

Analysis Of Autism Spectrum Disorder By Extracting Features From Eeg Signals Using Classifier

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Abstract: Autism spectrum disorder is a neurodevelopment disorder characterized by impairment in social interaction, deficits in communication, restricted and repetitive actions. Identification of disorder at an early stage decreases the level of dependency of a person. Feature extraction is used to obtain the hidden information and Classifier the signals to identify whether the children had Autism Spectrum Disorder. The Proposed the system is molded to estimate the condition normal or not. The results show accuracy in range (80-90) % when using KNN & NBC Classifier. The proposed model can be adapted to help psychiatrist for diagnosis and intervention process.

Keywords : Autism Spectrum Disorder, Feature Extraction, EEG Signals, KNN & NBC Classifier

I. INTRODUCTION

Autism is a complex neuro behavioral condition that includes impairments in social interaction and developmental language and communication skills combined with rigid, repetitive behavior [1]. The brain develops rapidly during the first years of life and atypical neurodevelopment is likely due to a combination of genetics, biological, and environmental conditions, all compounded by adaptations that result from atypical interactions between the developing child and his or her environment. Detection of autism signal is one of pattern recognition problem that is influenced by two factors: extracted features and classifier; where some of those extracted features facilitate discrimination process of classes which in turns normal classifier like different in mean distance is sufficient. The identification of the Autism Spectrum Disorder by analysis of EEG signal is used to detect the disorder at an early stage as soon as possible. In other cases there is a need for compatibility of features and classifier to get good results.

II. PROPOSED METHOD

The main objective of this project is to acquire the EEG signals of a person and to develop an autism spectrum disorder identification tool to identify the disorder as early as possible. If the disorder is identified early the chance of risk for the individual is low and they can be provided with therapy such as Applied Behavior Analysis (ABA), Verbal Behavior Therapy (VBT) and Cognitive Behavioral Therapy (CBT) to decrease the level of dependency.

A. Block Diagram

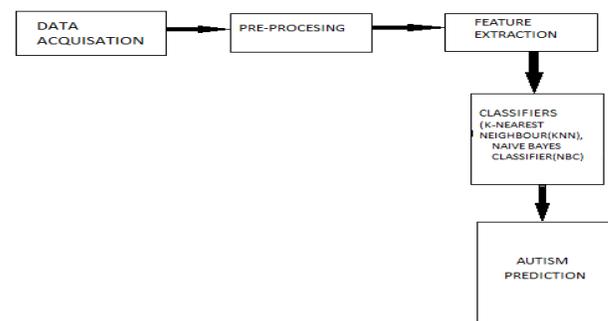


Fig. 1. Block Diagram

B. Process Description

EEG signals are affected by noise from child movement, environment and electrode connection. Therefore, it is necessary to pre-process EEG data to reduce the artifacts. The mean value was subtracted from each channel then EEG data were filtered using band pass filter (0.1- 60) Hz[2]. All EEG data were normalized between (0 to 1) after filter process.

III. MATERIALS AND METHOD

A. Data acquisition:

EEG signals were recorded in a relaxing state and divided into two groups: the first one is called a normal group without any mental disorder and the second one is called autistic group with Autism Spectrum Disorder. The data is acquired from children using the neuro-max kit which is a 16-channel electrodes kit. An EEG signal is recorded with 16-channel at a sampling frequency of 256Hz. The data are collected with 65 active EEG electrode. During the acquisition of data a syrup called pedicloryl is given to avoid insomnia and flushing. This syrup contains triclofos sodium as an active ingredient. Collected data is filtered by band pass filter with band pass frequency between (0.1-60) HZ[3].

B. Normalisation:

In this process data are collected from different datasets which is used to convert into single database. There are different database were first database is in three digit decimal form and another database in two digit decimal

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A. Clinical Evaluation method:

If the conducted test is positive and the person have the disorder it is considered as true positive while the person have no disorder it is false positive. If the conducted test is negative and the person have disorder it is false positive and if the person have no disorder it is true negative. The below mentioned formula is used to find the accuracy of the tool.

$$\text{Accuracy} = (\text{TP} + \text{TN}) / (\text{TP} + \text{FP} + \text{FN} + \text{TN})$$

Table I: Clinical Testing

Test	Have disorder	No disorder
Positive	TRUE POSITIVE(TP)	FALSE POSITIVE(FP)
Negative	FALSE NEGATIVE(FN)	TRUE NEGATIVE (TN)

B. Performance analysis:

In the proposed methods, including feature extraction and classification techniques. And also certain classifier techniques is used to measure the accuracy. The classifier are KNN-K-Nearest Method and NBC-Navie Bayes classifier. Both the classifiers have a different way of approach respectively. The main objectives this project is to identify whether the child is affected by Autism Spectrum Disorder are not. The following table describes experimental result for existing system analysis of accuracy.

Table II: Performance Analysis -Average

S.NO	DATASET	KNN (%)	NBC (%)
1	200	74.56	77.50
2	250	82.34	88.00
3	300	87.55	90.66
4	350	90.23	92.00
5	400	92.46	94.75
6	450	93.98	95.33
7	500	94.12	96.60
8	550	95.33	97.05
9	600	96.22	98.33
10	650	97.03	98.74

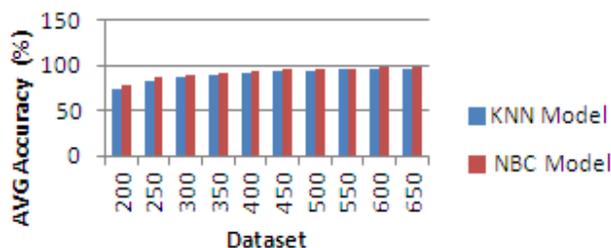


Fig. 3. Performances analysis

V. FUTURE SCOPE

The combination of KNN and NBC methods is achieved the best results with overall accuracy of % in classifier techniques. By using KNN and NBC method got 89.54% accuracy. For more accuracy of finding autism spectrum disorder RCNN method will give 95% of accuracy.

VI. REFERENCES

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