DISCOVERY OF DIFFERENCES IN BRAIN USING FUNCTIONAL MAGNETIC RESONANCE IMAGING (FMRI): A SURVEY

Selvakumar K
M.Tech (IT) PG Scholar, Dept. of Information Technology, Sathyabama University, Chennai.
Vijay K
Asst. Professor, Dept. of Information Technology, Sathyabama University, Chennai.

Abstract
The Functional Magnetic Resonance Imaging (FMRI) is popular Brain Imaging Technique, which able to serve and to detect changes in blood flow to specific areas in the brain. It offers both an anatomical and a working view of the brain. FMRI data are too massive in volume, so it needs an effective and efficient multivariate data mining methods to discover information the data set. The objective of this paper is to do detailed study of MRI data. MRI data consists of both the images and numerical data set. The several methods carried into consideration to study are Hidden Markow Random Field (HMRE), Fuzzy-C-Mean algorithm and Seeded Region Growing Method for handling the MRI image. MRI statistical data are analyzed in the first two papers of the survey and the remaining paper based on the brain MRI imaged data.

Keywords: Neuroimaging, Clustering, Multivariate Time Series, MRI Image, FMRI, Segmentation.

INTRODUCTION

The Brain is the most complex part of the human body. It is the Major functional unit of Central Nervous System. It is the center for all the body's functions, such as walking, talking, breathing, taste, smell and etc. It also controls our thinking functionality, our emotions and all our cognitive activities. Injury to any part of the brain can produce impairment in the function that it controls [7]. Impairment in Function leads to Psychiatric disorders like Schizophrenia and Somatoform. Some disorders cannot be identified by the bio marker. Abnormal Brain Activity observation   is the only way to identify minor cognitive activities. FMRI (Functional Magnetic Resonance Imaging) is   a technique for quantifying the activity of the brain. The Basic Signal of FMRI depends on Blood-Oxygen-level dependent (BOLD).

Functional MRI directly measures the blood movement in the brain; thereby provide information on brain activity. FMRI Data are based on time series of voxel images of the brain. The data of 3- dimensional pixels called voxels. Data represents brain activity and information content expected to be more complex. To understand brain activity, it is necessary to understand the relationship among brain regions during task. The availability of information and accessibility of brain data is mandatory. We need multivariate data mining method to interact with pattern to analyze with the help of clustering technique.

A data mining and time series variant includes dataset preparation, clustering technique, feature selection, and dimension reduction methods to find and analyze appropriate brain data. The clustering used to define the group of objects with similar patterns. A Cluster is an examination of streaming data potentially distinguish cluster with similar movements. Time series data mostly large in number and may contain occupier. Time series is a special dataset type where time has non-linear ordering. To overcome of this problem, clustering algorithm is implemented. Time series bunching is the most significant data mining duty in a broad application fields including the stock market, neuroimaging, molecular research. As a result, a lot of research has focused on similarity search in clusters and in time series. PCA is a dimension reduction algorithm that cuts down the unwanted data dimensions by doing a covariance analysis among factors. It is recommended to identfy the uncover trends in brain regions and its related data.

LITERATURE SURVEY
Title of the paper: Approximate Clustering of Time Series Using Compact Model-based Description [1].**Author:** Hans-Peter Kriegel   et.al.

The performance of time series data is normally determined by time series and its size. There is few compression methods used to frame the essential feature of time series. Such compression methods have low accuracy in long time series. To overcome that a new approximation technique based on mathematical model implemented through this paper. The approximation technique represents a time series with a set of reference series. The representation of cost depends on the time series and its overall capacity to handle the data. The understanding of reference by time series is easy. Cluster technique applied to the specific combination of parameters. The approximation depends on the number of referenced coefficients which are all used. The distance computation requires high runtimes than any others in case of spatial indexing representation such as R-Tree [1].

Title of the paper: Structure-based Statistical Features and Multivariate Time Series Clustering [2]**Author**: Xiaozhe Wang et.al.

The increasing new technology has raised an alarm in the time series data with more difficult and formed a multivariate series to effectiveness in data. Here objective is to cluster the multivariate series of data. A univariate series of data to characterize by a set of vector whose dimensions are numerical in feature of the time series [2].

Using this method, each object has shown as a univariate time series in data. Univariate data are shown as a descriptive vector for each and every multivariate time series. Descriptive vector is chained, and then the vectors are clustered with an SSF clustering algorithm. Additionally, this method assists as a dimension reduction technique to analyze the objective. The success ratio depends on the valued addition to the tools, used to access the human activity and more interaction in the area of research. It is a technique used for clustering multivariate time series bounded with its data. Normally concatenation consumes high amount of time. Accuracy can be improvised in less time.

Title of the paper: Segmentation of Brain MR Images through a Hidden Markov Random Field Model and the Expectation-Maximization Algorithm [3] **Author:** Yongyue Zhang et.al.

Herewith, observed a new hidden markov random field (HMRF) model through identified a random progression initiated by an RF. RF sequence is not be detected rightly. However, the estimation done, through its observations. The (HMRF) model ability to segment MRI data by Expectation-Maximization (EM) method. HMRF model has the Potential to encode the numerical and 3-D represented properties of an image. This algorithm deals with parameter estimation and gives a complete framework for unsupervised data. It encodes both three-dimensional and numerical feature of a segmented image. This method doesn't afford excellent result incase of smoothness of the MRI images.

Title of the paper: A Modified Fuzzy C-Means Algorithm for Segmentation of Magnetic Resonance Images [4]. **Author:** M.N. Ahmed et.al.

In this paper, the author represented a customized procedure for estimation of intensity inhomogeneity that supports fuzzy segmentation by fuzzy logic. This method work by change in the objective function existed in the standard Fuzzy-C-Mean (FCM). The variation in objective representation performs recompenses intensity in similar objects and it allows pixel labels further more. Hence it is superior in sectioning scans, falsify by distraction and pepper noise in the images. The involvement of their task is to establishing BCFCM algorithm that it requires quicker clutching to correct classification. Less iteration is enough to cover as compared to other segmentation methods were used. It has the skill to handle BCFCM that afford better results than EM. These methods have phantom measurement to limit by global changes for image variation.

Faster to Generate the result, but Limited to single input feature .

Title of the paper: A Texture based Tumor detection and automatic Segmentation using Seeded Region Growing Method [5].**Author:** Mukesh Kumar et.al.

As we know, Tumor detection is a challenging task in the MRI image. Actually MRI Image is a high pixel image that reflects the normal and abnormal tissues, available in that help to figure out the overlapping. The seeded algorithm has difficulty, if there is no enough growth of tumor, because in the initial stage of the tumor cannot be identified properly, by this method accurately can be able to identify. However, this method used to detecting the tumor based on the texture investigation of MRI. In this method, if the tumor is spotted, then it goes to

segmentation for getting the regular and irregular image pattern. Owns the ability to detect the abnormality present in MRI Data and effectiveness in detecting tumour in an initial stage. It consumes more time to identify the brain tumor.

Title of the paper: Mining Interaction Patterns among Brain Regions by Clustering [6].**Author:** Claudia Plant et.al.

In this paper, author's introduced a notion for multivariate series in addition to interaction K-Means, a proficient algorithm for interaction-centered clustering. IKM accomplishes good results in both artificial data and real time data from different domains, but specifically superb results produced in FMRI and EEG data. This algorithm is robust and mountable in divergence to analyze the noise. Interaction cluster segment Dataset into *K* clusters and to avoid segment overlapping. All clusters have a specific interaction pattern. The pattern identified by IKM is easy to read and can be pictured. A key benefit of IKM is possible to interpret the detected patterns in the brain regions. To simplify interpretation, concentrate on a particular sub grouping of the models which differentiates among by the clusters. For each and every pair of clusters, the best selective models are selected by leave one by one validation using their cluster objects of the consisting clusters. To attain a ranking, the top-ranked models is the mostly differentiate among the clusters in the groups. Interaction procedures in nature are not restricted to be linear so normally nonlinear models used to clarify their authority in the given data sets. Easy to rank and to detected the pattern based on their discriminate among the clusters groups.No feature selection technique to handle interaction-based clustering.

CONCLUSION
We observed that several methods for identifying the disorders and formulating the human brain activity from MRI images and MRI raw data set. It mainly deals with the effectiveness of MRI data and related to MRI images are presented so far, experimental limitations are observed. Methods are having several limitations such as no perfect results generation in case of normal pattern, particularly in contrast between brain tissues and its regions, eliminating intensity in similarity of MRI images and also has the tough task in invariables.

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