in governments. The goal of the Fake News Challenge is to explore how artificial intelligence technologies, particularly machine learning and natural language processing, might be leveraged to combat the fake news problem. Fake news is increasingly becoming a menace to our society. It is typically generated for commercial interests to attract viewers and collect advertising revenue.

II. TYPES OF FAKE NEWS

There are differing opinions when it comes to identifying types of fake news. However, when it comes to evaluating content online there are various types of fake or misleading news we need to be aware of. These include:

A. Clickbait

Clickbait stories use sensationalist headlines to grab attention and drive click-throughs to the publisher website, normally at the expense of truth or accuracy.

B. Propaganda

Stories that are created to deliberately mislead audiences, promote a biased point of view or particular political cause or agenda.

C. Satire/Parody

Lots of websites and social media accounts publish fake news stories for entertainment and parody. For example; The Onion, Waterford Whispers, The Daily Mash, etc.

D. Sloppy Journalism

Sometimes reporters or journalists may publish a story with unreliable information or without checking all of the facts which can mislead audiences. For example, during the U.S. elections, fashion retailer Urban Outfitters published an Election Day Guide, the guide contained incorrect information telling voters that they needed a ‘voter registration card’. This is not required by any state in the U.S. for voting.

E. Misleading Headings

Stories that are not completely false can be distorted using misleading or sensationalist headlines. These types of news can spread quickly on social media sites where only headlines and small snippets of the full article are displayed on audience newsfeeds.

F. Biased/Slanted News

Many people are drawn to news or stories that confirm their own beliefs or biases and fake news can prey on these biases. Social media news feeds tend to display news and articles that they think we will like based on our personalised searches.

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A variety of sources for news exist, and the most widely used are listed below.

1) *Radio:* There are many types of radio broadcasters, including commercial and non commercial, that deliver news to listeners. It is common for local radio stations to exist as affiliates of larger broadcast networks.
2) *Newspapers:* The highest circulating print media is newspaper.
3) *Television:* The largest broadcast US television news networks include NBC, CBS, ABC, and Fox. Local television news channels carry national news programs as well as local news programs.
4) *Word of Mouth:* News that you hear from others by word of mouth is also a source of news!
5) *The Internet:* Since its invention and widespread use, the Internet has rapidly become a major source for news. Many news sites correspond to radio, newspaper, and television networks, but some news organizations, which mostly focus on political news, only appear online such as Politico, Real Clear Politics, and The Huffington Post.
6) *Social Media:* Social media is another source of news users visit sites like Facebook and Twitter to follow and share news. For mobile use, social media sites also develop and release apps for phones or other mobile devices that users can download to access news.

III.SVM CLASSIFIER

For a dataset which contains features set and labels set, an SVM classifier create a model to predict classes for new examples. It classifies that examples means it assigns new data points to one of the classes. If there are only 2 classes then it can be called as a Binary SVM Classifier. There are 2 kinds of SVM classifiers:

A. Linear SVM Classifier
B. Non-Linear SVM Classifier

Svm Linear Classifier is the linear classifier model, In which we can consider that training examples plotted in space. These data points are expected to be separated by an apparent gap. It predicts a straight hyperplane dividing 2 classes. The primary focus while drawing the hyperplane is on maximizing the distance from hyperplane to the nearest data point of either class. The drawn hyperplane called as a maximum margin hyperplane.
In the real world, our dataset is generally dispersed up to some extent. To solve this problem separation of data into different classes on the basis of a straight linear hyperplane can't be considered a good choice. For this Vapnik suggested creating Non-Linear Classifiers by applying the kernel trick to maximum-margin hyperplanes. In Non-Linear SVM Classification, data points plotted in a higher dimensional space. SVMs are effective when the number of features is quite large.
It works effectively even if the number of features are greater than the number of samples.

IV.NAIVE BAYES CLASSIFER

Bayes Theorem works on conditional probability, which is the probability that an event will happen, given that a certain event has already occurred. Using this concept we can calculate the probability of any event based on the likelihood of another event
Below is the formula for calculating the conditional probability.
Where,

$$P(H|E) = \frac{P(E \mid H) * P(H)}{P(E)}$$

P(H) is the probability known as the prior probability.
P(E) is the probability of the evidence.
P(E|H) is the probability of the evidence is true.
P(H|E) is the probability of that the evidence is there.
The concept I use to classify fake news is that fake news articles often use the same set of words while true news will have a particular set of words. It is quite observable that few sets of words have a higher frequency of appearing in fake news than in true news and a certain set of words can be found in high frequency in true news. Of course, it is impossible to claim that the article is fake just because of the fact that some words appear in it, hence it is quite unlikely to make a system perfectly accurate but the appearance of words in larger quantity affect the probability of this fact.[16] Naive bayes is Very simple, easy to implement and fast and Needs less training data.

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V. DATASET

The important is the collection of input data that is News in this case. Online news can be collected from different sources, such as news agency homepages, search engines, and social media websites. The dataset used to test the efficiency of the model is Buzzfeed news dataset having, 10240 news article tagged as real or fake.

VI. IMPLEMENTATION DETAILS

As mentioned above I used Buzz feed news Dataset. Every news statement is labelled as "REAL" and "FAKE" were tagged as 1 and 0 respectively so as to classifier. These dataset is then shuffled randomly and divided into two parts that is training and testing dataset. Training dataset was used to train the classifier. Test dataset was used to get result or estimation of how well the classifier performs on new data. After pre-processing Feature Extraction is performed using TF-IDF transform. Term Frequency refers to how many times a given term appears in document and Inverse -document frequency measures the weight of the word in the document i.e. if the word is common or rare in document. In short it shows the importance of words in the sentence, all the words which are less important like a, an, the, as etc are get removed after these process. Count Vectorizer allows us to use the bag-of-words approach by converting a collection of text documents into a matrix of token counts.

VII. RECEIVED RESULTS

After doing all the process I got the final result in the form of confusion matrix. A confusion matrix is a technique for summarizing the performance of a classification algorithm. It shows result Including with some parameters like precision, recall, f score etc. From the obtained confusion matrix I get the classification accuracy can be obtain as the ratio of correct predictions to total predictions made.

Classification accuracy = correct predictions / total predictions

In other way we can write Accuracy as,

$$\mathrm{ACC} = \frac{\mathrm{TP} + \mathrm{TN}}{P + N} = \frac{\mathrm{TP} + \mathrm{TN}}{\mathrm{TP} + \mathrm{TN} + \mathrm{FP} + \mathrm{FN}}$$

Where,

True positive (TP), True negative (TN), False negative (FN), False Positive (FP).

Classification Using SVM and Naïve Bayes classifier is shown in the following table:

Total News statements :10240

Tabel 1.1

Parameters in confusion Matrix	SVM	Naive Bayes
TP	2016	758
TN	4228	5362
FP	1524	390
FN	2472	3730

So, by using Support vector machine and Naïve Bayes classifier fake news can be identified with the accuracy of 60.97% with the SVM classifier and accuracy of 59.76% with the naïve bayes classifier.

VIII. CONCLUSION

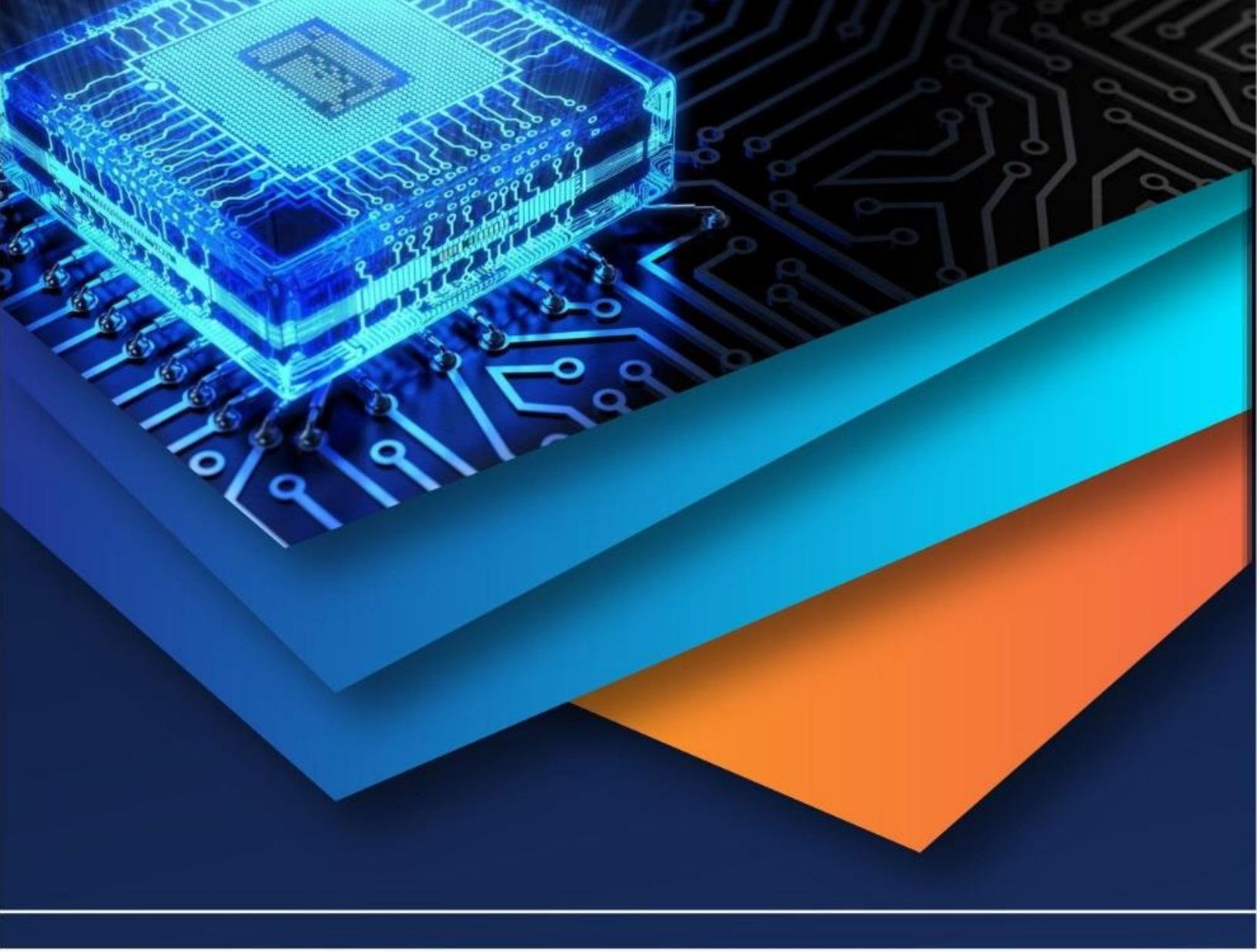
In this way very first I have gathered all the necessary dataset. After that the filtering of dataset was done on the basis of various news statements and its respective Labels. Then pre-processing is done in various ways to get the data in machine readable form. Finally classification is done by two classifiers which was SVM and Naive Bayes classifier. By using Support vector machine and Naïve Bayes classifier fake news can be identified with the accuracy of 60.97% with the SVM classifier and accuracy of 59.76% with the naïve bayes classifier. Therefore by observing the results in this Experiment I conclude that SVM classifier is better choice for detection of fake news than Naive Bayes classifier. To improve the results further we can use Deep learning approach for that we required lot of learning data, so these becomes the future scope.

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IOT Based Smart Wireless Sensor Network For Industrial Automation:A Review

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ABSTRACT: With advancement of Automation technology, life is getting more straightforward and less demanding in all perspectives. In this day and age Automatic systems are being favoured over manual framework. With the fast increment in the number of users of internet over the past decade has made Internet an integral part of life, and IoT is the most latest and rising internet technology. This system proposes an internet based industry automation system that enables a single industry administrator to control industry appliances easily utilizing ARM7 processor and IOT. This proposed system takes into consideration automation of industrial loads to accomplish computerization over internet. This utilizes IOT for the web serve interface and ARM7 processor to process and run circuit loads. User is permitted to send commands for machines/load switching over internet utilizing IOT from anyplace on the planet over internet. The ARM7 processor captures these instructions via net over wifi connector. Presently the ARM7 processes got information to remove user common. Subsequent to getting commands it displays it on LCD display. Additionally it switches the loads on/off based on received commands to achieve user desired output. The system hence accomplishes industry automation over IOT utilizing ARM7 processor.

KEYWORDS: Arm7, internet of things (IOT), GSM, LCD, Relay.

I. INTRODUCTION

Automation is one of the increasing needs with in industries. Automation decreases the human efforts by replacing the human efforts by system which are self operated , The Internet is one method for the developing platform for automation, through which new advancement are made through which on effortlessly monitor too control the system utilizing internet. As we are making utilization of internet the system becomes system and live data monitoring is also possible utilizing IoT system.

IOT can be depicted as connecting everyday objects like smart-phones, Internet TVs, sensors and actuators to the internet where the devices are intelligently linked together enabling new forms of communication between things and people and between things themselves.

Here this system proposes a internet based industry automation system that enables a single industry operator to control industry appliances easily utilizing ARM7 processor and IOT. This proposed system allows for automation of industrial loads to achieve automation over internet. We utilize IOT for the web serve interface and ARM7 processor to process and run circuit load.

User is permitted to send commands for machines/load switching over internet utilizing IOT from anyplace in the world over internet. The ARM7 processor captures these commands by net over wifi connector. Presently the ARM7 processes received information to extract user commands. Once you have commands it displays it on LCD show. Likewise it switches the loads on/off based on received commands to accomplish user desired output. The system in this way achieves industry automation over IOT utilizing ARM7 processor.

II. MOTIVATION

The new time of technology has reclassified communication .The most majority these days approach mobile phones and in this manner the world in reality has turned into a global village. At any given minute, a particular individual can be reached with the mobile phone. But the use of cell phone can't simply be limited to sending SMS or starting conversations. New developments and ideas can generate from it that can additionally upgrade its capabilities.

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Advances, for example, Infra-red, Bluetooth, and so on which has developed in recent years goes to show the very fact that improvements are in fact possible and these improvements. Have eased our life and the manner we stay. Remote management of a several home and office appliances is a subject of developing interest and in recent years we have seen numerous systems giving such controls.

III. LITERATURE REVIEW

Our proposed device allows for automation of business masses to achieve automation over net. We use IOT for the web serve interface and ARM7 processor to manner and run circuit hundreds [1].
Implementation of web server utilizing Raspberry Pi for intelligent monitoring is new method to monitor a industrial environment which designed here for the real time implementation[2].a raspberry pi running with Linux OS coded with C++ program that recovers the temperature and in addition humidity readings and these values are sensed and sent to the internet[3].
Personal Computer based temperature monitoring and control system utilizing virtual instrumentation, Lab VIEW. Data acquisition is an crucial position in industry so that you can make certain the excellent of service. Temperature sensor measures the temperature and produce corresponding analog sign which is similarly processed by way of the microcontroller. The simulator acquires information from the microcontroller through Ethernet port. The facts can be displayed on the LCD in microcontroller and PC monitor Automation and control can be done with the help of control hardware [4]
we are developing a system which will automatically monitor the industrial applications and produce Alarms/Alerts or take intelligent decisions using concept of IoT. IoT has given us a promising method to build powerful industrial systems and applications by using wireless devices, Android, and sensors [5].
The proposed system is having centralized controller, sensors and relays. Centralized module is the main unit that collects the data from plant sensors and gives this data to the end user utilizing GSM communication. Additionally at whatever point required it control the production automatically by switching the relays and actuators. The ARM7 LPC2148 is utilized as monitoring and controlling unit for various parameters [6].
we can interface website page and server through gateway. The common gateway Interface (CGI) is a standard for interfacing external applications with data servers, similar to HTTP or Web servers. A plain HTML document that the Internet daemon retrieves' is static, which implies it, exists in a constant state: a text file that doesn't change. A CGI program, then again, is executed continuously, with the goal that it can output dynamic information [7].
We are developing a system which will automatically monitor the industrial applications and generate Alarms/Alerts or take intelligent utilizing idea of IoT. This system likewise helps us take some essential decision from any purpose of the world inside web network. Wifi shield is being utilized to go about as service point amongst network and interfacing network [8].
This paper combines the idea of Raspberry Pi industrial workstation and industrial Automation utilizing IoT. The system utilizes the raspberry pi as controller and server, the programming is done in the python dialect. The website page is outlined in HTML, JQuery, Ajax and Cup as structure for rendering the HTML template in python. All sensor information are gathered through raspberry pi. All the utilization full information are get to remotely through internet of thing platform [9].

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III. BLOCK DIAGRAM

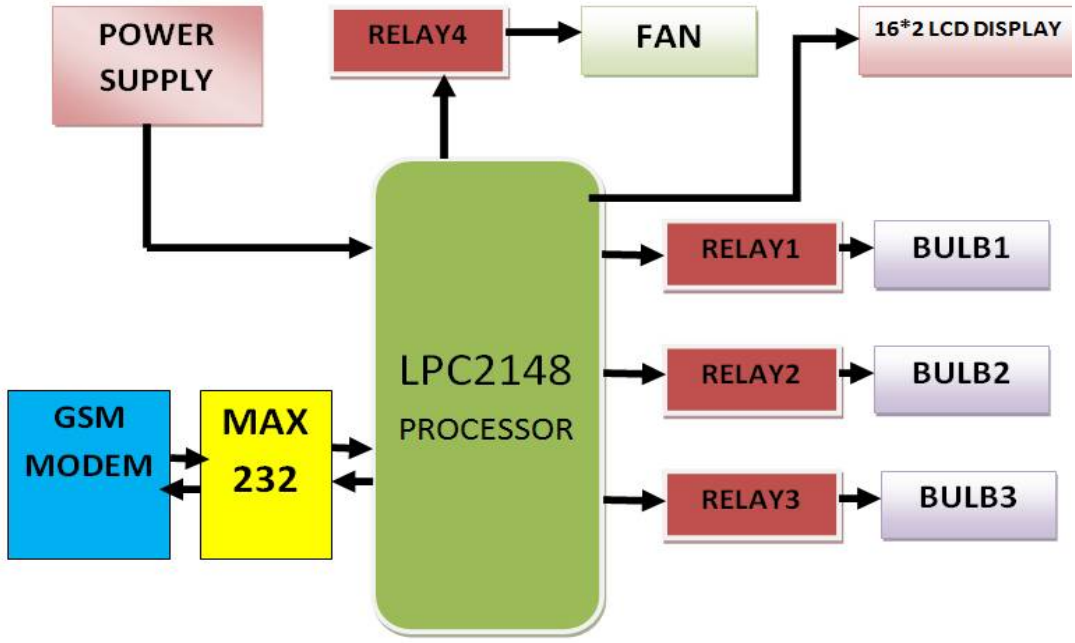


Fig.1 Block diagram of a system

V. HOW THE SYSTEM CAN WORK

The diagram shows the element involve in our system. The need voltage of 5v for arm7 processor is equipped from the ability offer unit so crystal rectifier can glow indicating that the system is prepared to be used. Then for shift load on/off the user has got to send the command from anyplace within the world through net. Through wireless fidelity the ARM7 method or capture these command and process there on to extract the need user command for shift the load. Extract command it then show it on LCD and per user command it then switches the load. For shift the various appliances connected we tend to use the relay driver circuit. To achieve the automation the user has got to initial send the command to arm7 processor through net. The electronic equipment we've got to power the control unit and certify it's operating properly or not. And when these following step are going to be happen. The user sends the command for the receiver.GSM receiver receives that command sent by the user over net.GSM receiver decodes the sent mail yet as sends the rules to the microcontroller (ARM7). Microcontroller problems the command and relying upon that it switches the load on/off.

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VI. FLOW CHART



VII. CONCLUSION

In this system could control industrial devices utilizing the wired controls as well as with the assistance of internet of Things which is the developing innovation in recent times we effectively controlled the industrial devices utilizing the IOT interface. This can be helpful to different industrial applications where machines should be controlled from distant places. This system responds to the controls sent as well as monitor gadget on local display for on and off and can perform similar tasks repeatedly reducing human efforts.

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IOT Based Smart Wireless Sensor Network For Industrial Automation

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ABSTRACT: With development of Automation technology, lifestyles are getting more truthful and less demanding in all perspectives. In this point in time Automatic systems are being favoured over guide framework. With the fast increment in the number of users of internet over the past decade has made Internet an indispensable part of lifestyles, and IoT is the maximum present day and rising internet era. This gadget proposes an internet based totally enterprise automation machine that allows a unmarried enterprise administrator to govern industry appliances without problems utilizing ARM7 processor and IOT. This proposed device takes into consideration automation of commercial loads to perform computerization over net. This utilizes IOT for the web serve interface and ARM7 processor to manner and run circuit masses. User is permitted to ship instructions for machines/load switching over internet utilizing IOT from anyplace on the earth over net. The ARM7 processor captures those commands through internet. Presently the ARM7 strategies got information to dispose of person commonplace. Subsequent to getting commands it displays it on LCD display. Additionally it switches the loads on/off based totally on acquired commands to obtain person desired output. The device as a result accomplishes industry automation over IOT making use of ARM7 processor.

KEYWORDS: Arm7, internet of things (IOT), GSM, LCD, Relay.

I. INTRODUCTION

Automation is one of the growing needs with in industries. Automation decreases the human efforts by way of replacing the human efforts by system that are self operated , The Internet is one approach for the growing platform for automation, thru which new development are made through which on effects monitor too control the device making use of net. As we are making utilization of net the gadget turns into machine and live data tracking is also viable making use of IoT system. IOT may be depicted as connecting everyday objects like smart-telephones, Internet TVs, sensors and actuators to the net in which the gadgets are intelligently connected collectively permitting new varieties of communiqué among things and people and between matters themselves. Here this device proposes a net primarily based enterprise automation device that enables a unmarried industry operator to control enterprise home equipment easily utilizing ARM7 processor and IOT. This proposed device lets in for automation of industrial masses to attain automation through gsm. We make use of IOT for the internet serve interface and ARM7 processor to method and run circuit load. User is authorized to ship instructions for machines/load switching over internet making use of IOT from anyplace within the global over internet. The ARM7 processor captures these commands by using internet over wifi connector. Presently the ARM7 methods obtained facts to extract consumer commands. Once you've got commands it displays it on LCD display. Likewise it switches the masses on/off based totally on received instructions to perform person desired output. The machine on this way achieves industry automation over IOT making use of ARM7 processor.

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II. HARDWARE COMPONENT

2.1ARM LPC2148 Microcontroller

We used ARM 7 LPC 2148 microcontroller in our assignment; it plays the function of a relevant processing unit in the assignment. The ARM board controls all the methods related to the machine. Hence, it's far maximum important part of device. LPC2148 microcontroller board is based totally on a sixteen-bit/32-bit ARM7TDMI-S CPU with actual-time emulation and embedded trace help, that combine microcontrollers with embedded high-speed flash reminiscence starting from 32 KB to 512 KB. A 128-bit wide memory interface and unique accelerator architecture permit 32-bit code execution on the maximum clock charge. For important code size programs, the opportunity 16-bit Thumb mode reduces code by means of more than 30% with minimum overall performance penalty. This is 32-bit micro-controller manufactured by way of Philips semiconductors (NXP). Due to their tiny length and occasional electricity intake, LPC2148 is ideal for programs where miniaturization is a key requirement, along with get right of entry to manipulate and point-of-sale.

2.2 Features of LPC2148 Microcontroller:

•16-bit/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package deal.
•eight KB to forty KB of on-chip static RAM and 32 KB to 512 KB of on-chip flash memory; 128-bit huge Interface/accelerator permits excessive-pace 60 MHz operation.
•USB 2.Zero Full-pace compliant tool controller with 2 KB of endpoint RAM. In addition, the LPC2148 provides 8 KB Of on-chip RAM available to USB by way of DMA.
•One or (LPC2141/42 Vs, LPC2144/46/48) 10-bit ADCs provide a complete of 6/14 analog inputs, with conversion Times as low as 2.Forty four ms according to channel.
•Single 10-bit DAC offers variable analog output (LPC2148 only).
•Two 32-bit timers/external event counters (with four capture and 4 examine channels each), PWM unit (six outputs) And watchdog.
•Low power Real-Time Clock (RTC) with unbiased power and 32 kHz clock enter.

2.3 LCD DISPLAY:

This is the instance for the Parallel Port. This instance would not use the Bi-directional feature found on more recent ports, for that reason it ought to paintings with most, if not all Parallel Ports. It but would not display using the Status Port as an input for a sixteen Character x 2 Line LCD Module to the Parallel Port. These LCD Modules are very common these days, and are pretty easy to work with, as all the common sense required walking them is on board.
Pros:
•Very compact and mild
•Low electricity intake
•No geometric distortion
•Little or no flicker relying on backlight technology
•Not tormented by display burn-in
•No excessive voltage or different risks gift in the course of repair/service
•Can be made in nearly any length or shape
•No theoretical resolution limit

2.4 RELAY

A relay is an electrically operated transfer. Many relays use an electromagnet to function a switching mechanism automatically, but different running ideas are also used. Relays are used wherein it's miles vital to control a circuit by means of a low-strength signal (with entire electrical isolation among manage and controlled circuits), or wherein numerous circuits ought to be managed by means of one sign. A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic area which draws a lever and adjustments the switch contacts.

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The coil contemporary can be on or off so relays have two transfer positions and maximum have double throw (changeover) transfer contacts as proven within the diagram.

2.5 GSM MODEM:

SIM 800C GSM Chip

SIM800C is a complete Quad-band GSM/GPRS solution in a SMT kind, which can be embedded inside the client applications.SIM800C helps Quad-band 850/900/1800/1900MHz, it may transmit Voice, SMS and information records with low electricity consumption. With tiny length of 17.6*15.7*2.3mm, it may smoothly healthy into slender and compact needs of patron design.SIM800C is a whole Quad-band. A GSM modem is a specialized kind of modem which accepts a SIM card, and operates over a subscription to a cellular operator, similar to a cellular Smartphone. From the cellular operator attitude, a GSM modem appears much like a cell Smartphone. When a GSM modem is attached to a pc, this lets in the laptop to apply the GSM modem to talk over the cellular network. While these GSM modems are maximum often used to offer cellular net connectivity, a lot of them can also be used for sending and receiving SMS and MMS messages. A GSM modem can be a committed modem tool with a serial, USB or Bluetooth connection, or it could be a mobile Smartphone that provides GSM modem competencies.

III. BLOCK DIAGRAM

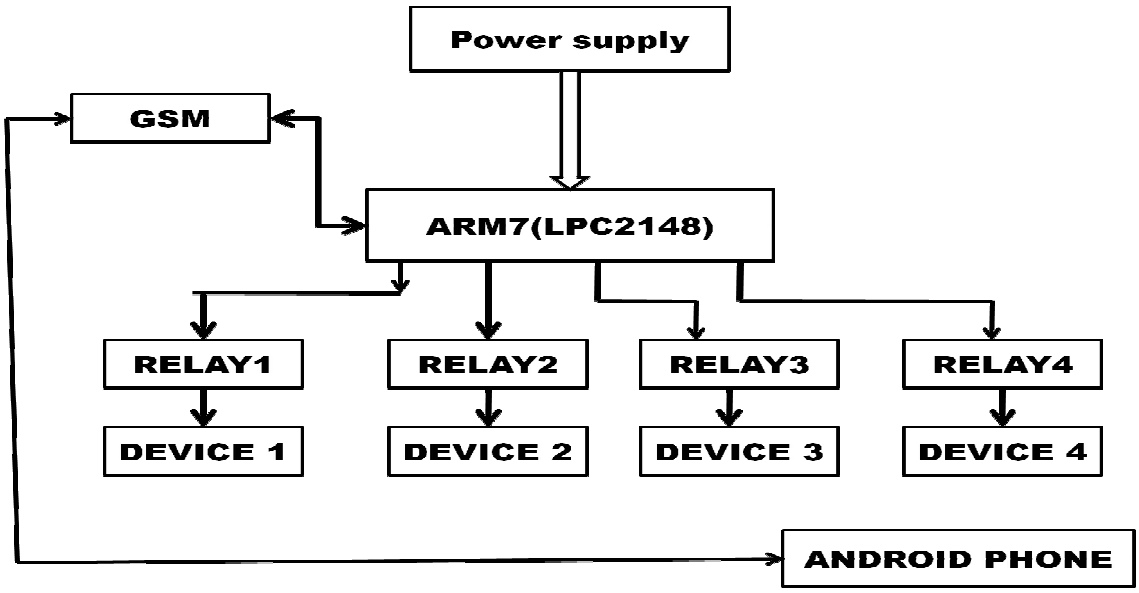


Fig 1: Block Diagram Of a System

IV. WORKING

The undertaking uses a GSM modem duly interfaced to the MC through the extent shifter IC Max232. The SIM card installed GSM modem upon receiving digit command via sms from any cell Smartphone ship that statistics to the MC via serial verbal exchange. Thus even as the program is carried out, it drives relays from the microcontroller thru relay driving force IC ULN2003. Loads are switched ON and switched OFF based totally on the corresponding command despatched from the person's cellular cell phone to GSM modem. As per the program, an acknowledgement is obtained if a sms is sent from the consumer to recognise the repute of the hundreds. The faraway MC sends robotically an sms

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confirming the popularity of the loads which includes load1 ON, Load2 OFF, load3 OFF, load4 OFF even as simplest one relay as been switched ON for load1. Accordingly the reputation shall be available relying on the variety of loads ON/OFF. The whole operation is displayed on the LCD display.

Operation Procedure:

1. To switch the 1st load send message '*a*'.
2. To switch off the 1st load send message '*b*'.
3. To switch on the 2nd load send message '*c*'.
4. To switch off the 2d load send message '*d*'.
5. To switch on the 3rd load send message '*e*'.
6. To switch off the 3rd load send message '*f*'.
7. To switch on the 4th load send message '*g*'.
8. To switch off the 4th load send message '*h*'.

V. IMPLEMENTATION RESULT



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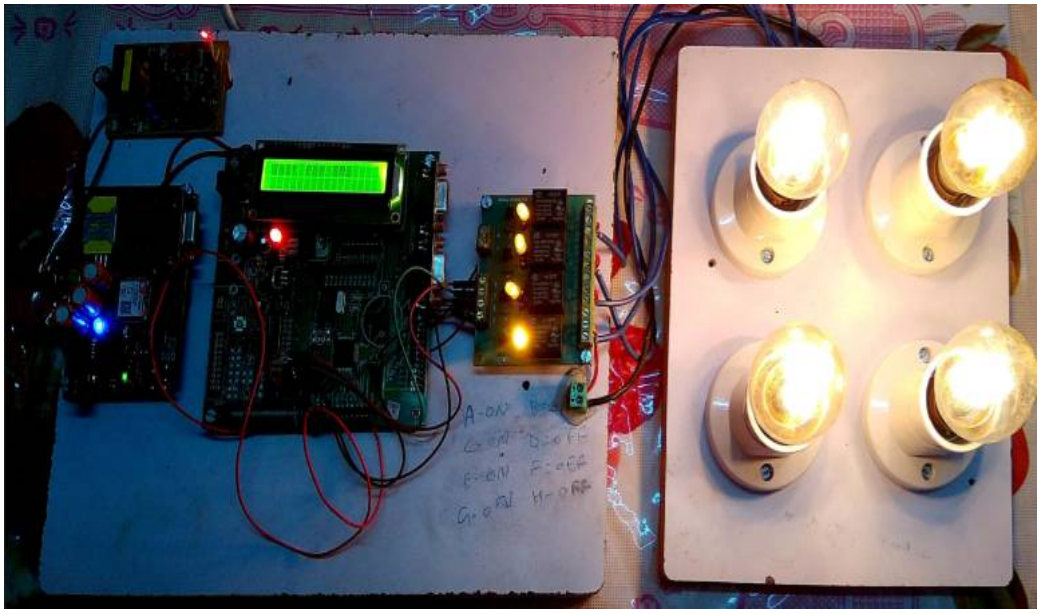


Fig 2: Implementation Of The System

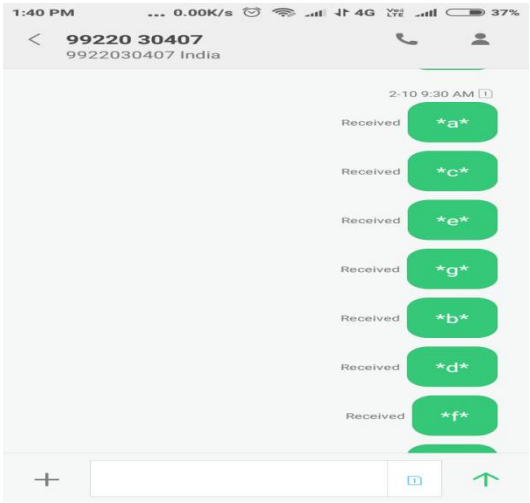


Fig 3: Screenshot Of Mobile Phone

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VI. CONCLUSION

In this system could control industrial devices utilizing the wired controls as well as with the assistance of internet of Things which is the developing innovation in recent times we effectively controlled the industrial devices utilizing the IOT interface. This can be helpful to different industrial applications where machines should be controlled from distant places. This system responds to the controls sent as well as monitor gadget on local display for on and off and can perform similar tasks repeatedly reducing human efforts.

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A WIRELESS IOT SYSTEM FOR GAIT DETECTION IN STROKE PATIENT

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Electronics and Telecommunication, S.S.G.M.C.E., Shegaon

Abstract – Gait monitoring using IOT is an important medical diagnostic process for stroke patient. we will design and implement an IOT system with Wi-Fi communication model and smart phone to discreetly monitor insole pressure of the patient's motion. this system is helpful for fall detection, the best way to reduce number of falls and to predict and prevent them from happening in first place .in this system a Internet based body sensors are used which is a wireless portable network used for gait detection and prevention of fall in stroke patient.

For this study, a smart-phone built-in sensor a with a Wi-Fi communication module is used to discreetly monitor insole pressure and accelerations of the patient's motion. To the best of our knowledge, we are the first to use the gait spatiotemporal parameters implemented in smartphones to predict a cautious gait in a stroke patient. This system can warn the user about their abnormal gait and possibly save them from forthcoming injuries from fear of falling.

INTRODUCTION:-

IOT is for internet of things. It refers to ever growing network of physical object that feature an IP address for internet connectivity and communication that occurs between these objects and other internet enabled devices and systems.

IOT is a system of interrelated computing devices, mechanical and digital machines, objects that provided with unique identifiers and ability to transfer data over network without requiring human-to-human or human-to-computer interaction.

It is a modern wireless communication technology having its application areas in various diversified domain areas. The basic idea of this concept is the pervasive presence around us of a variety of things or objects – such as Radio-Frequency Identification (RFID) tags, sensors, actuators, mobile phones.

Injuries due to a heart attack are a major health problem all over the world. More than 85% of heart attack patients regain the capacity to walk but their gait differs from that of healthy subjects. In older adults, the fear of falling after a stroke, named ‘‘cautious gait’’ leads to a specific gait pattern with reduced stride length and gait velocity. This diagnosis will also help to predict and prevent users from an injury. Stroke is one of the leading

Causes of morbidity and mortality in adults, accounting for 17.3 million deaths per year. Strokes significantly contribute to reduced gait performance. The majority of stroke patients do not reach a walking level that enables them to perform all their daily activities

IOT has created an explosion of sensor data due to the increased number of devices with embedded sensors. the aim of this study is to determine if the gait of stroke patients changes significantly over successive gait trials using smart phones. Data from a pressure-sensor embedded shoe and smart phone sensor were used to validate the proposed approach and to identify fear of falling with cautious gaits.

Injuries due to a heart attack are a major health problem all over the world. More than 85% of heart attack patients regain the capacity to walk but their gait differs from that of healthy subjects. In older adults, the fear of falling after a stroke leads to a specific gait pattern with reduced stride length and gait velocity. Stroke is one of the leading causes of morbidity and mortality in adults, accounting for 17.3 million deaths per year. Strokes significantly contribute to reduced gait performance. The majority of stroke patients do not reach a walking level that enables them to perform all their daily activities. For this project, we want to create smart sensor device that give the user feedback on any recognized walking abnormalities as fast as possible. Even though we think this will be more for older people, the product will be helpful for people of all ages. Using concept of IoT, to detect and translate physical data from real world. The device will track the user walking pattern and over course of few minute be able to give the user different type of feedback, from type of support that user need for improving walking pattern every day. This device is mainly used to prevent fall of stroke patient with help of gait detection using sensors.

LITRATURE REVIEW:-

1) Daiwat A. Vyas, Dvijesh Bhatt, Dhaval Jha, Assistant Professor, Dept. of Computer Science and Engg. Nirma University, Ahmedabad, India [2] presented a IOT which is network of physical devices accessed through the internet. It is a embedded technology to interact with internal states or external environment, it is a wireless technology that has its application in various domains IOT focus on aspects such as global real time integration, mobility, distributed intelligence, continuous connectivity etc.

2) K. Snehasri, N V Raghava Swamy [3] presented a wireless system to analyse gait using pressure sensors along with the IoT system for the real time detection of abnormality in users' gait pattern. Quantitative analysis of gait is provided by a device in conditions outside of the motion lab. While this work is continuing to be developed, it shows great promise as a future contributor to clinical gait analysis. Also, we are planning to compare healthy and stroke patients' data where the pairs are closely comparable based on gender.

3) Mark Sullivan, Casey Knox, Juan Ding [4] presented a system for Gait analysis through the Internet of Things (IoT) is able to provide an overall assessment of daily living. They design a next generation sensor embedded

smart IOT shoe can detect abnormal walking patter by foot pressure variation. In this when voltage is small the small variation in voltage then there is large change in pressure it creates a problem for sensors.

4) Wenlong Zhang, Student Member, IEEE, Xiuming Zhu, et.al.[5] presented a network-based mobile gait rehabilitation system is proposed for improved mobility and tele-rehabilitation. A compact rotary elastic actuator (cRSEA) has been introduced as the rehabilitation device. A new wireless protocol called MB Star Plus has been proposed to achieve a high sampling rate and guarantee real-time communication. A modified linear quadratic Gaussian (LQG) controller has been combined with a disturbance observer (DOB) to deal with the packet loss in this system. System integration method has been introduced and experimental results have been shown to validate the performance of this system. The plan for future clinical testing has been developed.

5) Parameters Felix Kluge, Heiko Gaßner, Julius Hannink, et.al. Presented a system for the sensor-based system [6] presented in this has great potential for the assessment of spatiotemporal gait parameters of healthy subjects and mildly affected gait of patients with PD. The possibility to quickly analyse a large number of steps that contribute to clinical decision making or treatment evaluation is an advantage compared to traditional motion capture laboratories. 6) Ruth E. Taylor-Piliae, M. Jane Mohler1, Bijan Najafi, Bruce M. Coull [7] presented a system in this Falls and fall risk are major concerns for stroke survivors. Since the majority of fall-related events occur at home or in community settings, the use of wearable mobile technology in stroke survivors may be useful to monitor fall risk and gait in these settings, which could further enhance recovery and/or prevent injuries. We have demonstrated the utility of the PAM Sys system for incorporation into cross-sectional monitoring of fall risk and gait assessment, with the potential for rehabilitation outcome assessment. As sensor algorithms become increasingly more predictive with less obtrusive applications, the potential for continuous monitoring of those at high risk for falling will develop into practical solutions for home and community settings.

6) Ruth E. Taylor-Piliae, M. Jane Mohler1, Bijan Najafi, Bruce M. Coull [7] presented a system in this Falls and fall risk are major concerns for stroke survivors. Since the majority of fall-related events occur at home or in community settings, the use of wearable mobile technology in stroke survivors may be useful to monitor fall risk and gait in these settings, which could further enhance recovery and/or prevent injuries. We have demonstrated the utility of the PAMSys system for incorporation into cross-sectional monitoring of fall risk and gait assessment, with the potential for rehabilitation outcome assessment. As sensor algorithms become increasingly more predictive with less obtrusive applications, the potential for continuou

monitoring of those at high risk for falling will develop into practical solutions for home and community settings.

Objectives :-

1. To study the different techniques for GAIT monitoring.
2.To implement subject specific IOT system for gait assistant.
3.To simulate the model for monitor a stroke patients status in real time.
4.To verify the operation by process of GAIT monitoring for stroke prevention.
5.To analyse the spatiotemporal parameters and kinematic motion of gaits.

SYSTEM ARCHITECTURE AND PROPOSED WORK :-

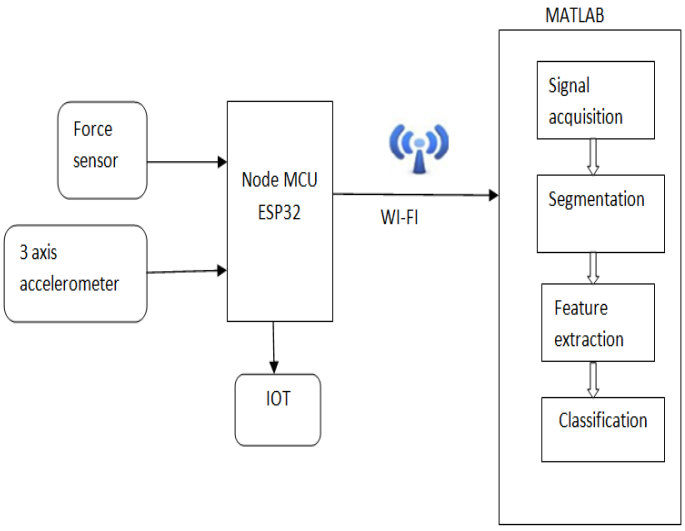
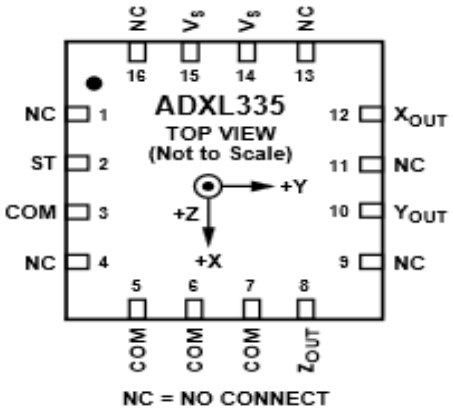


Fig : Block Diagram

SYSTEM/BLOCK DESCRIPTION:-

1) Accelerometer ADXL 335:-

ADXL335 is accelerometer sensor which deals with rule of piezoelectric effect. Whenever we will tilt the sensor the ball should move towards that path because of Gravitational force. The walls are comprised of piezoelectric elements. In this way , every time ball is contacting the wall an electric current will be created which will be translated in the form of values in any 3D space. ADXl335 is a three axis accelerometer i.e. it gives 3 values in output. It is a gadget which is utilized for detecting the adjustment in the increasing accelerations.



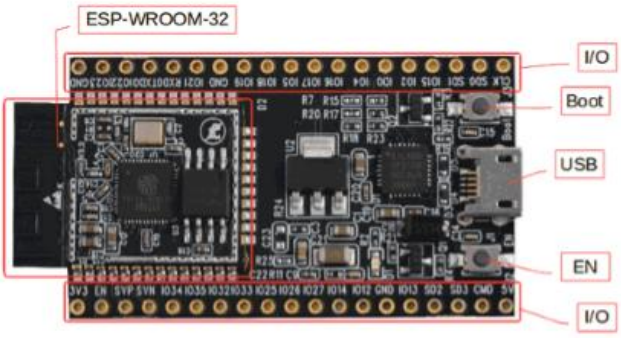
2) Pressure sensor:-

It is a gadget for measure the pressure typically of gases or fluids . Pressure is an outflow of power to stop gas or fluid. To examine the spatiotemporal parameters and kinematic movement of the gait, four piezo-resistive pressure sensors were set at the base of the shoe to evaluate the pressure distribution. It is seen that more than 70% body pressure is estimated from the front foot and back foot districts while walking.



3) Node MCU ESP32**:-**

ESP32 is a series of minimal cost, low power framework on a chip microcontrollers with incorporated wi-fi and double mode Bluetooth .the ESP32 arrangement utilizes Tensilica Xtensa LX6 microchip in both double core and single core variations and incorporate into constructed radio wire switches, RF balun, power enhancer , filters and power management modules. ESP32 is made and created by espressif frameworks. It is single 2.4 G HZ WI-FI and blue-tooth chip planned with low power 40nm innovation .It is programmed using Aurdino software.



4) IOT:-

The Internet of things (IOT) is the inter-networking of physical devices , vehicles (also referred to as "connected devices" and "smart devices") buildings and other items embedded with electronics ,software ,sensors ,actuators and network connectivity which enable this objects to collect and exchange data .

IOT is expected to offer advanced connectivity of devices , systems and services that goes beyond machine-to-machine (M2M) communication and covers a variety of protocols , domains and applications. The interconnection of this embedded devices (including smart objects), is expected to used in automation in nearly all fields, while also enabling advanced applications like smart grid , and expanding to areas such as smart cities .

5) Signal Analysis:-

a] Segmentation:-

The data taken through the WI-FI is get separated i.e. the unwanted data is removed and expected data is taken.

b] spatiotemporal parameters:-

The parameters measured from the insole pressure variation from an IOT-shoe and from the accelerometer of the smartphone was calculated to investigate common information between the parameters. Parameters with a higher coefficient were interpreted as being significant contributors to normal or abnormal walking detection. We investigated the relative error of spatiotemporal gait parameters of free gait with respect to parameters from the simulated motion gait. We observed that cadence and stride time for motion gait is higher than free gait for each trial.

C] Signal Classification:-

signal classification is to build a predictive model of signal trajectory densities in an RPS and differentiate between signals First, we applied our technique to the two data sets generated from free gait and simulated cautious gait events. It was observed that the pressure variation with one or two sensors during cautious

gait was much higher than free gait with respect to subject's gender age, height and weight. We can also see the variations of different walking patterns for different subject. Random forest technique is used for the classification of data. Two types of data i.e. motion gait and free gait is provided and check according to input data and gives the output data. For that There are 5 person, from each person we took 5 samples from it. 3 persons has free gait and 2 person's has cautious gait means fear of falling motion. So in data base we take 5 samples from each person, first 15 will be free gait and remaining 10 will be cautious gaits. In classification there are two methods training and testing.

1) Training:-

In training firstly the signal is given to signal acquisition where it converts the signal in digital form and then the signal is get segmented and from that we get the required data then it can be stored in feature database and then the classifier get trained and then it is given to validation block where signal is checked and gives the accurate data and then it goes to the trained classifier and we get the required signal and then it can be tested.

2) Testing :-

In testing the signal again converted into digital form and then it can be segmented and we get the required data and then the classifier is get loaded and it gives the classified result and then we get the output signal which is required.

Result and Disscussion :-

6.1) Flow Chart :-

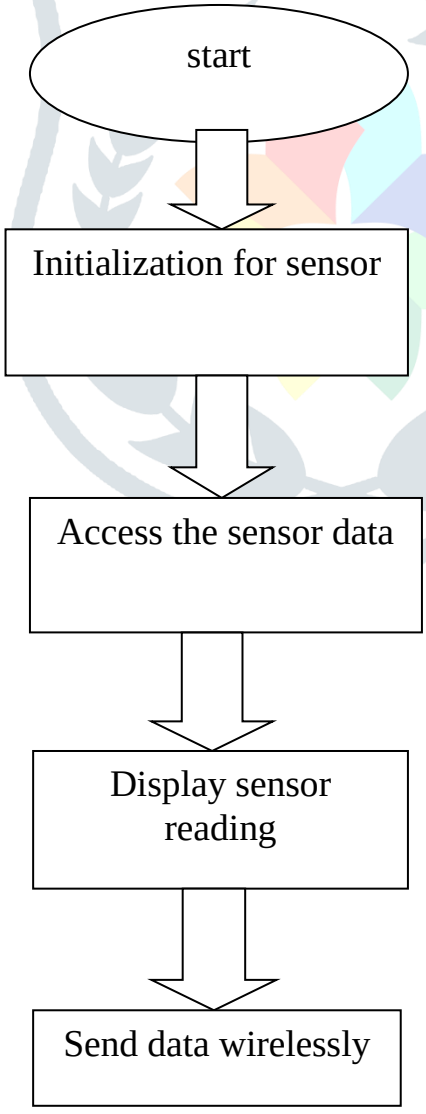


Fig :- flow chart for transmitt

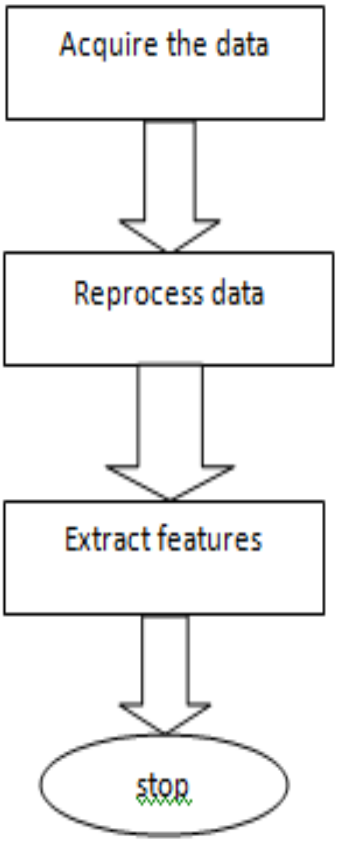


Fig :- flow chart for receiver

6.2) Results:-

In this project , the acceleration sensor and pressure sensor are the input data and then with help of MCU the output data is taken on IOT with help of "BLYNK" app and also analyze the data on MATLAB and that here we use the random forest technique for classifier . In that the 5 persons are considered, from each person we took 5 samples from it. 3 persons has free gait and 2 person's has cautious gait means fear of falling motion. So in data base we take 5 samples from each person, first 15 will be free gait and remaining 10 will be cautious gaits.

6.2.1) hardware of project:-



Fig :- hardware for gait detection

In this hardware ,we can take two sensors accelerometer and pressure sensor it senses the i/p signals and then that signals are given to MCU then MCU provides the data to mobile through IOT and also provide the data to MATLAB for analysis of that data in this hardware we provide the lithium battery of 5v for i/p voltage and make it portable device.

6.2.2) outputs of data analysis in MATLAB:-

a) Training :-

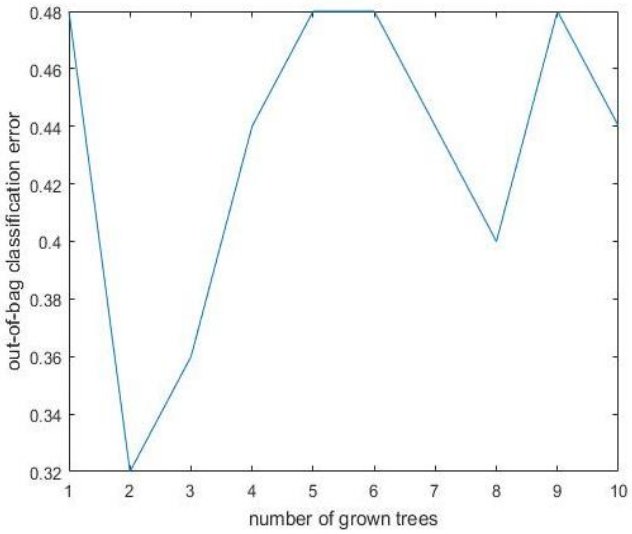


Fig :- out of bag error

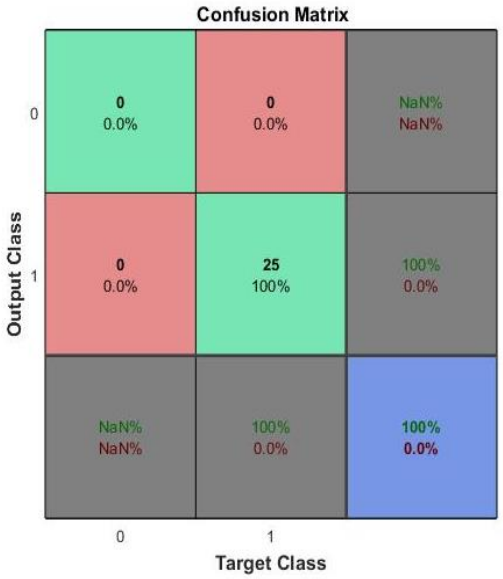


Fig :- confusion matrix

b) Testing:-

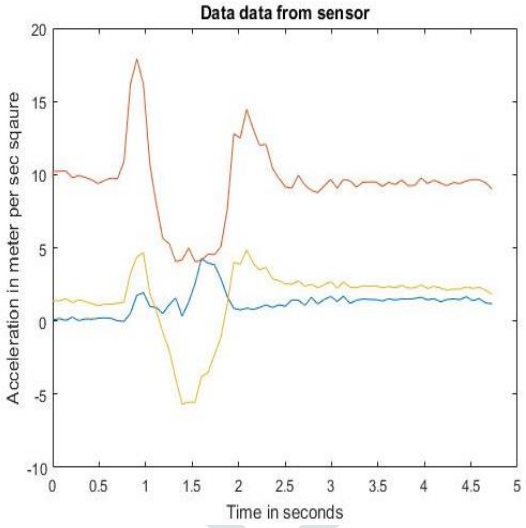


fig :- tested data of aacelerometer



Fig :- test the gait

In MATLAB, first the data is trained by using random forest technique and then the data is get then then it can be tested and depending on that it gives the result for accelerometer and pressure sensor .

6.2.3) BLYNK Results:-



Fig:- result through IOT in Mobile

In this BLYNK app , we get the output data by connecting that MCU with the mobile with help of SSID and Pass-ward . And also get the different values of accelerations and pressure and also observe the graph of accelerations on it and depending on that it predict that the gait is free or cautious.

ADVANTAGES AND APPLICATION:-

Advantages:-

a) The percentage of fall due to caution gait is reduced.

b) It also reduce the rate of morbidity and mortality in adults.

c) It identifies the problem within patient and protect them from injuries.

d) It helps in assessing, planning and treating an individual with condition affecting his or her ability to walk.

Applications:-

a) Medical diagnostics :

Pathological get may reflect compensation for underlying pathologies or be responsible for causation of symptoms in itself. The study of gait allows diagnoses and intervention strategies to not made as well as permitting future development in rehabilitation engineering .

b) Chiropractic and osteopathic utilization :

Observation of gait is beneficial for diagnoses in Chiropractic and osteopathic professions as hindrances in gait may be indicative of misaligned pelvis or sacrum. Chiropractic adjustment of pelvis has shown a trend in helping restore gait patterns as has osteopathic manipulative therapy

c) Comparative biomechanics:

By studying the gait of non human animals, more insight can be gained about mechanics of locomotion, which has diverse implications for understanding the biology of species in question as well as locomotion more broadly.

d) Gait as biometrics:

Gait has been established as biometrics to recognize people by the way they walk. This advance in gait recognition has therefore led to development f techniques for forensics use since each person can have a gait defined by unique measurements such as location of ankle, knee, and hip.

CONCLUSION AND FUTURE SCOPE

CONCLUSION:-

Gait monitoring using IOT is an important medical diagnostic process for stroke patient. We will design and implement an IOT system with Wi-Fi communication model and smart phone to discreetly monitor insole pressure of the patient's motion. in this system a Internet based body sensors are used which is a wireless portable network used for gait detection and prevention of fall in stroke patient and this is most helpful as number of falls mostly in older people is increased due to the abnormality in gait of stroke patient.

In this paper, we presented a wireless system to analyze gait using sensors through a real-time detection of abnormality in users gait patterns. The proposed Iota system can detect and predict cautious gait that can lead to a fall. Here presented preliminary results from a patient using the embedded IoT system and showed that the data can be used to analyze the cautious gait**.** The system may also find multiple applications in gait behavior detection for people with various disabilities who are at a high risk of falls related injuries with location information.

FUTURE Scope:-

It was built on a single embedded platform which is smart watch and also connected to mobile through IOT and we get the required data on a single platform and also able to connect more amount of sensors on this embedded platform and get more results.

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EEG Spectral Analysis on OM Mantra Meditation: A Pilot Study

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Abstract
Mantra meditation is easy to practice. "OM" Mantra is the highest sacred symbol in Hinduism. The present study investigated the temporal dynamics of oscillatory changes after OM mantra meditation. Twenty-three naive meditators were asked to perform loud OM chanting for 30 min and the EEG were subsequently recorded with closed eyes before and after it. To obtain new insights into the nature of the EEG after OM chanting, EEG signals were analyzed using spectral domain analysis. Statistical analysis was performed using repeated measures of analysis of variance. It did not reveal any specific band involvement into OM mantra meditation. But significantly increase in theta power was found after meditation when averaged across all brain regions. This is the main effect of OM mantra meditation. However, the theta power showed higher theta amplitude after condition at all regions in comparison to the before condition of meditation. Finding was similar to other studies documenting reduction in cortical arousal during a state of relaxation. The study argues for the potential role of loud 'OM' chanting in offering relaxation. It provides a new perspective of meditation to the naive meditators. This information may help to demystify meditation and encourage those considering this as beneficial practice.

Keywords Mantra meditation · EEG · OM

Introduction

Yoga is the holy science on philosophy that has universal, non-sectarian and timeless appeal (Madanmohan 2008). Meditation, being one of the aspects of yoga, can be defined as willfully and purposefully regulating one's own attention either for relaxation, exploring oneself or personal growth. It can operationally be divided into two categories: on focusing attention on a particular external, physical, or mental object, while ignoring all irrelevant stimuli or on an unchanging repetitive object, is constantly held in focus such as mantra mediation (Schmidt et al. 2013). It has been claimed that Mantra meditation is easy to practice (Burke 2012). Om Mantra is the highest sacred symbol in Hinduism and is the ancient sound from which all other sounds and creation emerge signifying the Supreme Power (Kumar et al. 2010). Hence, in the present study, meditation with OM mantra has been chosen.

Related Work

OM meditation brings psycho-physiological relaxation on the basis of galvanic skin response (Das and Anand 2012). The autonomic and respiratory variables were examined during OM meditation and control session (Telles et al. 1995). The repetition of "OM" is compared with repetition of "One" (Telles et al. 1998). But the repetition of OM only reduced the skin resistance, suggesting a refined change in the mental state. A subsequent study examined middle latency auditory evoked potentials before and during the practice of it. It is a comparative study between experienced meditators and aged matched naïve subjects. Reduction in the peak latency of the Nb wave during Om meditation suggests neural activity (Telles et al. 1994). Functional magnetic resonance imaging (fMRI) study (Kalyani et al. 2011) has shown significant deactivation of limbic brain regions during OM meditation. The immediate effect of 20 min of mental chanting with effortless defocusing on syllable 'OM' has been observed on the Stroop task using fNIRS technology (Deepeshwar

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et al. 2014). The protocol employed in this study consisted of random thinking, OM meditation and eight states. This study reported increased Oxy-hemoglobin concentration and cerebral blood flow in the prefrontal area during meditation compared to random thinking. It suggests that OM meditation induce a state of reduced psycho-physiological arousal with enhanced awareness and attention. Initially the author attempted to investigate the effect of OM chanting on brain by checking the complexity of EEG signal after this meditation on the basis of Higuchi fractal dimension, but OM chanting was not of fixed duration for each subject. Statistical analysis was absent in this work (Harne 2014). Even listening to the OM sound affects the neural cortex (Kumar 2015).

The time–frequency analysis on the "OM" chant signal has found that "OM" chanting reduces the stress from human mind and gives calm and peace to a stressed mind (Gurjar and Ladhake 2008).

Our Approach

All these studies related to OM meditation vary in experimental setup and methods to observe the response of meditation. It has been found that EEG analysis to investigate the effect of loud OM chanting on the brain has not been studied so far. Hence effort has been taken to examine the changes in EEG associated with OM chanting. The aim is to compare oscillatory changes in the standard frequency bands (delta, theta, alpha, and beta) before and after OM chanting. In all studies related to different meditations (Cahn and Polich 2006; Baijal and Srinivasan 2010; Chan et al. 2008; Huang and Lo 2009; Lagopoulos et al. 2009; Cahn et al. 2010) examining EEG measures reported an increase in theta power. Since other meditations have shown modulation in the theta band, it has been therefore hypothesized that like other meditation OM chanting would result in changes in theta activity.

The second purpose of this study is to explore with a group of naive meditators how OM meditation as a lifestyle-based activity effectively reduces stress for improved mental and physical health and well-being because they can present a valuable source of knowledge of the early stages of meditation practice. Hence, engineering students have been chosen as a naive meditator group.

Many studies confirm that the state changes in EEG during meditation. In this study, the objective was to verify what changes could be expected in baseline trait EEG patterns outside meditation. Hence we employed before-after without control group experimental design to particularly examine the trait changes in EEG patterns.

The rest of this paper is organized as follows. The materials and methods are discussed in first section. Second Section presents results. The discussion part is covered in third section. The conclusion is given in last section.

Materials and Methods

Subjects

A total of N = 23 naive meditators (F = 14) were assessed (M = 20.99, SD = 0.99, 18–22 years). Subjects had no meditation training. They were chosen from a college of engineering through word of mouth and were also informed that their brain activity would be recorded before and after OM chanting. They all were right-handed and blind to the experimental hypotheses with no history of neurological illness. They were nonsmokers and medication-free and none of them was a habitual drinker. Nobody had previously practiced any form of meditation techniques. All experiments were performed with the informed and explicit consent of each subject. This study is presented and applied to the concerned ethical committee of Government Medical College, Akola, Maharashtra, India.

Design of Study

This is a single group repeated measure study, in which all the subjects were asked to perform OM chanting for the duration of 30 min. Assessments were performed before and after the intervention. For this study, the following is the experimental setup (Fig. 1).

At the very first moment subject was asked to relax just laying down and with eyes closed, during which EEG of the respective subject for more than 2 min was recorded. This recorded new data is an EEG signal before OM chanting. After recording first data, he/she was asked to sit down in relax state with erect posture and closed eyes and was asked to chant OM mantra for 30 min. While chanting, first we have to inhale smoothly and hold the breath; soon we have to release the air (exhale) by chanting OM. There was no light in the room during chanting. The surrounding was made silent in order to maintain calm and peace which helped subject to concentrate fully. The respective subject was then asked to relax by laying down and eyes closed. EEG was



Fig. 1 Experimental setup

recorded for more than 2 min. This recorded data is an EEG signal after OM chanting. The subjects provided detailed descriptions of the experiences in written form when asked about the experience of it.

EEG Recording

EEG recording was performed in an electrically shield room of Bilala hospital under the guidance of Dr. Saurabh Bilala, Akola. EEG signals were recorded according to international standard 10–20 from 16 channels using RMS India system with 256 Hz sampling frequency for monopolar montages. These electrodes are Fp1, F7, T3, T5, O1, F3, C3, P3, Fp2, F8, T4, T6, O2, F4, C4, P4 (Fig. 2). The electrodes in right hemisphere were referred to the right earlobe (A2) and electrodes in left hemisphere were referred to the left earlobe (A1) with the ground at the forehead.

Analysis

Since the purpose was to explore brain dynamics as a result of OM chanting, the EEG data of the first 1 min before OM chanting was used to assess the control state and the first 1 min data after OM chanting to assess state achieved after meditation. 1 min data should be used for trustworthy spectral analysis (Nuwer et al. 1999). The EEG signals were filtered between 0.1 and 60 Hz. Since EEG is not a stationary signal for duration longer than 3.5 s (Gasser and Molinari 1996), 256 data points epoch was filtered. The FFT was then performed to the selected data for every 1 s segment. The power spectral density (PSD) of delta (0.3–4 Hz), theta (4.1–8.0 Hz), alpha (8.1–12.0 Hz), and beta (12.1–30.0 Hz) and gamma (30.1–55.0) frequency band were obtained by using Welch technique, Hanning windowing function. The resulting values were afterwards normalized into a relative power (Amodio et al. 2009; Aftanas and Golocheikine 2001) as follows:

$$Relative_power = \frac{\int_{f_L}^{f_H} S_b(f)df}{\int_0^{f_{\max}} S_T(f)df} \times 100 \quad (1)$$

where f_L is the lower frequency of particular band, f_H is lower frequency of particular band, $f_{\max} = 55$ Hz, S_b is EEG signal of particular band, S_T is the EEG signal of particular band.

Finally, mean relative power was computed for every electrode. For statistical analysis, all 16 electrodes were divided into 10 brain regions which are as follows: right occipital (O2), left occipital (O1) right parietal (P4) and, left parietal (P3), right central (C4), left central (C3), right frontal (F8, F4, and Fp2), left frontal (F7, F3 and Fp1), right temporal (T4 and T8) and left temporal (T3 and T7). Under each region, power values of the constituent electrodes were averaged, and the procedure was repeated for all the frequency bands.

Statistical Analysis

IBM SPSS, version 22 was used for statistical analysis. The normality of the relative power data distribution through a Kolmogorov–Smirnov test was preliminarily tested. It revealed a normal distribution of the data, justifying the subsequent use of ANOVA analyses. Two analyses of variance (ANOVAs) were performed on the relative power values. To verify the specificity of a band involved into the OM chanting effect, two way repeated ANOVA with factor bands (5: delta, theta, alpha, beta and gamma) and condition (2: before and after). For documenting the specificity of a location involved into the OM chanting effect, each frequency band was submitted to a within-subjects design, analysis of variance (ANOVA) over the factors of condition (before and after), hemisphere (2: left and right) and region (5: F—frontal, C—central, P—parietal, O—occipital, T—temporal). A p value less than 0.05 was considered statistically significant. Greenhouse-geisser corrected values were reported.

Results

First two-way ANOVA analysis is conducted to test the hypothesis stated in introduction. The analysis revealed only band significant effect [$F(4, 88) = 102.3$, $p = 0.00$]. This analysis failed to show significant condition main effect and band × condition interaction effect. Research results are the opposite of what was expected. No specific band involved into the OM chanting effect (Fig. 3).

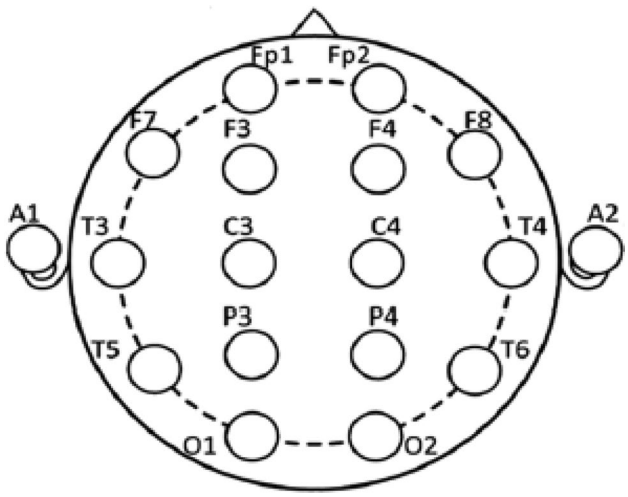


Fig. 2 Electrode placement

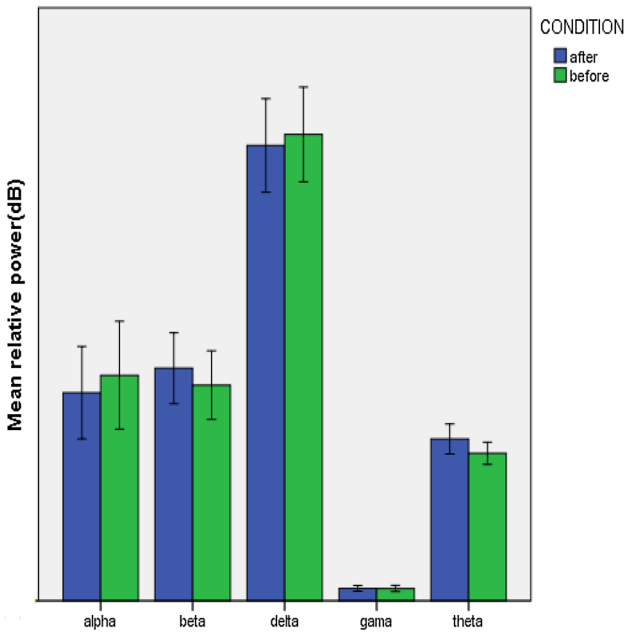


Fig. 3 Relative power before and after OM mantra meditation (N = 23). No any band exhibited a significant effect

To evaluate the association between hemisphere, region and condition after OM chanting, three-way repeated ANOVA with hemisphere (left and right), region (5) and condition (2) as factors was performed for relative power values separately for all the five types of bands (delta, theta, alpha, gamma and beta). Main effects (conditions, regions and hemisphere) and interaction effect for each frequency band are given in Table 1.

Theta Band Analysis

Repeated-measures ANOVA demonstrated significant main effects for condition for theta band only. Hence, there was a significant increase in theta power in the after condition compared to the before condition, when averaged across all brain regions. Figure 4 shows the relative power for all ten regions for before and after condition. The results clearly depicted the increase of relative theta power at all regions in after condition.

Alpha Band Analysis

Interaction effect (hemisphere × region × condition) is significant for alpha band. Post-hoc were conducted for same band. Our interest lies in only one simple main effect involves determining the mean difference in relative power between conditions at different regional levels for different hemispheres. But comparisons reflected no significant difference in before and after power in any region (Table 2).

Delta Band Analysis

Hemisphere × region × condition interaction effect is present for delta band. The same analysis is carried out as for alpha band. No significant results are found for any region for different conditions as depicted in Table 3.

Discussion

This study aimed to examine the effects of OM mantra meditation on baseline EEG brainwave patterns. Any band oscillations as a trait of 30 min OM chanting was not observed but an overall EEG wide band theta increases after this meditation significantly which is just 30 min effect of OM mantra meditation. This result is similar with previous study on experienced acem meditators (Lagopoulos et al. 2009), reporting similar EEG patterns for theta. Theta band changes are linked mostly with level of meditation experience (Kasamatsu and Hirai 1966). Hence the results are very promising with naïve meditators and only with 30 min practice of OM mantra meditation.

The closer examination showed theta activity rises insignificantly on all regions of the brain. Increased theta power across all cortical regions indicate widespread reductions in cortical arousal (Canteros et al. 2002; Jacobs and Lubar

Table 1 Results of ANOVA for relative power for two hemisphere, five regions and two conditions in all frequency bands between before and after condition of experimental group (n = 23)

Frequency band	Condition main effect	Condition × region interaction effect	Condition × hemisphere interaction effect	Condition × region × hemisphere interaction effect
Delta	F(1,22) = 0.211, p = 0.65	F(4,88) = 0.661, p = 0.621	F(1,22) = 0.147, p = 0.705	F(4,88) = 4.036, p = 0.005
Theta	F(1,22) = 4.851, p = 0.038*	F(4,88) = 0.431, p = 0.786	F(1,22) = 0.365, p = 0.552	F(4,88) = 0.962, p = 0.433
Alpha	F(1,22) = 0.5, p = 0.487	F(4,88) = 1.135, p = 0.345	F(1,22) = 1.774, p = 0.197	F(4,88) = 4.242, p = 0.003
Beta	F(1,22) = 1.164, p = 0.292	F(4,88) = 1.92, p = 0.114	F(1,22) = 1.721, p = 0.203	F(4,88) = 0.159, p = 0.959
Gam-ma	F(1,22) = 0.016, p = 0.9	F(4,88) = 0.577, p = 0.68	F(1,22) = 0.648, p = 0.43	F(4,88) = 041, p = 0.997

*Significant (p < 0.05)

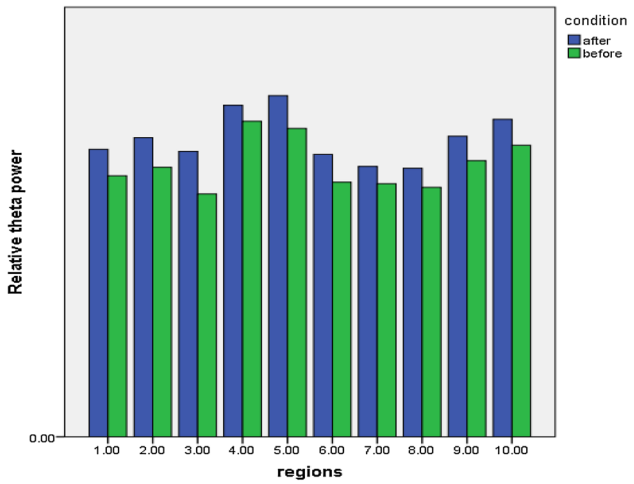


Fig. 4 Bar graph showing changes in relative power in theta band in all ten regions at before and after conditions: region: *1* left frontal; *2* left temporal; *3* left occipital; *4* left parietal; *5* left central; *6* right frontal; *7* right temporal; *8* right occipital; *9* right parietal; *10* right central

1989; West 1980; Jacobs and Friedman 2004). The state of deep relaxation is accompanied by reduction in cortical arousal (Dean and Cosic 2011). Though there is no previous report on the effect of loud 'OM' chanting on brain with EEG, an earlier study (Kalyani and et al. 2011) had observed the impact of same on brain using fMRI. Remarkably, our study findings are in tune with this previous study; OM mantra meditation offers relaxation.

As this study includes naïve meditators, subject was allowed recitation of OM mantra according to his\her vocal strength and at random frequencies. A further more detailed study can be conducted to test whether recitation of OM mantra at specific frequencies and with experienced meditators, induces enhanced effect on brain. The significance of 30-min acute session of OM chanting will result in an increased of theta activity, thus achieving relaxation.

Conclusion

In conclusion, the effect of OM meditation on brain on the basis of spectral analysis of EEG signal before and after OM chanting was examined. The results show that a 30 min OM mantra meditation practice alter theta EEG patterns significantly more than baseline EEG brainwave patterns. The findings in the present study are related to naive meditators. Thus a 30 min OM chanting serving as an introduction to meditation that provides naive meditators with the opportunity to experience the phenomenon of meditation, and then share their experiences in focus groups immediately thereafter. Further studies are required (i.e., randomized controlled trials) engaging a larger sample size, using advanced techniques to evaluate its precise physiological effects and underlying mechanisms.

Table 2 Results of paired t-test for relative alpha power for before and after condition for each region (n = 23)

Hemisphere	Region	Difference in conditions	Paired differences					
			Mean	Std. deviation	Std. error mean	95% confidence interval of the difference		
						Lower	Upper	p
Left	Frontal	Before–after	0.0195	0.0928	0.0194	−0.0207	0.0596	0.325
	Temporal	Before–after	0.0371	0.1067	0.0223	−0.009	0.0832	0.110
	Occipital	Before–after	0.0147	0.1088	0.0227	−0.0324	0.0617	0.525
	Partial	Before–after	0.0233	0.1153	0.024	−0.0266	0.0731	0.344
	Central	Before–after	0.0162	0.103	0.0215	−0.0284	0.0608	0.459
Right	Frontal	Before–after	0.0135	0.1278	0.0267	−0.0418	0.0688	0.617
	Temporal	Before–after	0.0056	0.1231	0.0257	−0.0476	0.0589	0.828
	Occipital	Before–after	0.0406	0.1306	0.0272	−0.0159	0.0971	0.150
	Partial	Before–after	−0.0256	0.1392	0.029	−0.0858	0.0347	0.388
	Central	Before–after	0.0059	0.1244	0.0259	−0.04791	0.0597	0.823

Table 3 Results of paired t-test for relative delta power for before and after condition for each region (n = 23)

Hemisphere	Region	Difference in conditions	Paired differences					
			Mean	Std. deviation	Std. error mean	95% confidence interval of the difference		
						Lower	Upper	p
Left	Frontal	Before–after	0.0169	0.1076	0.0225	−0.0297	0.0634	0.460
	Temporal	Before–after	−0.0102	0.1288	0.0269	−0.0659	0.0455	0.707
	Occipital	Before–after	0.04834	0.1572	0.0328	−0.0196	0.1164	0.154
	Partial	Before–after	−0.0000	0.1448	0.0302	−0.0626	0.0626	1.000
	Central	Before–after	0.0248	0.1272	0.0265	−0.0308	0.0792	0.372
Right	Frontal	Before–after	0.0099	0.1453	0.0303	−0.0529	0.0728	0.746
	Temporal	Before–after	−0.0006	0.1616	0.0337	−0.0705	0.0693	0.986
	Occipital	Before–after	−0.0079	0.1841	0.0384	−0.0875	0.0718	0.840
	Partial	Before–after	0.038	0.1782	0.0372	−0.0391	0.1151	0.317
	Central	Before–after	0.0031	0.1518	0.0316	−0.0625	0.06868	0.922

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or Indian Council for Medical Research or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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Theoretical Analyses

Survey on Om Meditation: Its Effects on the Human Body and Om Meditation as a Tool for Stress Management

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Abstract

Meditation and yoga both have positive effects on physical, as well as mental health. Om mantra chanting, a simple and easy to practice, also comes under the aspect of meditation. The “Om” mantra is also considered as the very name of the absolute. Om meditation not only affects the various parts of the brain, such as pre-frontal cortex, vagus nerve, amygdala and others but also affects the heart rate and respiratory rate. Considering the healing effects of Om meditation, through this paper, we are trying to explore all the relevant work done in the field of Om meditation. The survey includes a large number of papers covering the research previously conducted by many researchers, their results and different techniques adopted to study the effect of Om meditation on human beings. Studies on Om meditation are categorized under four different heads: Neuroimaging studies, EEG studies, evoked potentials studies and other methods studies. Even though the existing research evidenced capability of Om meditation in curing anxiety and depression, more rigorous studies with better design, with larger sample size and with different control groups are required. Especially the need to explore untouched research areas of Loud Om meditation using EEG is suggested in the paper. Furthermore, future research directions are also suggested.

Keywords: EEG, pre-frontal cortex, vagus nerve, amygdala

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Stress, a word formerly coined by Selye, is defined as “the non-specific neuroendocrine response of the body” (Szabo, Tache, & Somogyi, 2012). Stating the medical, social and philosophical importance of stress, Hans Selye has termed stress as the most meaningful subject for humanity (Szabo et al., 2012). Technically stress is classified as Eustress termed as positive stress, Neustress and Distress (Thapliyal, Khalus, & Labrado, 2017). Distress further leads to chronic stress (Thapliyal et al., 2017) which, if poorly managed may lead to more serious illnesses (Sharma, Dhall, Gedeon, & Goecke, 2013). Stress may arise due to a number of reasons which can include the inability to cope with work pressure, economic conditions or family issues (Smitha, Xin, Lian, & Robinson, 2017). Everyday stress may lead to adverse conditions such as anxiety, fear, anger, depression or social frustrations (Perera, Perera, Rathnarajah, & Ekanayake, 2017; Sharma et al., 2013). Long term effects of stress may affect the heart and brain functions (Chandra, Jaiswal, Singh, Jha, & Mittal, 2017). A number of studies conducted in the last decade indicate that use of yoga and meditation may reduce levels of anxiety and

depression and facilitate better states of relaxation which are conducive to better mental and physical health (Ahani et al., 2013).

Yoga is the spiritual science that is considered as omnipresent, unsectarian and unaltered phenomena (Madanmohan, 2008). Meditation is one of the aspects of yoga that can be stated as consciously and voluntarily guiding one's self-attention for relaxation or for seeking oneself or for personal improvement. Meditation can be categorized into two types: first type involves focusing attention on a particular object and second being mental or loud repetition of a chant called as mantra meditation (Schmidt & Walach, 2014). Varieties of mantras can be chosen for meditation. Mantra repetition is a simple method to implement in order to attain meditation (Burke, 2012). The appearance of an Om syllable in the Upanishads, Bhagwat Gita and Vedas make it holy and sacred (Kumar, Nagendra, Manjunath, Naveen, & Telles, 2010) thus making it the highest sacred symbol in Hinduism. Om, considered as the name of God, is a sacred syllable in Hinduism from which all other sound came into existence (Kumar et al., 2010).

Om singing is based on the generation of vibrations that propagate bottom-up through the body (Kalyani et al., 2011). Vibrations are generated by the successive uttering of simple basic sounds A-U-M that do not require involvement of the tongue. Om mantra can be chanted out loud or internally. When it is chanted out loud, the sound of the mantra becomes the focus of your attention. Saying the mantra aloud is said to help accustom yourself to the pronunciation of the mantra, as well as calming your mind. Mantras chanted mentally are the most powerful (Taimini, 1986). But mental repetition is said to require a great level of focus and attention to keep your mind pointed on your mantra (Goel, 2018). The author (Goel, 2018) suggests that it is good way to begin with loud mantra meditation.

Many studies on this mantra meditation have been conducted since 1994 (Telles, Nagarathna, Nagendra, & Desiraju, 1994). Mainly these studies were based on mental repetition of Om mantra which revealed that Om meditation leads to physiological awareness, and increased sensitivity (Kumar et al., 2010). EEG has a wide range of applications in research field since it contains a lot of pathological and physiological information (Liu, Yan, Zeng, & Wang, 2010). EEG signals are used as a tool to examine mental states, to find the effects of meditation (Harne, 2014). But neurophysiological changes from loud Om mantra meditation, are yet to be fully explored.

The syllable of 'Om 'consists of the three phonemes - A, U, and M. "A" represents the physical plane. "U" represents the mental and the astral plane, the world of intelligent spirits, and all heavens. "M" shows the deep-sleep state (Sivananda, 2010). The vibrations of Om flow from the belly to brain, and these sound vibrations have a great impact in harmonizing our body (Dwivedi & Singh, 2016).

Scope of Om Meditation

Nowadays stress is more persistent than ever because of the accelerating pace of modern life and constant change. It is a well-established fact that stress hinders memory, concentration, judgment and decision-making (Moss & Hammond, 1991). Relaxing effects produced after Om meditation can be brought by any other techniques of meditation as well (Cahn & Polich, 2006). Since Om meditation is easy to practice, it needs less time, as well as does not require expert or trainer to assist while performing; it has advantages over other meditation techniques. The purpose of this review paper is to explore the existing experimental studies on Om meditation be it loud, mental or listening Om in order to find the effects of Om meditation on the human body.

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This paper is an attempt to systematically review the available studies on Om meditation, to determine how the studies have been done and to find the benefits of Om meditation so far explored. Many researchers have found the effects of Om meditation on human beings by analyzing various parameters such as Electroencephalograph (EEG), neuroimaging, Evoked Potentials and other methods (Bhargav et al., 2016; Das & Anand, 2012; Deepeshwar, Vinchurkar, Visweswaraiah, & Nagendra, 2015; Harne, 2014; Kumar, Guleria, & Khetrapal, 2015; Kalyani et al., 2011; Telles, Nagarathna, & Nagendra, 1995; Telles, Nagarathna, & Nagendra, 1998; Telles et al., 1994; Gurjar, Ladhake, & Thakare, 2009). This review could work as a platform holding analysis of the previous studies, as well as providing directions for future research in Om meditation. To study the effects of Om chanting on human being, the study is divided, according to four different criteria depending on the parameters used to analyze the effect of Om meditation. The four criteria are listed below:

1. Om meditation studies using neuroimaging methods
2. Om meditation studies based on EEG methods
3. Om meditation studies using middle latency response (MLR) method
4. Om meditation studies using other methods

Om Meditation Studies Using Neuroimaging Methods

Table 1 summarizes the findings of studies on Om meditation based on neuroimaging method.

Table 1

Om Meditation Studies Using Neuroimaging Methods

Om chanting type	Subjects	Type of meditators	Method / Signal Processing	Experimental Design	Findings
Bhargav et al. (2016)					
Loud Om chanting	20	naïve	Functional near-infrared spectroscopy (fNIRS)	Subject exposed to mobile phones (30 min) → Om chanting (5 min)	Deactivation of pre-frontal cortices due to the vibrations produced by the sound 'Om'; Study suggests that Om chanting may have a stimulating effect on branch of vagus nerve in the ear canal.
Kumar, Guleria, & Khetrapal (2015)					
Listening Om mantra	21 (All male)	-	Functional magnetic resonance imaging (fMRI)	Listening OM (12 ms) → No sound (12 ms) → Listening AAM (12 ms) → No sound (12 ms) → Listening TOM (12 ms) → No sound (12 ms)	Neural regions activated during listening to "Om" sound in contrast to non-meaningful word (TOM); The common activated region DMFC supports the emotional empathy of "Om" sound, while SMG implicates phonological processing of "Om" syllable.
Deepeshwar, Vinchurkar, Visweswaraiah, & Nagendra (2015)					
Mental Om mediation	22 (All male)	Experienced	fNIRS	Random thinking → mental chanting and effortless defocusing on syllable "Om"	Oxygenation levels are increased in the PFC during meditation

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Om chanting type	Subjects	Type of meditators	Method / Signal Processing	Experimental Design	Findings
Kalyani et al. (2011)					
Loud Om Chanting	12	4 experienced and rest naïve	fMRI	15 Seconds REST → Om 15 Seconds → REST 15 Seconds → SSSS 15 Seconds	Significant deactivation in the amygdala, anterior cingulate gyrus, hippocampus, insula, orbitofrontal cortex, Para hippocampal gyrus and thalamus during 'Om' chanting. It suggests that Om chanting can be another therapy in depression and epilepsy

Note. DMFC = Dorsal Medical Frontal Cortex, SMG = Supramarginal Gyrus, ms = millisecond, PFC = Pre Frontal Cortex, AAM and TOM and SSSS = any random sound other than Om selected by author, REST = rest state as defined and used by author in respective study.

Functional magnetic resonance imaging (fMRI) and functional near-infrared spectroscopy (fNIRS) were used to compare and evaluate the effects of Om meditation by the following four studies. From the studies on neuroimaging (Bhargav et al., 2016; Deepeshwar et al., 2015) pre frontal cortex (PFC) area of the brain is seen to be affected wherein deactivation and oxygenation of PFC is observed which lead to the conclusion that the vibrations produced by Om meditation has relaxing effects. The authors (Bhargav et al., 2016) specifically point out stimulating effects of Om meditation on a branch of the vagus nerve. They also presented future research directions in this study with larger sample size and advanced stroop methods with reaction time along with Stroop performance scores. Studies comparing Om syllable with neutral syllable (Kumar et al., 2015) show that neural regions such as bilateral cerebellum, left dorsal medial frontal cortex and right supramarginal gyrus activate during listening to “Om” sound. Further stating that DMFC holds the emotional affinity of “Om” sound, whereas SMG suggests lingual processing of “Om” syllable. The confounding effect of Om meditation is observed in an FMRI study (Kalyani et al., 2011) that shows that meditation has a sign of relaxation. Indeed, the authors imply that Om meditation can be used as a therapy for people affected by anxiety and suffering from depression.

Om Meditation Studies Using EEG Methods

EEG signal as a neurological and psychiatric diagnostic tool was firstly used and discovered by a German psychiatrist Hans Berg in 1929 (in Tudor, Tudor, & Tudor, 2005). Table 2 summarizes the findings from EEG Om meditation studies.

Table 2

Om Meditation Studies Using Electroencephalogram (EEG) Methods

Om chanting type	Subjects	Type of meditators	Method / Signal Processing	Experimental Design	Findings
Harne, 2014					
Loud Om mantra chanting	10	Naïve	Time domain Analysis (Higuchi Fractal Dimension (HFD))	Rest → Om Chanting → Rest	Om chanting reduces the complexity of EEG signal.

The study suggests that Higuchi fractal analysis reveals that EEG complexity reduces after loud Om meditation and also states that a feeling of calmness is achieved (Harne, 2014). This study suggests that this analysis can

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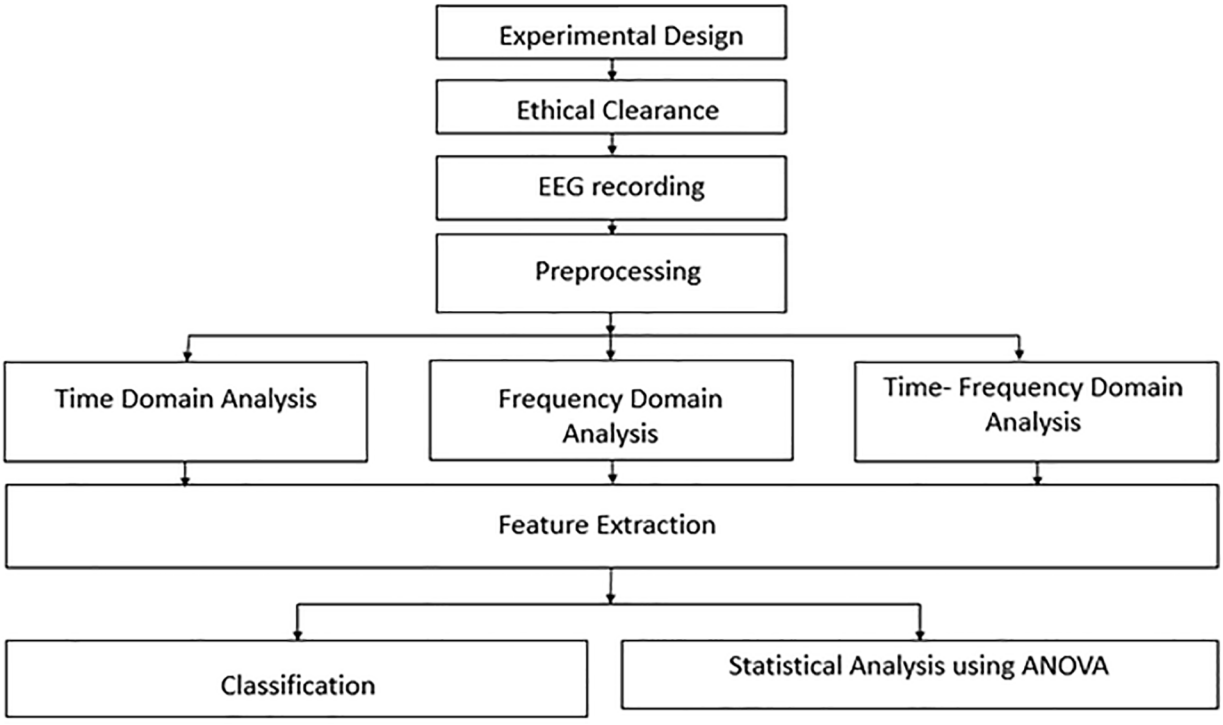


Figure 1. Framework for EEG analysis

be further extended in time domain. In order to reach more sound results it is suggested that a control group design is needed. Still very few studies have been conducted for Om meditation considering its effectiveness level. In this paper, we have also added a proposed method to explore the area of EEG analysis of Om meditation.

Since the studies conducted on EEG analysis of Om meditation are less in number and more research can be carried out in this direction, a step wise description is provided below which can help researchers exploring further this area of study. Figure 1 shows the EEG framework of EEG analysis. The first phase is to choose a proper experimental design. It is the process of outlining a study to meet defined objectives. Phase one is a very important step since it makes certain that the correct data of sufficient sample size and power is available to carry out the research in a valid and replicable way (Malik & Amin, 2017). The ethical issues should be handled before the data collection. In EEG recording phase, raw EEG signals are collected from the scalp of the brain (Puce & Hämäläinen, 2017). The next phase is preprocessing which includes artifact removal and data filtering (Ames, 1971; Basar, 1999). EEG signal is now free for time, frequency, and both time and frequency domain analysis (Al-Fahoum & Al-Fraihat, 2014). The next phase after analysis is the feature extraction. It is used to find features or information that can lead us to classification (Güler & Übeyli, 2005; Kordylewski, Graupe, & Liu, 2001; Übeyli, 2008). And the last stage is signal classification. Signal classification process can be carried out by various methods such as linear analysis, nonlinear analysis, adaptive algorithms, clustering and fuzzy techniques, and neural networks. The feature vector data obtained is analyzed and its algorithmic characteristics lead to a hypothesis (Kordylewski et al., 2001; Subasi & Ercelebi, 2005). Statistical analysis using Analysis of variance (ANOVA) or two way repeated ANOVA are used to test the hypothesis of the study.

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Om Meditation Studies Using Middle Latency Response (MLR)

Table 3 summarizes the studies conducted on MLR to examine the effect of Om meditation.

Table 3

Om Meditation Studies Using Evoked Potential (EP) and Middle Latency Potentials Response (MLR)

Om chanting type	Subjects	Type of meditators	Method / Signal Processing	Experimental Design	Findings
Telles, Nagarathna, Nagendra & Desiraju (1994)					
Mental Om meditation	18	Both naïve and experienced	AEP- MLR	Two sessions Relax (6 min) → Mental Om meditation → Relax (6 min) → Mental repeating word 'One'	Study revealed differences among senior and naive meditators, naive meditators require extra effort to practice meditation.
Telles, Nagarathna, & Nagendra (1995)					
Mental Om meditation	14	Both naïve and experience	MLR	Relax (6 min) → Mental Om meditation → Relax (6 min) → Non targeted thinking	Reduce HR indicate psychophysiological relaxation.
Telles, Nagarathna, & Nagendra (1998)					
Mental Om meditation	12	Both naïve and experienced	MLR	Three sessions Mental Om meditation (MOM) (15 min) → Mental repeating word (COM) (15 min) → Neutral thinking (15 min)	Skin resistance level reduces during mental Om meditation; Heart rate (HR) reduce; Respiratory rate (BR) reduce

Note. AEP = Auditory Evoked Potentials; MLR = middle latency response method.

Among the subjects categorized as meditators and naïve, the studies were carried out in three sessions of mentally chanting Om, mentally chanting One and neutral thinking (Telles et al., 1995; Telles et al., 1998). The experimental results showed increased peak amplitude of the Na wave during meditation among experienced meditators[1] which was correlated with an increase in the number of neurons recruited (Kumar et al., 2010), whereas a decreased amplitude in Na wave during control session was observed revealing reverse implications (Kumar et al., 2010; Telles et al., 1994). From the three studies conducted by Telles and her co-authors, it can be concluded that Om meditation produces significant health benefits such as reduced respiratory rate, reduced heart rate, reduced skin resistance and leading to a state of relaxation (Telles et al., 1994; Telles et al., 1995; Telles et al., 1998).

Om Meditation Studies Based on Other Methods

In order to find potential further benefits of Om meditation, other methods such as Galvanic skin response (GSR) and audio analysis were also evaluated (Das & Anand, 2012; Gurjar, Ladhake, & Thakare, 2009). Table 4 summarizes the studies conducted using other methods on Om meditation.

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Table 4

Om Meditation Studies Using Other Variables

Om chanting type	Subjects	Type of meditators	Method/ Signal Processing	Experimental Design	Findings
Das & Anand (2012)					
Loud Om chanting	20 (All female)	-	Galvanic Skin Response (GSR)	Prayer (15 min) → Om Meditation (15 min)	significant increase in GSR values as an effect of prayer and meditation which suggested the Psycho physiological relaxation
Gurjar, Ladhake, & Thakare (2009)					
Om chanted sound	-	-	Wavelet analysis if speech signal	-	Om chanting affords steadiness in mind, calm and peace to the stressed mind

The study on skin responses by Das & Anand (2012) revealed the Psycho-physiological relaxing effect of Om meditation and prayer. Gurjar et al. (2009) carried out a study on the audio record of Om sound. Wavelet analysis of Om chant using MATLAB revealed the positive effects of chanting Om mantra such as stabilization of brain, removal of earthly thoughts and increase of energy. The study concluded that daily practice of Om mantra helps in increasing level of human attention and concentration (Gurjar et al., 2009). Om chanting can be considered as a contributing factor to support human being affected by high levels of stress and as medicine for human being under stress.

Comparison of Om Sound With Other Sounds

Table 5 demonstrates the comparison of Om sound with other sound like 'ONE' and 'SSS'. Om sound application seems to produce better results. Further studies can be conducted by comparing it with any other relaxing sound.

Table 5

Comparison of Om Sound With Another Sound

Compared sound	Effect of Om sound vs other sound
Telles, Nagarathna, & Nagendra (1998)	
Om is compared with mental repetition of "ONE"	Om sound alone was responsible for reducing skin resistance indicating a change in mental state.
Telles, Nagarathna, Nagendra, & Desiraju (1994)	
Om sound is compared with mental repetition of "ONE"	Effect of Om sound observed in expert meditators.
Kalyani et al. (2011)	
Om sound is compared with "ssss" sound	The "ssss" task did not produce any significant activation/deactivation in brain regions as produced by Om sound.

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Conclusion and Future Directions

The effects of Om meditation on the brain and other parts of the body have been explored with various methods. The findings are varied in nature which warrants a need for empirical, experimental and theoretical studies in this field. Recent efforts on Om mantra meditation have used neuroimaging and evoked potentials study. Moreover, most of the studies are based on mental Om chanting. This paper suggests the need for further research in the field of Om meditation using EEG as a tool for analyzing mental effects of Om meditation.

Various signal processing techniques, namely fast Fourier transforms, wavelet transforms, independent component analysis, principle component analysis, coherence analysis (Kaur & Singh, 2015) can be added to investigate the information in EEG during loud Om mantra meditation.

Questioning the medicinal properties and relaxing effect of Om meditation practice is a strong impetus for future studies. Further studies are needed to examine the effects of cultural dependency and gender dependency on Om meditation. The study on this mantra carried out on subjects with different medical conditions, different age groups, different working conditions and different physical posture may help to evaluate the effect of Om meditation even better. Such studies may prove useful for society as a whole. This review argues for the EEG analysis of the loud Om mantra.

Limitations of This Review

Despite of the beneficial and stress relieving effects of Om meditation, some people are reluctant to practice it because of its religious background. We have tried to cover all studies conducted on Om meditation and summarize the effect of Om meditation on the human body. Due to a small sample size and little research in this field, only some effects of Om meditation are presented. The paper suggests a need for further research in this field, through sounder and better methodological approaches with the aims for establishing the potential positive effects of Om meditation both for physical and mental well-being.

Notes

1) Experienced meditators are the one who perform Om meditation daily whereas Naive meditators are the one who do not follow the practice of meditation daily. No scale has been given in the papers (Telles et al., 1995; Telles et al., 1998) which we have refered to compare Naive and experienced meditators.

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Competing Interests

The authors have declared that no competing interests exist.

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Explore the effect of Om mantra meditation on brain with wavelet analysis

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Abstract: - This study uses a discrete wavelet transform based feature extraction method to examine the effect of Om meditation on the brain. With twenty-three healthy engineering college students between the age group of twenty to twenty-two chosen as subjects for the study, EEG signals were obtained before performing Om meditation as well as after performing Om meditation. EEG signals were classified into Gamma, Beta, Alpha, Theta and Delta bands by using detailed coefficients and approximate coefficient obtained by five level wavelet transform. Feature such as relative power using the Welch method was extracted from each band and was analyzed using two way repeated analysis of variance. Findings reveal increased theta power and higher theta amplitude in after condition at all regions in comparison to the before the condition of meditation but results were not significant. No significant results were found in any other band. As described in other studies, increased theta power is a sign of relaxation. Results revealed through the study were promising results for single day testing and immediate effect of Om meditation. The study emphasizes the importance of Om meditation which could work wonders for people under stress if adopted as a daily routine. As Om meditation is simple and easy to practice, it could open a new horizon for naïve meditators.

Key-Words: - Mantra meditation, EEG, Om.

1 Introduction

Meditation is one of the aspects of yoga that can be stated as consciously and voluntarily guiding self-attention for relaxation or for seeking oneself or for personal improvement. Meditation can be categorized into two types: the first type involves focusing attention on a particular object and second being a mental or loud repetition of a chant called mantra meditation [2]. Varieties of mantras can be chosen for meditation. Mantra repetition is a simple method to implement in order to attain meditation [3]. The appearance of the Om syllable in Upanishads, Bhagvat Gita, and Vedas make it holy and sacred [4], thus making it the highest sacred symbol in Hinduism. Om, considered as the name of God, is a sacred syllable in Hinduism from which all other sound came into existence [4].

Many benefits of Om meditation have been revealed from studies conducted using sophisticated mathematics and medical tests to analyze its effect on the human body. Many researchers have found the effects of Om meditation on human by analyzing various parameters such as functional Magnetic Resonance Imaging (fMRI) [5], Evoked Potentials [6-7], Electroencephalograph [8-9] and other variables [10-11]. fMRI study has been conducted on the listening of the Om mantra [12].Even wavelet analysis of uttered Om sound has been done [13]. All analysis shows the positive effect of Om mantra meditation on the human body.

There are mainly two studies based on EEG on loud Om mantra meditation. The first study [8] is the time domain analysis of the EEG signal before and after Om chanting. The second study [9] is based on power spectral analysis which employed a fast Fourier transform (FFT) to examine oscillatory changes in the standard frequency bands (delta, theta, alpha, and beta) after OM chanting. Most of the studies [14-20] related to different meditations used the concept of FFT to explore neural concomitants. Wavelet and FFT are two tools of spectral analysis [21]. Wavelets are localized in both time and frequency whereas the standard FFT is only localized in frequency. Wavelet is proved to be better in detecting brain diseases [21]. In the existing literature on meditation, many studies used wavelet analysis and features from it to classify the EEG patterns [22-26]. A few works of literature have addressed the use of wavelet for power spectral analysis of the EEG signal. In the present study, in contrast to Fourier analysis, wavelet analysis has

been used for spectral analysis of the EEG signal before and after OM chanting. The aim is to compare oscillatory changes in the standard frequency bands (delta, theta, alpha, beta, and gamma) before and after OM chanting. In all studies related to different meditations [14-20] examining EEG measures reported an increase in theta power. Since other meditations have shown modulation in the theta band, it has been therefore hypothesized that like other meditation OM chanting would result in changes in theta activity [9].

In order to find the effect of Om mantra meditation on human beings, subjects with no prior experience of meditation were chosen. Students of Shri Sant Gajanan Maharaj College of engineering were selected as subjects for conducting the study.

This study is an attempt to evaluate the trait changes in EEG pattern due to Om meditation outside meditation, unlike other studies where states are evaluated during meditation. The rest of the paper is organized as follows: at the first section, materials and methods are discussed followed by experimental results. The discussion part is covered in the third section. The last section concluded the study.

2 Materials and methods

2.1 Subjects

A total of 23 naive meditators with a mean age of 20.99 years, between the age group of 18–22 years were assessed. Subjects chosen had no meditation training referred to as naïve meditators. They were chosen from a Shri Sant Gajanan Maharaj College of engineering randomly. Subjects were informed to practice Om mantra meditation and that their brain activity would be recorded before and after OM chanting. Nonsmokers, not frequent drinkers and right-handed subjects with sound mind state were chosen with the explicit consent of each subject. This study is presented and applied to the concerned ethical committee of Government Medical College, Akola, Maharashtra, India [9].

2.2 Design of study

The study was conducted in two sessions with repeated measures: the first session involves EEG assessments before Om meditation and the second involves EEG assessments after Om meditation. Subjects were asked to perform OM chanting for a duration of 30 minutes.

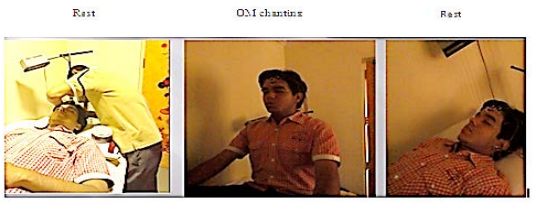


Fig. 1 Experimental setup

The experimental setup for the study is
"Rest →OM chanting →Rest"
as shown in the figure below (Fig. 1). The recording was done in a peaceful and quiet place in order to help the subject to concentrate more effectively. The subject was asked to relax by laying down on a cot with closed eyes. In this relaxing mode, EEG was recorded termed as "EEG before meditation". After recording EEG data, the subject was instructed to sit in an erect position and perform Om chanting for about 30 minutes. During the Om chanting subject was asked to breathe smoothly. During meditation, subjects were asked to inhale for a longer time and exhale with chanting Om. The room of the recording was kept dark for better concentration. Following meditation, the subject was again asked to relax by laying down on a cot with eyes closed. And, again EEG was recorded for more than two minutes which is termed as "EEG after meditation". The subject provided with their detailed experience after experiment [9].

2.3 EEG recording before and after Om mantra meditation

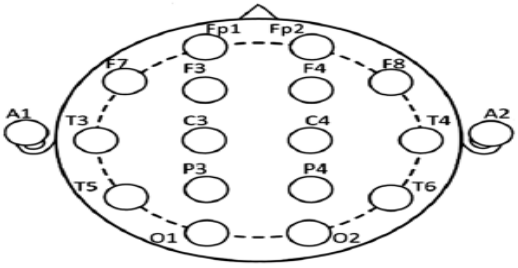


Fig. 2 Electrodes placement

In an electrically shield room of Bilala Hospital, Akola, EEG recording was performed under the guidance of Dr. Saurabh Bilala. EEG signals were recorded using monopolar montages, according to international standard 10-20 from 16 channels using the RMS India system with a 256 Hz sampling frequency. The electrodes and their placement are as shown in fig. 2. The electrodes in the left hemisphere were referred to the left earlobe (A1) with the ground at the forehead [9]. Electrodes placed on the right hemisphere are numbered evenly, whereas those on the left hemisphere are numbered oddly. Electrodes used are prefrontal

electrodes Fp (1,2), frontal electrodes F(7,3,4,8), temporal electrodes T(3,4,5,6) Central C(3,4), Parietal P(3,4), Occipital O(1,2) and reference earlobe A(1,2).

2.4 Discrete wavelet analysis

Out of the two types of wavelet transform: Continuous and Discrete, Discrete wavelet transform (DWT) is used widely in biomedical applications [27]. DWT is a time-frequency analysis technique suitable for analyzing non-stationary signals. EEG signals contain non-stationary characteristics [26], hence DWT is the well-suited technique for analyzing EEG [27-28]. DWT decomposes signal by passing it through a pair of high pass and low pass filter having mirror characteristics. By using a filter bank tree diagram DWT decomposition is shown in the diagram below (fig.3). Using quadrature mirror filters (QMF), DWT split the signal into two equal components: Detail and Approximate. 'Detailed coefficients' (D) are obtained by passing the signal through high pass filter whereas 'approximation coefficients' (A) are obtained by passing through low pass filter. The filtered signal out of low pass filter is again split into two components D2 and A2 corresponding to level 2. Again the low pass filter components of level 2 are split into two coefficients D3 and A3 and so on. As the level goes on, low pass filter components are split further and in this way, DWT decomposition takes place thus forming a bank of continuous bandpass filters spread logarithmically over frequency [27-28].

Scaling function dependent on low pass filter $\Phi_j,k(n)$ is given by

$$\Phi_j,k(n) = 2^{\frac{j}{2}} h(2^j n - k) \quad (1)$$

and the wavelet function dependent on high pass filter $\Psi_j,k(n)$ is given by

$$\Psi_j,k(n) = 2^{\frac{j}{2}} g(2^j n - k) \quad (2)$$

where $n = 0,1,2,.....,M-1$; j represents resolution

$j = 0,1,2,....,2j-1$; k represents sampling ratio

$J=\log_2(M)$ M is the legth of the signal[29]

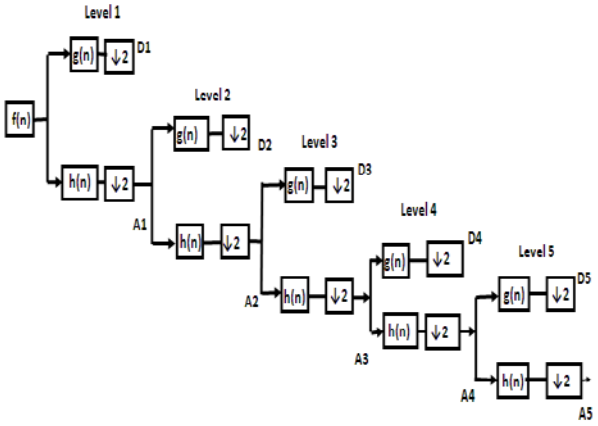


Fig. 3 DWT sub-band decomposition

Approximation coefficients in the ith level is given by:

$$A_i = \frac{1}{\sqrt{M}} \sum_n f(n)\Phi_j,k(n) \quad (3)$$

Detail coefficients in the ith level is given by:

$$D_i = \frac{1}{\sqrt{M}} \sum_n f(n)\Psi_j,k(n) \quad (4)$$

With the sampling frequency of 256 Hz, the maximum level L chosen for decomposition is 5. In this study, DWT has been carried out using various mother wavelets namely:

Daubechies db2, db3, db4, db5, db6, db7, db8, db9, db10.

Coiflets coif1, coif2, coif3, coif4, coif5

Symlets sym1, sym2, sym3, sym4, sym5, sym6, sym7, sym8.

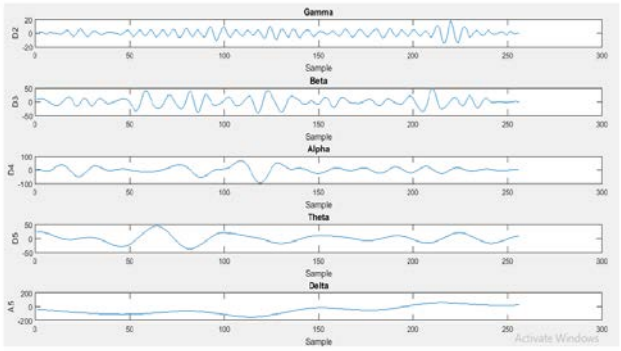


Fig. 4 Approximate and detailed coefficients of one second EEG using db4 wavelet taken from a subject before Om meditation

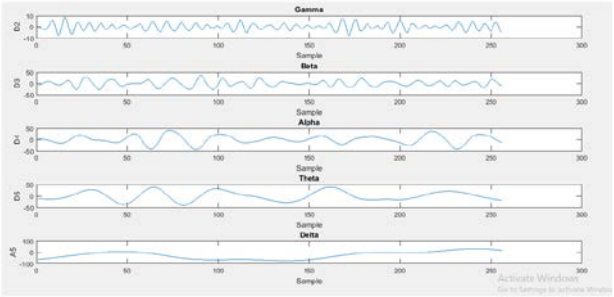


Fig. 5. Approximate and detailed coefficients of one second EEG using db4 wavelet taken from a subject after Om meditation

Table 1 Bands with five level DWT

Level	Wavelets coefficients	Frequency bands (Hz)	Correspondi ng Band
2	Detail coefficient D2	32-64	Gamma
3	Detail coefficient D3	16-32	Beta
4	Detail coefficient D4	8-16	Alpha
5	Detail coefficient D5	4-8	Theta
5	Approximate coefficient A5	0-4	Delta

Analyzing the coefficients in sub-bands yields classified signal into five bands namely Gamma (32 – 64 Hz), Beta (16-32 Hz), Alpha (8-16 Hz), theta (4-8 Hz) and delta (0 - 4 Hz) (table 1).Fig.4 and fig 5 show the approximate and detailed coefficients for one second EEG.

2.5 Feature extraction using DWT

Since the purpose was to explore brain dynamics as a result of OM chanting, the EEG data of the first one minute before OM chanting was used to assess the control state and the first one minute data after OM chanting to assess state achieved after meditation [9]. One minute data should be used for trustworthy spectral analysis [30]. 256 data points epoch was selected. The DWT was then performed to the selected data. The power spectral density (PSD) of delta (0.3–4 Hz), theta (4.1–8.0Hz), alpha (8.1–16.0 Hz), and beta (16.1–32.0 Hz) and gamma (36.1-64.0) frequency band were obtained by using Welch technique, Hanning windowing function. The resulting values were afterward normalized into a relative power [31-32] as follows:

$$\text{relative power} = \frac{\int_{f_L}^{f_H} S_b(f)df}{\int_0^{f_{\max}} S_T(f)df} \times 100 \qquad (5)$$

Where
f_L - lower frequency of particular band,
f_H - lower frequency of particular band,
f_{max} =55 Hz,
S_b – EEG signal of particular band,
S_T – EEG signal of particular band

Finally, the mean relative power was computed for every electrode. For statistical analysis, all 16 electrodes were divided into 8 brain regions which are as follows: right partial occipital (P4, O2), left partial occipital (P3, O1) right central (C4), left central (C3), right frontal (F8, F4and Fp2), left frontal (F7, F3 and Fp1), right temporal (T4 and T8) and left temporal (T3 and T7). Under each region, the power values of the constituent electrodes were averaged, and the procedure was repeated for all the frequency bands. The descriptive representation of the proposed feature extraction scheme is presented in Fig. 6.

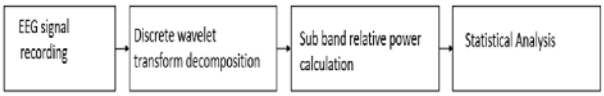


Fig. 6. Flow diagram of proposed approach to qualify the changes in spectral power of each band

2.6 Statistical analysis

For statistical analysis, IBM SPSS software version 2 was used. In order to find the normality of the relative power data distribution, a Kolmogorov–Smirnov test was preliminarily tested. It revealed a normal distribution of the data, justifying the subsequent use of ANOVA analysis. Two-way analyses of variance (ANOVAs) were performed on the relative power values obtained. In order to verify the specificity of a band involved into the OM chanting effect, two way repeated ANOVA was carried out with factor bands namely, delta, theta, alpha, beta, and gamma also considering two conditions namely before and after. In order to analyze the specificity of location involved into the OM chanting effect, each frequency band was submitted to a within-subjects design, analysis of variance (ANOVA) over the factors of condition (before and after) and region (8). A statistically significant value of p is 0.05. Greenhouse-geisser corrected values were reported.

3 Experimental results

Meditation features were quantified by discrete wavelet transform using different mother wavelets namely Daubechies (db2 to db8), Symlets (sym1 to sym8). The result turns out from all different wavelets that are almost the same.
The first two-way ANOVA analysis is conducted to check the involvement of a particular band in OM

meditation on relative power obtained by different mother wavelets. All reveals only band significant results, not any interaction (band x condition) or condition effect.Fig.5 shows relative power in the band before and after condition with the db4 mother wavelet. Research results are the opposite of what was expected. No specific band involved in the OM chanting effect.

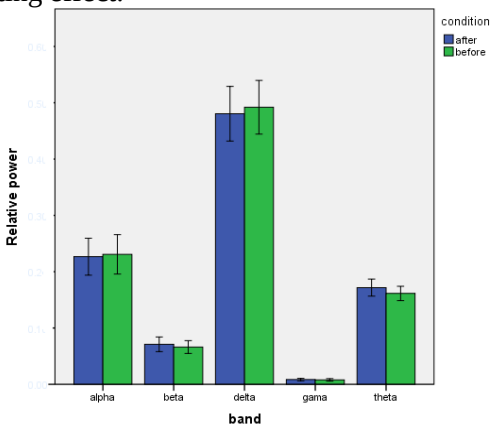


Fig.5 Relative power with DWT (db4 mother wavelet) before and after OM mantra meditation (N=23). No any band exhibited a significant effect.

Secondly two -way repeated ANOVA with region [8] and condition [2] as factors were performed for relative power values obtained by different wavelet separately for all the five types of bands (delta, theta, alpha, gamma, and beta) to assess the association between region and condition after OM chanting. Main effects (conditions and regions) and interaction effect for each frequency band with db4 wavelet are given in table 2.Repeated-measures ANOVA demonstrated insignificant main effects for condition and interaction effect for all bands (table.2).

Fig.6, fig7, fig.8, fig.9, fig.10 show mean relative power with symlet2, db8, db7, db6, and db4 mother wavelet. But closer examination shows an increase in theta power in all regions in after condition with all wavelets. These results are very promising and enhanced theta is noticeable with the db4 mother wavelet only.

Table 2 ANOVA results (n=23)

Frequency band	Condition main effect	Region main effect	Condition × region interaction effect
Alpha	F (1, 22) = 0.045 P = 0.835	F(7,154)= 18.796 P = 0.00	F(7, 154) = 1.196 P = 0.308
Beta	F(1,22) = 0.533 P = 0.473	F(7,154)= 15.242 P = 0.000	F(7,154) = 0.608 P = 0.748
Delta	F(1,22) = 0.533 P = 0.473	F(7,154)= 15.242 P = 0.000	F(7,154) = 0.608 P = 0.748
Gamma	F(1,22) = 0.198 P = 0.660	F(7,154) = 7.915 P = 0.000	F(7, 154) = 0.550 P = 0.866
Theta	F(1,22) = 1.185 P = 0.288	F(7,154)= 48.064 P = 0.000	F(7, 154) = 0.454 P = 0.866

*significant ($p<0.05$)

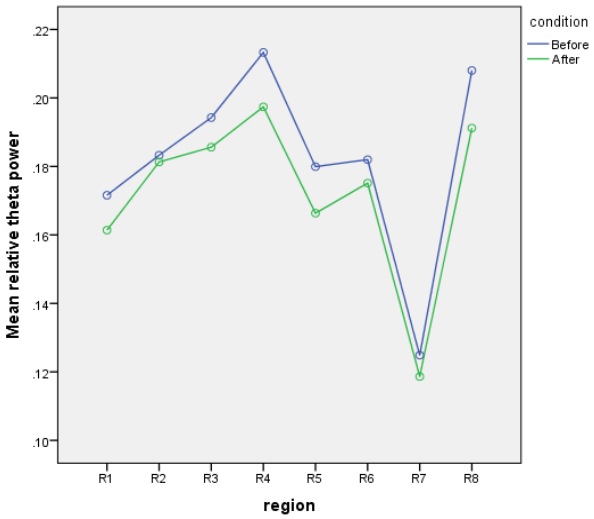


Fig. 6 Profile graph showing changes in relative power in theta band in all eight regions at before and after conditions with symlet2 mother wavelet: Region: R1: Left Frontal; R2: Left temporal R3: Left partial occipital R4: Left central; R5: Right frontal; R6: Right temporal; R7: Right partial occipital R8: Right central

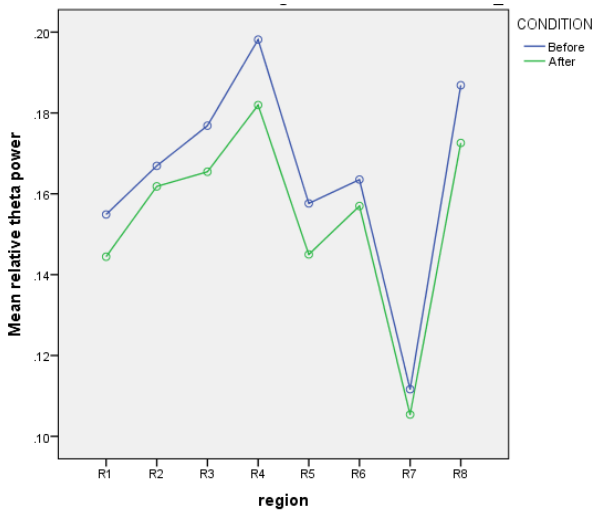


Fig. 7 Profile graph showing changes in relative power in theta band in all eight regions at before and after conditions with db8 mother wavelet

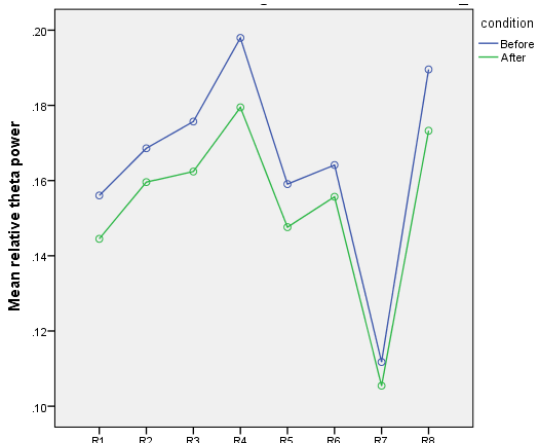


Fig. 8 Profile graph showing changes in relative power in theta band in all eight regions at before and after conditions with db7 mother wavelet

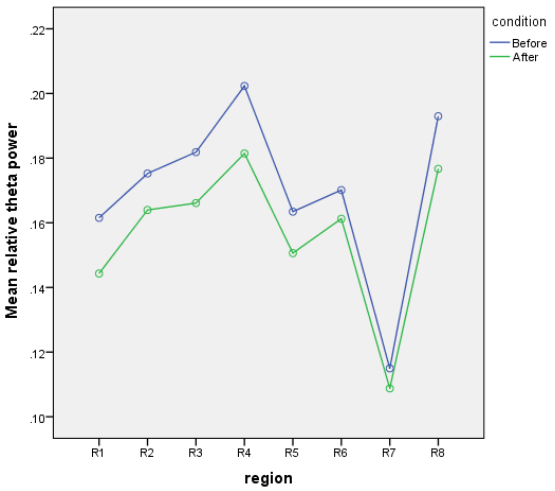


Fig. 9 Profile graph showing changes in relative power in theta band in all eight regions at before and after conditions with db6 mother wavelet

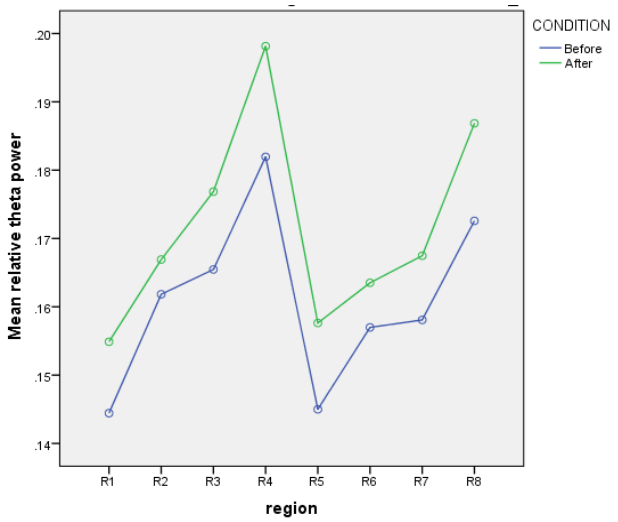


Fig. 10 Profile graph showing changes in relative power in theta band in all eight regions at before and after conditions with db4 mother wavelet

4 Discussion

The focal objective of this study was to explore the effect of Om mantra meditation on the brain through information rendered by the relative discrete wavelet power of all bands of EEG. Any band oscillations as an attribute of 30 minutes OM chanting was not observed with wavelet analysis. But an increase in theta power in all regions of the brain has been observed. Raised theta denote a reduction in cortical arousal [33-36]. The condition of deep relaxation is correlated with a decrement in cortical arousal [37]. Earlier studies have presented the significance of Om mantra meditation in offering relaxation [5, 9]. Thus on the basis of previous literature and our study, OM chanting can be proposed as an effective measure for offering relaxation.

There are many previous reports [14-20] on mediation in which theta power increases during meditation. But these studies usually performed a FFT spectrum analysis of the EEG signal. In our knowledge, only one study on Sudarshan Kriya yoga [38] has been conducted using a similar feature to analyze its effect on brain signals during a working memory task. This is the second effort to use this feature to investigate the effect of meditation on the brain and thus producing promising results with naïve mediators and only thirty minutes Om chanting. The syllable of 'Om' consists of three sound A U M [4] "A" represents the physical plane. "U" represents the mental and astral plane, the world of intelligent spirits, and all the heavens. "M" shows the deep-sleep state [39]. In this study, while recording EEG, subjects were not abided by the time constraints for the recitation of 'A',' U', 'M 'sound of Om mantra. A detailed study can be carried out by keeping fixed time for 'A',' U', 'M 'recitation or with experienced meditators or with a bigger sample size or with control groups. Our study on naïve meditators with immediate effects of loud Om mediation can work as an impetus for naïve meditators to practice Om meditation on a daily basis and may provide solace to people under stress.

5 Conclusion

Power spectral density extracted from DWT transform were calculated to quantify the differences in the various brain areas at varied bands of frequency. For analysis, two way repeated

ANOVA measures were employed which reveals the relaxing effects of Om meditators. This EEG study on naïve meditators for just 30 minutes results in increased theta power which is a sign of relief and relaxation. The study suggests that if such a small duration of Om meditation has such a relaxing effect then it could be used as a stress reliever if adopted as a daily routine. Further research studies with a larger sample size and using advanced signal processing techniques are recommended.

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Implementation of 5S Methodology at Spectrum Electrical Industries Limited

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Abstract: 5S is a fundamental establishment of Lean manufacturing framework. 5S is a precise strategy utilized by industries, and this originates from five Japanese words: seiri (sort), seiton (set in order), seiso (shine), seiketsu (standardize), and shitsuke (sustain). It is a tool that is use for cleaning, arranging, sorting out and giving the fundamental preparation to workplace improvement. This research work deals with practical implementation of one of the important lean manufacturing tool that is 5S methodology in the Spectrum Electrical Industries Limited MIDC, Jalgaon. An itemized use of the 5S framework is given. It will affect each and every one like Engineers, Supervisors, operators, worker from Top level to lower level management team of Industry. By following the 5S technique, this research work may demonstrate huge upgrades to productivity, profitability, efficiency, and housekeeping. The research work shows the significant improvements by using before and after pictures. It additionally plans to build a more grounded hard working attitude inside the workers and engineers who might be relied upon to proceed with the great practices.

Keywords: Lean Manufacturing, 5S, Continuous Improvement, Workplace Management, Productivity Improvement

I. INTRODUCTION

Plastic molding is all around generally utilized procedure in today" world. Because of the surprising expense of metallic materials and their absence of availability the plastic materials are in all respects broadly utilized in numerous applications. The plastic material has great characteristics and their characteristics can likewise be improved effectively by the utilization of catalyzers. Therefore plastic molding is getting extremely high consideration. Plastic trim has exceptionally wide order. Plastic items with complicated shapes are manufactured with the help of Injection molding machines. Injection molding machines are used for their high productivity and high quality. The plastic molding industries are replacing their conventional machines by the injection molding machines due to their high productivity, high efficiency and easy to use control.

Spectrum Electrical Industries Limited is one of the industry that use the Injection molding machine for manufacturing of plastic components of electrical application for the customers like Schneider Electric, Legrand, Anchor, Araymond, Nirmiti, Goldmedal etc… In the industry by directing investigation that helped us to recognize the issues with the machines, overall shop floor conditions, safety, low productivity, Long setup time, and cleanness of the industry.

5S is a framework to reduce 7 deadly wastes like Transportation, Inventory, Motion, Waiting Time, overproduction, Over-processing, Defects and rework and enhance productivity through keeping up orderly working environment and utilizing visual signs to accomplish progressively reliable operational outcomes. The term 5S refers to five stages 1S-sort, 2S-set in order, 3S-shine, 4S-standardize, and 5S-Sustain that are additionally here and there known as the 5 pillars of a visual working environment. The 5S workplace organization is essential for company irrespective of its size. It was initiated from japan, keeping in mind all employee participation in lean manufacturing. The 5S principle is not only for shop floor, but also for the entire organization. Many managers believe that it is enough if the shop floor is kept clean. In reality every department in organization or industry should be kept organized. "A place for everything and everything in its place" is the mantra of the 5S strategy. The result is an improved plant manufacturing process and the lowest overall cost for finished goods produced.

Productivity Improvement With The Help of Value Stream Mapping by Reducing Mould Changeover Time

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Abstract: The objective of this research work is to improve productivity by identifying the possible lean improvements in the plant with the help of Value Stream Mapping. The most critical issue faced by manufacturers today is how to deliver their products or materials quickly at low cost and good quality, for that several methods and approach exist such as lean Manufacturing tools for improving the productivity and efficiency by identifying the wastes in each department and Processes. Lean tools enabling a company to differentiate value from waste and facilitate to maximize customer value while minimize waste. Value Stream Mapping is to use the Kaizen activity with Single Minute Exchange of Die (SMED) or Quick Mould-changeover to effectively support future state for process improvements. As a conclusion for this paper presents that the designed Future Value Stream Map (FVSM) which helps to effectively identify wasteful activities and production processes and Implement that to improve the Productivity. VSM and Kaizen serve as an input for continuous improvement by reducing the manufacturing lead time using SMED in Plastic Injection Moulding at Spectrum Electrical Industries Limited.

Keywords: VSM, SMED, Quick Mould-changeover, Lean Manufacturing, Productivity Improvement.

I. INTRODUCTION

Value stream mapping is also known as a value stream analysis and lean process mapping, it is defined as a lean tool that employs a flow diagram which documenting every step in the process. Value stream mapping as a fundamental tool to identify wastes in the process, reduce process cycle time, and implement process improvements.
Divided in two parts: 1) Current State Mapping.
2) Future State Mapping.

1) Current State Mapping:

Value stream mapping is a representation of the flow of materials from supplier to customer through the organization as well as flow of information. This enables us to see at a glance where the delays are in the process, any restraints and excessive inventory in process. The current state mapping is the first step in working towards ideal state for organization. Value stream mapping (VSM) is a team exercise and should involve representatives from all of the departments within the process being mapped this process should be facilitated and led by an expert with experience in creating value stream mapping. A value stream mapping is best created by hand using a pencil (will need to make frequent corrections and changes) on a sheet of A3 paper. It is better to create map by hand and involve the entire team.
Firstly need to decide what it is exactly that we wish to map, in an organization or company with many products there may have to be some initial work done to identify which product or family group of products that should be mapped, we may decide to go with highest value, or take a longer term strategic look at those product ranges that we expect to do more business with in the future and we may be guided by our customers as to what to map.

2) Future State Mapping:

The problems highlighted in current state mapping could all be tackled one by one but what we really need is a vision of where we want to end up so that we can focus our efforts on achieving an agreed "Future Ideal State." The team guided by the expert should create a future ideal state value stream map which should envision the absolute best the process could be, this should then be agreed by senior management as the ultimate goal of our future value stream mapping exercise. This Future Ideal state could be a single cell rather than isolated process in different parts of the factory with daily (or more frequent) deliveries to the customer and from the supplier. Kanban systems could be

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VALIDATION AND PERFORMANCE OF PIN FINS USING CFD

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Abstract- Fins (Extended surfaces) are mainly use to increases the heat transfer rate, there are different types of fins such as cylindrical, rectangular, square, annular and tapered fins. Mostly in many cases cylindrical pin fins are used as extended surface, the proposed model of pin fins equipped with rectangular enclosure having cross section 250$^{\times}$ 100 mm^2 and length is 1020mm.For CFD simulation the following data of experimental analysis is used such as a Reynolds number ranges from 13,500 to 42000, clearance ration (C/H) = 0, inter fin spacing ratio S_y/D = 3.417,No. of fins are 11 for staggered arrangement. Then CFD results for single elliptical perforated pin fins are obtained and validated with experimental results. The proposed model is analyzed using CFD for two circular perforation and the results shows that the use of the two circular perforation leads to heat transfer enhancement than the solid and single elliptical perforated cylindrical fins. This benefits arise due to not only the increased surface area but also heat transfer enhancement near perforations through the formation of localized air jets.

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I INTRODUCTION

One of the primary goal in the design of modern thermal system is the achievement of more compact and efficient heat exchangers. Reducing energy loss due to ineffective use and also enhancement of energy transfer in the form of heat has become an important duty for the design engineer of thermal system. Extended surfaces (Fins)are use to increase heat transfer rate from the base(Heated) surface in large no of applications. Types of fins such as cylindrical, rectangular, square, annular and tapered or pin fins. One of the commonly use heat exchanger fins is the pin fin. Many industrial systems have critical components which must be cooled at sufficient rate to avoid damaging and overheating. The fins expose to the flowing fluid which cools or heats it, with high thermal conductivity of fins allowing increased heat being conducted from base through the fins. By using the suitable design of fins the requirement of excess power to cool down the surface decreases. Extended surface gives the required heat transfer rate in several application like automotive heat exchangers, engine and turbine blade in the aerospace industry ,thermal reactor, cooling of oil transport pipe line which runs several kilometer, cooling of computer processor, electronic cooling.

Nomenclature

D	Pin diameter, mm
d	Perforation diameter of the pin fin, mm
H	Pin fin height, mm
h	Heat transfer coefficient, W/m^2.K
k	Conductivity of air
n	Number of perforations
N	Number of pins
L	Base plate length, mm
P	Fan power, W
T	Temperature, ˚C
Q	Power applied on the base, W
U	Average Air velocity, m/s
I	Current
R	Resistance of heater element
V	Voltage, V
T_{in}	Temperature in
T_{out}	Temperature out
T_s	Surface temperature
h_{av}	Average heat transfer coefficient

Design and Development of Manually Operated Cotton Seed Planter

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Abstract: In India, nearly 70% of the people are dependent on agriculture. So the agricultural system in India should be advanced to reduce the manual efforts of farmers. Various operations are performed in the agriculture field like seed sowing, weeding, cutting etc. by the farmers. The very basic and significant operation is seed sowing. But the present methods of seed sowing are very costly. The present equipment used for seed sowing is very difficult and inconvenient to handle. So there is a need to develop a machine which will reduce the efforts of farmers and the cost of plantation also. To overcome the difficulties in the previous papers, efforts are taken to develop manually operated cotton seed planting machine which introduces a control mechanism to drop the seeds at a particular position with specified distance between two seeds and lines while sowing. As day by day the labour availability becomes the great concern for the farmers and labour cost is more, this machine reduces the efforts and total cost of planting the seeds. This technology in the farming system reduces the manual efforts of farmers, saves time, energy and labour cost.

Keywords: Cost, Cotton, Planter, Seed, Sowing.

I. INTRODUCTION

The agricultural industry has always been the backbone of India's sustained growth. As the population of India continues to grow, the demand for produce grows as well. Hence, there is a greater need of mechanization of the Agricultural industry in India is still in a stage of infancy due to the lack of knowledge and the unavailability of advanced tools and machinery. India is set to be an agricultural based country approximately 75% of the population of India is dependent on farming directly or indirectly. Special emphasis was laid on the later as more than 70% of the farmers fall in small and, marginal category. Our farmers are using the same methods and equipment for the ages. E.g. seed sowing, spraying. There is a need for the development of effective machine for increasing the productivity. A developing country like India is expected to continue to rely more on hand tools for the foreseeable future for cultivation. The use of hand tools for land cultivation is still predominant in India because draft animals and tractors require resources that many Indian farmers do not have easy access to. As our population continues to increase, it is necessary that we must produce more food, but this can only be achieved through some level of mechanization. These small holder farmers still continue to plant manually, the result of which is low productivity of the crops. It is therefore necessary to develop a low cost planter that will reduce the effort of poor farmer.

LITERATURE REVIEW

Traditional methods include broadcasting manually, opening furrows by country plough and dropping seeds by hand and dropping seeds in the furrow through a bamboo/metal funnel attached to a country plough. For sowing in small areas dibbling that making holes or slits by a stick or tool and dropping seeds by hand.
Thorat S.V. and G. Patil: This article represents the advanced system for improving the agricultural processes such as cultivation on ploughed land, based on robotic assistance. We developed a vehicle having 4wheels and operated by DC motor. The machine will cultivate the farm by considering particular column at fixed distance depending on crop.
Kalay Khan and Ashok Kumar: Author presented a brief information for single row multi crop planter which planting the various crops like wheat, maize, okra etc. But it is not suitable for the large seed spacing crops like cotton.
Kyada A.R. and Patel D.B.: This article provides information about the manual seed planter machine has considerable potential to greatly increase productivity. By using of this machine, achievement of flexibility of distance and depth variation for different seed plantation is possible.

STRUCTURAL ANALYSIS OF GROUND NUT OIL EXTRACTION MACHINE

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Abstract: Groundnut oil extraction involves removing oil content of the groundnut seeds. There is a misconception between groundnut oil & other vegetable oil used because of the inefficient processes of producing groundnut oil. The main aim is to provide analysis of designed automated groundnut oil extractor. The desired crushing effect at lower input is achieved by the low speed of the machine. The main components are electric motor, expellant unit, drains collector, hopper. The 3 D model was drawn with the help of CATIA software. The analysis will be carried out with the help of ANSYS software.

Keywords - **Structural Analysis, CATIA, ANSYS**

I. INTRODUCTION

Groundnut oil expelling machine is an important device for oil recovery from groundnut seed in a roller mill, direct firing of barrel and pressing with an engine driven oil expeller. Expeller use a horizontal rotating metal screw, which feeds oil-bearing seeds into a barrel shaped outer casing with perforated walls. The seeds are continuously fed to the expeller, which grinds, crushes and presses the oil out as it passes through the machine. The pressure breaks the oil cells in the product and oil flows through the perforation in the casing and passes through the oil outlet and is finally collected with oil receiving container which situated directly bellow. The residue of the material from which oil has been extracted, are sent out through the cake outlet. Bigger units which process greater quantities of oil are available for use in larger mills. The percentage of oil extracted by expellers is nearly 90% depending upon the type and kind of products as well as the expeller being employed. The friction created by the products being pressed wears down the worm shaft and other internal parts, and also have the tendency of creating problem or causes failure of main shaft.

The need to produce a groundnut oil expelling machine arose even in the distant past due to the need to produce oil for domestic and commercial uses. Groundnut seed (*Arachis hypogea*), also known as peanut and earthnut, It is grown principally for its edible oil and protein rich seeds. The oil content of the seeds is between 45% and 55% depending on the variety. To remove the oil content from the groundnut seed, the process known as oil extraction, expelling or expressing is carried out. Groundnut oil extraction technologies involves machines that are developed to carryout sub-processing operations involved in traditional groundnut oil extraction. These machines are; shelling, roasting, de-skinning, milling and kneading machines. Also, there are machines that are developed to extract groundnut oil from the just shelled groundnut seeds, such as hydraulic press and screw press.

In our research we introduced the simulation in purpose of stress and displacement analysis of the expeller shaft of oil extraction machine. The expeller shaft is an important part of screw press as it supplies the pressure required for extracting oil from the raw material. It is found from observation that the failure of screw causes extra costs which is undesirable. In addition, excess stress, bending, displacement may cause major overhaul of the press. So to increase the life of screw press and efficient oil extraction it is necessary to find exact stress and bending of the screw blades. Also vibration analysis and self weight analysis of Domestic oil extraction machine is required. So to determine these, simulation is introduced which is performed by FEA (Finite Element Analysis) with ANSYS software.

II. OBJECTIVES

The main objective is to provide analysis of designed oil extractor with improved, durable groundnut oil expeller for manufacturing by using local sourced materials.

Other specific objectives are:

- To develop a model of machine that will extract oil from groundnut after manufacturing the oil extraction machine, within a minimum time frame.
- To provide structural analysis of designed Groundnut oil extractor for manufacturing which will be affordable for small scale oil miller or domestic users.

"QUALITATIVE AND QUANTITATIVE ANALYSIS OF FRICTION STIR WELDING JOINTS"

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Abstract: Friction Stir Welding (FSW), a solid state welding process, look like a most promising techniques for joining an aluminium alloys avoiding a large number of difficulties arising from the use of traditional fusion welding processes. In experimentation, the effect of friction stir welding process parameters like Tool Travel speed, Rotational speed ,and shoulder diameter on mechanical properties and microstructural properties of Friction stir welding joint of 6111-T4 studied by using Factorial and Taguchi design and analysis. The Quantitative results gives the maximum responses such as Tensile strength at rotational speed 1000 rpm, tool travel 18 mm/min, shoulder diameter 24 mm and Hardness at 1100rpm, 18 mm/min and 24mm. An ANOVA analysis indicates an influence of individual parameters on Ultimate Tensile strength a of welding joint. a mathematical relations are proposed for Tensile strength and Hardness of weld joint. Whereas a qualitative observations gives are the best for optimal conditions suggested in by prediction model.

Index Terms: Factorial; Taguchi design; Microstructural ;ANOVA.

I. INTRODUCTION

Friction Stir Welding (FSW), as a solid state welding process is one of the promising process for joining Aluminum alloys to overcome the limitations of conventional processes. FSW is a solid state welding process, patented in 1991 by The Welding Institute (TWI), in which rotating tool is introduce into the adjacent edges of the work piece metal are welded and moved along length of the joint. The composition of the tool rotation and advancing velocity vectors induces a characteristic metal flow all around the tool adjacent surface. The tool travel determines heat creation due to friction forces and material deformation work. The process has been demonstrated to be effective and is currently industrially utilized for materials difficult to be welded, especially aluminum and magnesium alloys. As a matter of fact, the use of a solid state welding process limits the insurgence of defects, due to the presence of gas in the melting bath, and avoids the negative effects of material metallurgical transformations strictly connected to the change of phase. Finally, the reduced thermal flux – with respect to traditional fusion welding operations – results in smaller residual stress values in the joints and, consequently, in limited distortions in the final products [1,2]. due to safety and legal constrictions and to maintenance procedures, the analyses and the control of welding parameters in order to obtain high resistance, uniform microstructure and fatigue performances become fundamental in the case of such technology. Many papers are presented in the literature on microstructural, physical and mechanical behavior of friction stir welded Al-alloys, only few papers focus on the effect of processing parameters to obtain joints good efficiency in terms of tensile and fatigue properties. In the authors show the results of an optimization study of tool geometry in order to improve the tensile properties of FSW joints. In [4,5] the authors focus the attention on the effect of tool rotation speed, advancing speed and tool geometry on fatigue strength of aluminium alloy.

II. EXPERIMENTAL DESIGN

Friction stir welding process parameters tool travel speed, rotational speed and shoulder diameter of FSW Tool were selected on the basis of research papers and previous studies of FSW. The design of experiment has been done by using factorial design with 3 factor and 3 level of process parameter method to get a wide range in sample space as mentioned in table no.1. With the basic parameter like rotational speed and transverse feed or tool travel was consider an effective and significant factor for making a quality joint in friction stir welding. For non-ferrous aluminium alloy metals are mainly joining by using FSW in several joint configurations. During FSW metals are joined in the solid state due to the heat generated by the friction and flow of metal by the stirring action of a pinned tool. In this investigation, the effect of friction stir welding process parameters like Tool Travel speed, Rotational speed and shoulder diameter on ultimate tensile strength, joint hardness and micro structural properties of Friction sir welding joint of AA 6111-T4.

Table 1 Mechanical properties and chemical composition of AA 6111-T4

Tensile strength		Melting point (T4)	Elongation at break		
210-280 MPa		505-650°C	26%		
Al	Cr	Mg	Mn	Si	Ti
95.6 %	0.10 %	1.0 %	0.45 %	0.10 %	0.10 %

2.1 Process Parameter Selection

As motioned in various research papers about a quality joint, the response parameter ie ultimate tensile strength was consider for this research. A set of process parameters and the response parameters are framed in typical ranges base on a literature data and hypothetical analysis. The sample random numbers was been used to run a best trial for a P value and R^2 values in Statistical Software

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Original Article

AN ELIMINATION TYPE OF POKAYOKE- A GAME CHANGER TOOL IN THE PROPELLER SHAFT ASSEMBLY

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ABSTRACT

Monitoring the Industrial OEE (Overall Equipment Effectiveness) [3],[4]is now a day's a very essential concern for optimizing the use of the resources and tracking the efficiency of the manufacturing organization. To produce the goods with no errors is really a challenge in this era. Pokayoke [1] is a Japanese term; which means "Mistake Proofing" and most widely used in automotive industries to eliminate defect and possibility of producing the defective parts. "Elimination" is one of the type of the Pokayoke system; which is generally adopted to eliminate the possibility of the chance error during the operation. Thistool is used in Propeller Shaft manufacturing organization; especially in Propeller Shaft assembly; resulting in the productivity optimization which is achieved more than 50%, another breakthrough is 20% saving in "rework" parts and 30% "Not ok" parts are saved out of the total propeller shafts considered for trial.

KEYWORDS: Productivity Optimization, Propeller Shaft Assembly & Mistake Proofing

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INTRODUCTION

For the propeller shaft assembly, this bearing needs to be assembled in the centre of the centre bearing kit. It's very difficult to hold and retain the bearing at its location with the rubber shield. In this regards, the bearing needs some additional outer shell for bearing holding purposes. The two halves of the retainers are pressed over the bearing just like the sandwich, bearing is in the middle of the assembly and the two halves are pressed with the hydraulic pressure.

Process Flow of Bearing Retainer Fitment Operation

The very common process of bearing retainer fitment operation; which is mostly adopted by the majority of the automotive propeller shaft manufacturing industry is given below.

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Productivity Optimization: a tailored Lean and Agile approach for Automotive Propeller Shaft Assembly

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Abstract: Considering present scenario of Industrialization; it has been observed that most of the Original Equipment Manufacturers belongs to MSME's (micro, small and medium enterprise) are inadequate with state-of-art technology due to many more reasons; resulting in ceasing of technological growth, "Productivity" mainly focuses on total number of quantity produced, created, or completed. It is a count of productive competence of a machine, industry or an individual. In agile manufacturing [3],[4] requisites, productivity might not be excessively helpful as it makes a sense to measure the number of characteristics per individual or per team over the time. "Kaizen" is an approach; where workers work together to achieve regular, incremental improvements in the manufacturing process. It combines the collective ability of a organization to create an mechanism for repeatedly eliminating waste from manufacturing processes. With the implementation of the kaizen; one issue [1] on operation over machine tool was eliminated, one man two machine concepts achieved and Industrial organization achieved more than 12% increment in production.

Keywords: Productivity Optimization, Automotive Propeller Shaft, Kaizen

1. INTRODUCTION:

Automotive propeller drive shafts are the torque carriers; they are subject to torsion and shear stress which is equivalent to the difference between the input torque and the load. They must be strong enough to bear the stress, whilst avoiding too much additional weight as that would in turn increase their inertia. To allow for variations in the alignment and distance between the driver and driven components, drive shafts frequently incorporate one or more universal joints, shaft couplings and sometimes a splined joint or prismatic joint.

"Throughput" is comparative effectiveness of any manufacturing process or any operation. Throughput time is "the time between the release of a production order and the receipt of manufactured goods in inventory or the shipment of the goods to a consumer". It can be stated as a calculation of items manufactured per unit span of the time.

By arranging the "Gemba" visits to know their production related barriers and to see how difficult the process of manufacturing is, it is observed that most of the automotive propeller shaft industries are facing lots of problems for the overall manufacturing of the propeller shafts. Most of the cars are front wheel drive, but some of the cars like Maruti Omni, Gypsy, Mahindra Bolero etc. and different SUV (Sports Utility Vehicles) are coming in the class of rear wheel drive, propeller shaft is a important component for the cars, buses, trucks because the hazard associated with is having too much importance in the field of the automobile. To know how it is most hazardous automobile component, we have to take the example of the one of the Olympic pole vaulting game of jumping a man with stick in his hand with a long run and suddenly stops due to the long stick which he is having, all the momentum will effect to lift the sports man in the air due to sudden stoppage. The same case happening with the car or a bus, unfortunately if the propeller shaft of the vehicle breaks through the joint ends it will thrust in the surface of the road and it will tilt whole vehicle at a high speed, it may cause severe accident.

To restrict the mishap, manufacturer must pay full attention on the throughout manufacturing process of the propeller shaft, starting from the procurement of raw material by checking the quality of incoming material and monitoring the overall process by the implementation of the modern manufacturing techniques.

2. MOTIVATION

Automobile is a very vast field; technological changes are rapidly taking place in this field. Every day most of the original equipment manufacturers and multinational organizations are registering their patents in the automobile field by inventing state of art technology and equipments those will serve for society. Many accidents happened till the date due to failure of the propeller shaft and this failure is mostly due to overload of production, improper manufacturing methodology, lack of the technical awareness and non standardized workflow procedures.

3. PROPELLER SHAFT WITH REAR ENGINE AND REAR WHEEL DRIVE

An automobile may use a longer propeller shaft to deliver power from an engine or from transmission to the other end so called as differential of the vehicle; before it goes to the wheels. A pair of short drive shafts is commonly used to

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Original Article

PAINT PEEL OFF- A NUISANCE IN AUTOMOTIVE PROPELLER SHAFT ASSEMBLY

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ABSTRACT

Manufacturing an automotive propeller shaft is really a challenging process. The propeller shaft consists of many sub components known as sub-assemblies. The sub components like Stub yoke, Flange Yoke, Sleeve Yoke, Tube, Split Spline Shaft, Mid Slip Shaft, Bearing Cup, Cross etc. As the propeller shaft is located beneath the Automobile, a little attention is given towards its aesthetic appearance. The propeller shaft is coated and painted with paint and phosphate, which is mostly carried out in the paint booth [3]. The main reason is to reduce the warranty issues and enhance the life of it and also to avoid premature failure during when the propeller shaft is in operation.

KEYWORDS: Paint Peel Off, Propeller Shaft Assembly & Paint Booth Issues

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INTRODUCTION

The functionality and the efficiency are the important criterion of each and every manufactured component; which is manufactured through the systematic process. The life and service span of the components plays a major role in the organization which wants to remain in the market competition. The aesthetic look of the propeller shaft is also one of the intolerable specifications of the quality. The painting is one of the facets of the propeller shaft. We have visited to some of the Automotive Propeller Shaft industries, especially their paint booths to find out loopholes and concerns affecting to the warranty of the components.

Generalized Process Flow for Painting Operation

The painting booth is an integrated part of the propeller shaft assembly section. The painting is performed with the standard manual spray painting process. The generalized process flow prior before and after the painting the propeller shafts in the propeller shaft assembly is given below.

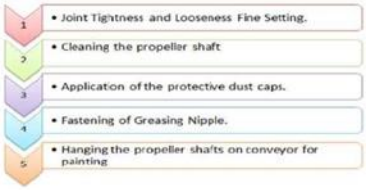


Figure 1: Process Flow for the Painting Operation

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Bearing Cup Grease Metering for EOHS Fulfilment – An Obligatory in Propeller Shaft Assembly

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Abstract: - **Nowadays technology is rapidly changing with innovation. In this 21st century organizations are focusing on lesser inputs with higher productivity and quality with minimum human resources. To enhance OEE [4], [5] is a primary task in the growth of the organizations. Considering present scenario of most of the Indian industries it has been observed that there is still lack of technology due to too many certain reasons. Apart from focusing on such types of issues and by visited the certain different types of leading automobile manufactures to know their production related barriers by providing them with better solution to resolve their production related issues at our extent. Environmental occupational health and Safety is very much essential part in Industries.**

Key words: Bearing Cup, Propeller Shaft Assembly, EOHS, Grease Metering

INTRODUCTION:

The lean and agile [2],[3] manufacturing technologies are very much essential for improving the quality and quantity of the organization. For the propeller shaft assembly, the universal joint kit must be assembled with the four bearing cups, one cross and four Circlips. The special dedicated machines are provided to do the sub assembly of these above mentioned parts. The propeller shaft is manufactured with the following stages.



The propeller shaft is manufactured through the above stages **[1]**. These are the most commonly employed steps followed by most of the original equipment manufacturers. There are separate manufacturing sections for each stage in propeller shaft manufacturing line.

The eighth stage is the propeller shaft balancing stage, where the propeller shaft is balanced with the designed standards in gm/cm. The balancing is required to reduce the unwanted vibrations produced due to rotational movement of the propeller shaft. The vibrations may damage the bearings and rest of the moving parts, also due to vibrations there might be fatigue failure of the propeller shaft components.

Grease Spillage during Propeller Shaft Balancing

During the propeller shaft balancing; the propeller shaft is rotated with unloaded condition at approximate 1500rpm. During rotation, the excessive grease which is pop upped during the sub assembly operation will be thrown away due to centrifugal action.

After completion of the bearing press up fitment operation; there will be an assembly carried out over the conveyor of the front propeller shaft and the rear end of the propeller shaft with the proper orientation. This will be carried out with a specific skill and experience. After having the assembly; the propeller shaft is fastened on the dynamic balancing machine; to reduce the unwanted vibrations during when the propeller shaft is at a higher speed.

But when the propeller shaft is clamped over the balancing machine; it is rotating with designed rpm. Each end is having 04 Nos. of the bearing cups; that means that, if the propeller shaft is of two pieces, then it is having 12 Nos. of the bearing cups fully filled with the grease. And all these bearing cups; will rotate with approx. 1500 RPM and there will be spillage of the grease because during the sub assembly, rest of excessive grease will gets out of the bearing cups and it will be the major concern of the EOHS audit point and it will also hampers the morale of the associates; those are working on the same machine.

Trouble description:

"Excessive Grease is spilling out from the propeller shaft; during balancing operation"

Considering the severity of the problem, it was decided to go for the why-why analysis.

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Numerical and Experimental Investigation of Dual Purpose Solar Collector

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Abstract- **Solar water heating and air heating are a sustainable choice for obtaining thermal energy over a variable temperature range from the solar energy. The dual purpose solar collector (DPSC) is a flat plate type collector can be used for heating the water and air simultaneously using solar radiation resulting in optimum uses of energy and space. The system consists of horizontal parallel water tubes and vertical air channel for heating water and air using a same absorber plate. A mathematical model by ε- NTU method has been developed and the experiment was carried for DPSC. Experimental and numerical result shows the performance of solar collector has been increased as compared to single air or water heater.**

Keywords- Solar Collector, Solar Radiation, Thermal Efficiency, Solar Water Heating.

I. INTRODUCTION

A solar collector is a particular kind of heat exchanger that transforms solar radiant energy into heat. Solar air heating is a process for delivering heat from a solar collector through which air is circulated. In most space-heating applications, the heated air may be supplied directly to the living space as needed and may also be supplied to some type of heat storage device for later transfer to the living space. There are many ways in which air can be heated by solar energy. Air can be passed in contact with solar absorbing surface as flat metal plates, finned plates or ducts, corrugated or roughened plates of various materials, screen through which the air passes, and overlapped glass plates between which the air flows. Flow may be straight through, serpentine, above, below, or the both two sides of the absorber plate, or through porous absorber material. In simplest form, the solar air collector differs from the liquid type only in the shapes and size of the fluid passage in contact with the absorber.Heating of water for bathing, washing, or commercial purpose is one of the oldest and most cost effective uses of solar energy. The temperature levels required (40-60^{0}C) can be produced efficiently by simple, relatively inexpensive collection devices. A variety of techniques, ranging from very simple to complex, have been employed to produce hot water using solar energy. A blackened absorber plate and tubes with water placed in sunlight represents possible the simplest approach to a solar hot- water system. [1]

Assari et al. [2] designed and made the collector in a way that it can be used for heating the air and water simultaneously. In his design vertical tubes are attached to on the absorber plate and three different kinds of channels are used to enhance the performance of DPSC, such as: triangular fin, rectangular fin, and without fins. Simulation result shown that, the channels with rectangular fin have better performance compared with others, values of heat exchange effectiveness for straight (rectangular) fin is better than the triangular fin. Hence, heat delivery in this situation is higher.I. Jafari et al [3] was carrying the energy and exergy analysis of DPSC.The triangular air channel was used in the analysis. Results show the air section of DPSC increase heat delivery and efficiency of collector much at higher water inlet temperature.

Arun Venu et al. [4] incorporate a porous medium to improve the thermal performance of a DPSC. The porous matrix is added below the absorber plate of the collector to improve the performance of the system. The overall thermal efficiency of the modified collector is increases from 34.60% to 46.03% over inlet water temperature. Assari, M.R [5] again analyzed the DPSC at a different air velocity in the air heater. The result shows that, average efficiency of the single-purpose system is 67.8 %, while for the dual purpose system the efficiency is 71.6% and 72.3% for air speeds of 2.8 and 3.2 m/s, respectively, which is much higher. Alireza Mohajer et al. [6] designed a hybrid system which facilitates a dryer system and provides consumptive hot water. Experiments were carried out to dry a mixture of vegetable at constant air and water flow rate. The system reduces the costs and the space for installation.

In this paper, our main objective is to improve the thermal performance of DPSC. For the purpose, changes are made in the design developed by Assari M.R. and studied its performance. Horizontally parallel blackened copper tubes are attached to the top of the absorber plate. While the conjunction of the V-shaped air heater is on the bottom side of the same absorber plate. A mathematical model based on ε-NTU method. Results are validated with the experimental measurements and they have shown that the model can give accurate results.

II. MATHEMATICAL MODEL OF DPSC

A. Collector Design Details

Detail Configuration of the designed collector is given as follows:

- Absorber plate material: Black painted Copper sheet
- Absorber plate Dimension: 0.9652 m x 0.6604 m
- Absorber plate Thickness: 0.5 mm
- Air channel material: galvanized 0.65 mm

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Effect of Fractional Order in Diagonal Pole Motion in LHP

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Abstract:-The impulse response characteristics are related to the location of poles of F(s). In this paper, we discuss impulse response and frequency response of transfer function $\{1/(s^2+as+b)^q\}$ for different fractional values of q where $0.5 < q < 1$, $q = 1$, $1 < q < 1.5$ in digonal pole motion in LHP moves away from origin. The different characters of the impulse response and frequency response are shown in numerical examples. The numbers of figures are presented to explain the concepts.

Keywords: Transfer Function. Impulse response. Frequency response. Mat-lab

I. INTRODUCTION

The transfer function G(s) is given by

$$G(s) = \frac{L_o}{L_i} \quad (1)$$

Where L denotes the Laplace transform. The frequency response function and the transfer Function are interchangeable by the substitution $s = j\omega$ [1].

The frequency response function $G(j\omega)$ is

$$G(j\omega) = \frac{F_0}{F_i} \quad (2)$$

Where F denotes the Fourier transform.

TF has been used in many applications. One important application among them is monitoring the mechanical integrity of transformer windings (during testing and while in service).Mechanical deformation arise mainly due to short circuit forces, unskilled handling and rough transportation. Information related to winding deformation is embedded in the TF. Hence the first step should ensure accurate diagnosis, a correct interpretation of TF[2]. TF can be used to describe a variety of filter or to express solution of linear differential equation accurately [3]. The TF of system is analyzed and response curves are simulated [4].The location of poles and zeros gives idea regarding response characteristics of a system. Transfer function is mainly used in control system and signal processing.

II. SYSTEM STABILITY

If poles are in LHP, the system is stable; if poles are in RHP, the system is unstable and poles on imaginary axis then system is marginally stable or limitedly stable [5, 6, 7].

Effect of Fractional Order on Integrator and Derivative System for Different Values of q > 0

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Abstract- In this paper, we discuss Step response, Impulse response and Frequency response of Integrator and Derivative System for different fractional values of q where $0 < q < 0.5$, $0.5 < q < 1$, $q = 1$, $1 < q < 1.5$ The different characters of the Step response, Impulse response and Frequency response are shown in numerical examples. The numbers of figures are presented to explain the concepts.

Keywords:- Transfer Function; Step response; Impulse response; Frequency response; Mat-lab.

I Introduction

The transfer function G(s) is given by

$$G(s) = \frac{L_o}{L_i} \quad (1)$$

where L denotes the Laplace transform. The frequency response function and the transfer function are interchangeable by the substitution $s = j\omega$ [1,2,3].

The frequency response function $G(j\omega)$ is

$$G(j\omega) = \frac{F_0}{F_i} \quad (2)$$

where F denotes the Fourier transform.[4] TF has been used in many applications. One important application among them is monitoring the mechanical integrity of transformer windings (during testing and while in service).Mechanical deformation arise mainly due to short circuit forces, unskilled handling and rough transportation. Information related to winding deformation is embedded in the TF. Hence the first step should ensure accurate diagnosis, a correct interpretation of TF [5]. TF can be used to describe a variety of filter or to express solution of linear differential equation accurately [6]. The TF of system is analyzed and response curves are simulated [7]. , FOTF is used to design IOPID controller, FOPI controller and FO [PI] controller. Then, by exploiting Matlab, the frequency domain response and unit step response characteristics of the different control systems can be plotted.[8]FOTF is used for design the fractional order filter.[9]

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Nanocrystalline Pure and Modified $ZnSnO_3$ Perovskite: A Novel Material for Gas Sensing

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ABSTRACT: Nanocrystalline powder of pure $ZnSnO_3$ structure and average crystallite size 11.3 nm was synthesized by co-precipitation method. The as-prepared powder sample was characterized by using X-ray diffraction (XRD) and transmission electron microscopy (TEM). Thick films of $ZnSnO_3$ were fabricated by using screen printing technique. Surface modified $ZnSnO_3$ based thick films were fabricated by dipping method which was followed by firing. Surface morphology and elemental analysis of pure and surface modified nanocrystalline $ZnSnO_3$ thick films was studied by using FESEM with EDAX respectively. The response of pure $ZnSnO_3$ and surface modified $ZnSnO_3$ to different oxidizing gases like Cl_2, NO_2, H_2S, SO_2 and CO was investigated. The pure $ZnSnO_3$ exhibited high response response to 100 ppm towards nitrogen dioxide (NO_2) gas at an operating temperature 200^0C. MgO modified $ZnSnO_3$ (5 min), as compared to pure $ZnSnO_3$, demonstrated enhanced response towards NO_2 gas at an operating temperature 200^0C. The selectivity of the sensor elements for various target gases was studied.

KEYWORDS: Nanocrystalline, $ZnSnO_3$, Thick film, X-ray diffraction, Sensor response.

I. INTRODUCTION

Due to the emission of various toxic and hazardous gases, human body suffer from different diseases like lowering of haemoglobin levels, affects the nervous system and may cause mental retardation, headaches, blindness and hypertension. In day today modern life detection of different gases plays a vital role. Gas sensing has become a significant area of research that leads to the development of extremely reactive gas sensing devices able to detect various toxic and hazardous gases. It is supposed that the demand for toxic and deleterious gases is urgent to change human nose. A lot of gas detecting systems have recently been used in process control and laboratory analytics [1-4].

On solid-state gas sensor many types review papers have been published [5-9]. Nitrogen dioxide (NO_2) exposure is now essential target for different crucial processes in an environment. This gas can be very dangerous for human bodies when its concentration in an environment increases hence now a day NO_2 monitoring and controlling is essential. Semiconductor gas sensors (SMO) in the type of thin or thick films, based on metal-oxides like p–n heterojunctions, have been usually reported in the literature for NO_2 detection [10-16]. Basic characteristics of SMO gas sensor are sensitivity, selectivity and durability. In sort to achieve high sensor response and good selectivity, various factors such as nanostructure control, addition of dopant, operating temperature, gas concentration, etc. have been adopted to enhanced the gas sensing properties of SMO gas sensors. In nanostructure particles, a huge portion of the atoms exist at the surface, and therefore, the surface properties exposed to be foremost. The use of nanostructure particles in SMO gas sensors is touching interest in the scientific area [17-20]. Zinc Stannate ($ZnSnO_3$) perovskite has received interest for a variety of applications due to its scientific properties. $ZnSnO_3$ has a perovskite structure of the general formula ABO_3. $ZnSnO_3$ in recent times drawn attention in the research area due to its potential applications in gas sensors, electronic devices, solar cells, plating additives, optoelectronics, etc. [21-25].

In this paper, preparation of pure $ZnSnO_3$ nanocrystalline powder by a simple chemical route, fabrication of $ZnSnO_3$ based thick films and it surface modification by dipping method has been reported. Their gas sensing properties to carbon dioxide (CO_2), carbon-monoxide (CO), nitrogen-dioxide (NO_2), sulphur dioxide (SO_2), chlorine (Cl_2) and hydrogen sulfide (H_2S) were investigated.

II. EXPERIMENTAL DETAILS

2.1. Preparation of nanosized pure $ZnSnO_3$

The synthesis of $ZnSnO_3$ was done by using stoichiometric molar amount of analytically pure grade [$ZnSO_4.7H_2O$] and [$SnCl_4.5H_2O$] aqueous NaOH. The solution was continuously stirred by magnetic stirrer for 1h to obtain a