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# CLASSIFICATION AND RECOGNITION OF EEG SIGNAL USING MACHINE LEARNING

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***Abstract: -*** In recent years the view that stability theory has wider applicability than the originally limited context (i.e. first-order stable theories) is getting increasing recognition among model theorists. The current interest in simple (first-order) theories and beyond signifies a shift in the opinion of many that similar tools and concepts to those of basic stability theory can be developed and are relevant in a wider context. Shelah introduced the framework of abstract elementary classes and embarked on the ambitious program of developing a classification theory for abstract elementary classes. The objective of this dissertation is classification of EEG signal using machine learning. First of all we recognize signal and then apply classification method machine learning.

***Keyword:***Data Mining, Classification, Recognition, EEG

## I. INTRODUCTION

Data mining is primarily used today by companies with a strong consumer focus - retail, financial, communication, and marketing organizations. It enables these companies to determine relationships among "internal" factors such as price, product positioning, or staff skills, and "external" factors such as economic indicators, competition, and customer demographics. And, it enables them to determine the impact on sales, customer satisfaction, and corporate profits. Finally, it enables them to "drill down" into summary information to view detail transactional data.

With data mining, a retailer could use point-of-sale records of customer purchases to send targeted promotions based on an individual's purchase history. By mining demographic data from comment or warranty cards, the retailer could develop products and promotions to appeal to specific customer segments.

In search results the listings from any individual site are typically limited to a certain number and grouped together to make the search results appear neat and organized and to ensure diversity amongst the top ranked results. Clustering can also refer to a technique which allows search engines to group hubs and authorities on a specific topic together to further enhance their value by showing their relationships. Clustering is the unsupervised classification of patterns (observations, data items, or feature vectors) into groups (clusters). The clustering problem has been addressed in many contexts and by researchers in many disciplines; this reflects its broad appeal and usefulness as one of the steps in exploratory data analysis. However, clustering is a difficult problem combinatorial, and differences in assumptions and contexts in different communities has made the transfer of useful generic concepts and methodologies slow to occur. This paper presents an overview of pattern clustering methods from a statistical pattern recognition perspective, with a goal of providing useful advice and references to fundamental concepts accessible to the broad community of clustering practitioners.

## II. CLASSIFICATION TECHNIQUES

Different approaches to clustering data can be described (other axonometric representations of clustering methodology are possible; At the top level, there is a distinction between hierarchical and partitioned approaches (hierarchical methods produce a nested series of partitions while partitioned methods produce only one).

The taxonomy must be supplemented by a discussion of cross-cutting issues that may (in principle) affect all of the different approaches regardless of their placement in the taxonomy.

1.) Agglomerative vs. divisive: This aspect relates to algorithmic structure and operation. An agglomerative approach begins with each pattern in a distinct (singleton) cluster, and successively merges clusters together until a stopping criterion is satisfied. A divisive method begins with all patterns in a single cluster and performs splitting until a stopping criterion is met.

2.) Monotheist vs. Polytheist: This aspect relates to the sequential or simultaneous use of features in the clustering process. Most algorithms are polytheist; that is, all features enter into the computation of distances between patterns, and decisions are based on those distances. A simple monotheist algorithm reported in Ander berg considers features sequentially to divide the given collection of patterns.

3.) Hard vs. fuzzy: A hard clustering algorithm allocates each pattern to a single cluster during its operation and in its output. A fuzzy clustering method assigns degrees of membership in several clusters to each input pattern. A fuzzy clustering can be converted to a hard clustering by assigning each pattern to the cluster with the largest measure of membership.

4.) Deterministic vs. stochastic: This issue is most relevant to partitioned approaches designed to optimize a squared error function. This optimization can be accomplished using traditional techniques or through a random search of the state space consisting of all possible labeling.

5.) Incremental vs. non-incremental: This issue arises when the pattern set to be clustered is large, and constraints on execution time or memory space affect the architecture of the algorithm. The early history of clustering methodology does not contain many examples of clustering algorithms designed to work with large data sets, but the advent of data mining has fostered the development of clustering algorithms that minimize the number of scans through the pattern set, reduce the number of patterns examined during execution, or reduce the size of data structures used in the algorithm's operations. A cogent observation in Jain and Dubes [1988] is that the specification of an algorithm for clustering usually leaves considerable flexibility in implementation.

## III. MACHINE LEARNING

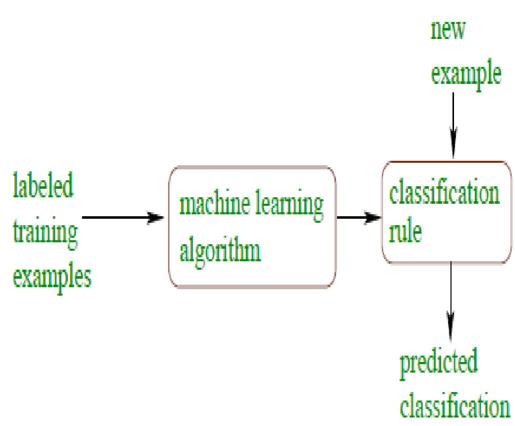



**Fig 1 Classify examples into given set of categories**

**ADVANTAGES:**

- often much more accurate than human-crafted rules(since data driven)
- humans often incapable of expressing what they know(e.g., rules of English, or how to recognize letters),but can easily classify examples
- don't need a human expert or programmer
- automatic method to search for hypotheses explainingdata
- cheap and flexible — can apply to any learning task

**DISADVANTAGES:**

- need a lot of labelled data
- error prone usually impossible to get perfect accuracy

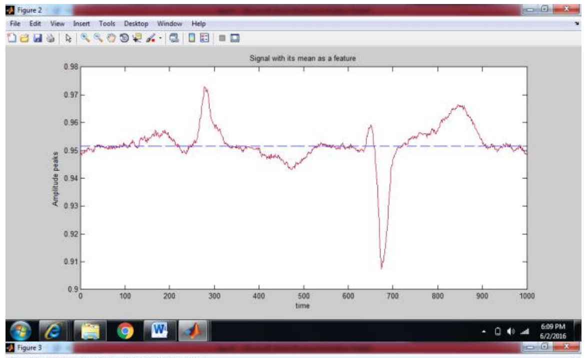
## IV. EEG SIGNAL

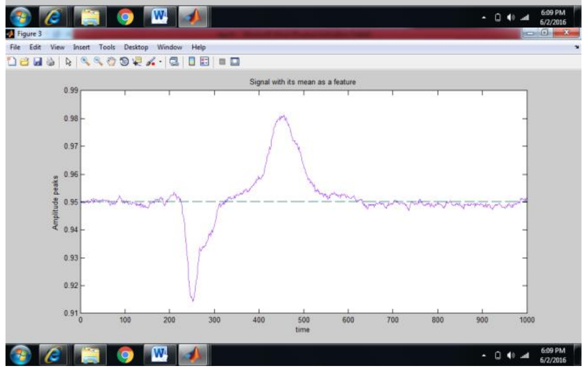
Many biomedical signals provide useful information for clinical application such as Electroencephalogram (EEG), which is one of the most important biomedical signals applied in neurological clinics. It can be measured by placing dozen(s) of electrodes at various positions on the scalp of a subject. EEG signals record cerebral electric activities and detect events of epileptic seizures in patients with epilepsy, which afflict approximately 1% of the population [9]. Patients with epilepsy often present in their EEG electrical potentials such as spikes or sharp wave that are of significant diagnostic characteristics. The routine EEG, which shows temporal and spatial information of the brain, is popularly used to diagnose, monitor and localize epileptogenic foci [10]. Therefore, the EEG test remains today the gold standard for the classification of seizure types and diagnosis of epileptic disorders. In recent years, several methods have been dedicated for detection of seizure based on EEG signals, which including wavelet coefficients, eigenvectors, time–frequency analysis and principal component analysis [11-14]. In general, these studies have shown the fact that the brain is a complex and non-linear dynamic system. Therefore, an efficient automatic estimation system using informatics technology is necessary.

## V. PROBLEM STATEMENT

1. In the field of classification there has been certain works to classify the datasets, signals and the rules applied to them.
2. The algorithms like C-mean, K-mean and simple SVM works good in terms of clustering but they don't have the effect on the classification.
3. In terms of accuracy of the classified cluster, it is also important to take care of the dataset which you have been handling.
4. The basic problem in the classification thing is the identification of the dataset which has been prepared and taking out the possible accuracy by testing the dataset with different parameters taken for the testing.
5. Our aim is to classify the dataset along with their parameters to judge them how accurate they are and to introduce new parameters to increase the accuracy.

## VI. RESULTS




## VII. CONCLUSION

In this paper, the epileptic seizure detection formultichannel EEG Signals based on the automaticidentification system is presented. Three classes (i.e., normal, inertial, and seizure) of features are extracted, and SVMsare employed to make a classification using those features.

To improve the accuracy, both unipolar and bipolar EEGsignals are used in this study. The predicting accuracy ofEEG signals can reach 98.91%. Therefore, our epilepsydiagnosis system can be very helpful for application inmedical practice.

## 1. REFERENCES

1. Jiawei Han and MichelineKamber 2 ed. "Data mining concepts and Technique"
2. Leonid Churilov, AdylBagirov, Daniel Schwartz, Kate Smith and Michael Dally, -Proceedings of the Workshop on Educational Data Mining at the 8th International Conference on Intelligent Tutoring Systems Jhongli, Taiwan 2011
3. Bagirov et al. Classification and Regression Trees Chapman and Hall, New York, NY, 1984
4. Leonid Churilov, AdylBagirov, Daniel Schwartz, Kate Smith and Michael Dally Drop Out Feature of Student Data for Academic Performance Using Decision Tree, Global Journal of Computer Science and Technology Vol. 10 Issue 2 (Ver 1.0), April 2010.
5. Anthony D Anna & Oscar H. Gandy Simplifying decision trees: A survey. Knowledge Engineering Review, 12:1{40, 1997
6. Huda Akil, Maryann E. Martone, David C Van Essen "Multivariate versus univariate decision trees" Technical Report 92-8, Department of Computer Science, University of Massachusetts, Amherst, MA, 1992
7. Hothorn T, Hornik K, Zeileis A. Unbiased recursive partitioning: a conditional inference framework. J Comput Graphical Stat 2006, 15:651–674.
8. M. Ikonomakis, S. Kotsiantis, V. Tampakas, "Text Classification Using Machine Learning Techniques" WSEAS TRANSACTIONS on COMPUTERS, Issue 8, Volume 4, August 2005
9. H. Witte, L. D. Iasemidis, and B. Litt, "Special issue on epileptic seizure prediction,"IEEE Trans. Biomedical Engineering vol. 50, no. 5, pp. 537–539, May 2003.
10. R. S. Fisher, W. V. E. Boas, W. Blume, C. Elger, P. Genton, P. Lee, and J. Engel Jr.,Epileptic seizures and epilepsy: definitions proposed by the international league against epilepsy (ILAE) and the international bureau for epilepsy (IBE)," Epilepsia, vol. 46, no. 4, pp. 470-472, Mar. 2005.