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A Survey on Brain State Identification and FMRI

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ABSTRACT: Brain interaction patterns are very complex and FMRI provides a prospective to study the functioning of brain and identifying the brain state. The FMRI data are time series of 3-dimensional volume images of the brain. The data is traditionally analyzed within a mass-univariate framework essentially relying on classical inferential statistics. Handling of feature selection and clustering is a complicated process in interaction patterns of brain datasets. To understand the complex interaction patterns among brain regions system proposes a novel clustering technique. System models each subject as multivariate time series, where the single dimensions represent the FMRI signal at different anatomical regions. In the Proposed paper, three algorithms such as FSS, IKM and Dimension Ranking Algorithm are analyzed.

KEYWORDS: Data mining, Clustering, Interaction K-means Algorithm, Feature Subset Selection, Dimension Ranking, FMRI.

I.INTRODUCTION

Feature selection for interaction based clustering in interaction patterns among brain images by using feature subset selection algorithm. Feature selection for interaction based clustering in interaction patterns among brain images by using feature subset selection algorithm to provide efficient selection process. The paper is to analyze the brain interaction patterns for identifying the state of the brain. Feature subset selection (FSS) is a technique to pre-process the data before performing any data mining tasks, e.g., classification and clustering. This technique was used to choose a subset of the original features to be used for the subsequent processes. Hence, only the data generated from those features need to be collected. After that, select the key features in the preprocessed dataset based on the threshold values. Interaction K-means (IKM), a partitioning clustering algorithm used to detect clusters of objects with similar interaction patterns classification and clustering. Finally, Dimension Ranking algorithm was used to select the best cluster for assuring best result.

II.BOLD EFFECT

Functional magnetic resonance imaging (FMRI) opens up the opportunity to study human brain function in a noninvasive way. The basic signal of FMRI relies on the blood-oxygen-level-dependent (BOLD) effect, which allows indirectly imaging brain activity by changes in the blood flow related to the energy consumption of brain cells. Recently, resting-state FMRI has attracted considerable attention in the neuroscience community. In resting state FMRI, subjects are instructed to just close their eyes and relax while in the scanner. FMRI data are time series of 3-dimensional volume images of the brain. FMRI produce images at higher resolution than other scanning techniques. Data from FMRI experiments are massive in volume with more than hundred thousands of voxels and hundreds of time points. Since these data represent complex brain activity, also the information content can be expected to be highly complex.

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Recent findings suggest a modular organization of the brain into different functional modules. In tracking cognitive processes with functional MRI mental chronometry it says that Functional magnetic resonance imaging (fMRI) is used widely to determine the spatial layout of brain activation associated with specific cognitive tasks at a spatial scale of millimetres. Recent methodological improvements have made it possible to determine the latency and temporal structure of the activation at a temporal scale of few hundreds of milliseconds. Despite the sluggishness of the hemodynamic response, fMRI can detect a cascade of neural activations - the signature of a sequence of cognitive processes. Decomposing the processing into stages is greatly aided by measuring intermediate responses. By combining event-related fMRI and behavioural measurement in experiment and analysis, trial-by-trial temporal links can be established between cognition and its neural substrate. To obtain a better understanding of complex brain activity, it is essential to understand the complex interplay among brain regions during task and at rest. Inspired by this idea, a novel technique is proposed for mining the different interaction patterns in healthy and diseased subjects by clustering. At the core of method is a novel cluster notion: A cluster is defined as a set of subjects sharing a similar interaction pattern among their brain regions. A cluster analysis of motion stream data potentially identifies clusters with similar movements, usually performed by different persons. Time series data are frequently large and may contain outliers.

In addition, time series are a special type of data set where elements have a temporal ordering. Therefore clustering of such data stream is an important issue in the data mining process. Numerous techniques and clustering algorithms have been proposed earlier to assist clustering of time series data streams. The clustering algorithms and its effectiveness on various applications are compared to develop a new method to solve the existing problem. After standard pre-processing including parcellation into anatomical regions, each subject is modelled as a data object which is represented by a multivariate time series. The nature of the considered images and the objective of the segmentation being multiple, there is no unique technique for image segmentation and segmenting an image into meaningful regions remains a real challenge. The algorithm is used to evaluate the values within a regional time and group them together based on the merging criteria, resulting in a smaller list and more number of information is collected and compared with the database and finally abnormality can be detected.

III. ANALYSIS OF VARIOUS FEATURE SELECTION ALGORITHMS

S.No	Algorithm Name	Advantages	Disadvantages
1.	Interaction K-means Algorithm	IKM achieves good results on synthetic data and on real world data.	Auto class technique is not applicable if the number of time points varies among the objects, a case frequently occurring in fMRI data.
2.	K-Means Method	The k-means method is in fact a perfect candidate for smoothed analysis: it is extremely widely used, it runs very fast in practice, and yet the worst-case running time is exponential	It did not make a huge effort to optimize the exponents as the arguments are intricate Enough even without trying to optimize constants.
3.	machine-learning algorithms	This leads to a new view about the neural basis of human perceptual decision-making processes.	It is also tempting to speculate that the general principles derived from the studies of simple perceptual decision processes reviewed here extend to other settings
4.	Relocation clustering, Relocation clustering, k-Means and fuzzy c-means	The goal of clustering is to identify structure in an unlabeled data set by objectively organizing data into homogeneous groups where the within-group-object similarity is minimized and the between-group-object dissimilarity is Maximized.	None of these in the paper which included in this survey handle multivariate time series data with different length for each variable

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5.	Mathematical Model, Efficient Approximative Clustering	The great benefit is that the size of our approximation depends only on the number of Coefficients of the model (i.e. the number of reference time series).	The distance computation requires rather high runtimes and, if the time series are indexed by a standard spatial indexing method such as the R-Tree [1] or one of its variants, this index will perform rather bad due to the well-known curse of dimensionality.
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IV.CONCLUSION

A survey on new approach for the feature selection before clustering mechanism has been presented in this paper. Feature Subset Selection method used to choose a subset of the original features to be used for the subsequent processes. In this algorithm, initially collect the preprocessed dataset then find out the ranges of the respected dataset. After that, select the key features in the preprocessed dataset based on the threshold values. Interaction K-means (IKM), a partitioning clustering algorithm used to detect clusters of objects with similar interaction patterns classification and clustering. Interaction K-means (IKM), a partitioning clustering algorithm suitable to detect clusters of objects with similar interaction patterns classification and clustering. Finally, Best Ranking algorithm used to select the best cluster for assuring best result.

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