

# AN EFFICIENT METHOD FOR PREDICTION OF AUTISM SPECTRUM DISORDER

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**Abstract:** Autism Spectrum Disorder (ASD) is a neurodevelopment abnormality that affects the behavior and communication of an individual. In present-day Autism Spectrum Disorder (ASD) is gaining its momentum faster than ever, which limits the social and cognitive skills whereas its symptoms may vary from person to person. Though much research has been carried out on ASD using different techniques, these studies didn't provide sufficient improvement in accuracy and performance. Also, detecting autism traits through screening tests is expensive and time-consuming. The main aim is to propose an effective prediction model by adopting an advanced machine learning techniques. The evaluation results show that the proposed prediction model provides better results in terms of accuracy, performance, and compared with the existing models using a real dataset that is collected from people. Further, if the disorder is detected, domain specialized doctors are suggested from the specified cities.

**Keywords:** Ada-Boost; detection; accuracy; performance; prediction;

## I. INTRODUCTION

Autism spectrum disorder (ASD) is a neurological disorder (a "brain" disease) characterized by the presence of persistent (ongoing) communication and social issues. It is a developmental disorder, which begins in early childhood and continues throughout life. Autism spectrum disorder affects most every aspect of life along the way. Cognitive (thinking and language) and social skills are typically developmentally delayed compared to their peers without disorder. Although diagnosis of the autism can be done at any age its symptom generally appears in the first two years of life and develops through time. Autism patients face different types of challenges such as difficulties with concentration, learning disabilities, mental health problems such as anxiety, depression etc. motor difficulties, sensory problems and many others.

Individuals with Autism have difficulties in interpreting both verbal and nonverbal language, such as gestures and tone of voice. Some individuals have a very literal understanding of language, and think people always means exactly what they say. Some may have limited speech, repetitive speech (echolalia) or not speak at all but may have fully functioning receptive language. Recognizing or understanding other people's intentions and feelings can be challenging.

Similarly, it may be difficult for these individuals to express their own emotions can make it hard to form and build relationships. Diagnosis of autism requires significant amount of time and cost. Earlier detection of autism can come to great help by prescribing patients with proper medication at an early stage. It can prevent the patient's condition from deteriorating further and would help to reduce long term costs associated with delayed diagnosis. Though a number of studies have been carried out using different techniques, these studies didn't provide sufficient improvement in accuracy and performance and also detecting autism traits through screening test is very expensive and time consuming. The main aim is to propose an effective prediction model by adopting advanced machine learning techniques, i.e. ADA Boost using which autism can be predicted quite early stage for better result in terms of accuracy, performance and comparing with the existing models using real data set collected from people. Further if the disorder is detected domain specialized doctors are suggested from the specified cities.

## II. LITERATURE SURVEY

The author [1], the advancement of artificial intelligence machine learning (ML), autism can be predicted at quite early stage. Though numbers of studies have been carried out using different techniques, these studies didn't provide any definitive conclusion about predicting autism traits on different age groups. Therefore this paper aims to propose an effective prediction model based on ML technique and to develop a mobile application for predicting ASD for people of any age. The proposed model was evaluated with AQ-10 dataset and 250 real dataset collected from people with and without autistic traits. The evaluation results showed that the proposed prediction model provide better results in terms of accuracy, specificity, sensitivity, precision and false positive rate (FPR) for both kinds of datasets. Outcome of this research provides an effective and efficient approach to detect autism traits for different age groups. Since diagnosing the autism traits is quite a costly and lengthy process, it's often delayed because of the difficulty of detecting autism in children and adolescents. With the help of autism screening application, an individual can be guided at an early stage that will prevent the situation from getting any worse and reduce costs associated with delayed diagnosis.

The publisher [2] is saying that machine learning is applied to diagnose ASD problem as a classification task in which prediction models were built based on chronological dataset, and then used those patterns to predict that the person is suffering from ASD or not. So it can be used for decision making under ambiguity. Here in this paper they have applied machine learning techniques and validate their performance on a Autism Spectrum Disorder dataset. Early diagnosis of ASD can save many people to destroy their lives as well as others.

In this paper, we have taken the data of adult people from the age of 17 to 60 years and tried to diagnose the Autism Spectrum Disorder by applying data mining techniques. There is sample range of questions in the dataset that was used in our research. The KNN, SVM, LR, CART, Naive Bayes and LDA algorithms have been used in the classification. Here we convert the data of some attributes into the numerical values. In the result of this implementation the Linear Discriminant Analysis algorithm shows the best result i.e. 72.2024% and most accurate than other algorithms.

The writer [3] is using the existing screening tools for early detection of autism are expensive, cumbersome, time-intensive, and sometimes fall short in predictive value. In this work, we apply Machine Learning to gold standard clinical data obtained across thousands of children at risk for autism spectrum disorders to create a low-cost, quick, and easy to apply autism screening tool performs better than most widely used standardized instruments. This new tool combines two screening methods into a single assessment, one based on short, structured parent-reported questionnaires and the other based on tagging key behaviors from short, semi-structured home videos of children. We demonstrate a significant accuracy improvement over standard screening tools in a clinical study sample of 162 children. We further discuss the challenge of extending machine learning algorithms to condition beyond autism, and we propose a generalized framework for using machine learning algorithms to simultaneously search for the presence of many different conditions.

The author of [4] The fifth edition of the Diagnostic and Statistical Manual of mental Disorder (DSM-5) now diagnoses ASD using a 2-dimensional model based social communication deficits and fixated interests and repetitive behaviors. Sorting out heterogeneity is crucial for study of etiology, diagnosis, treatment and prognosis. In this paper, we present an ensemble model for analyzing ASD phenotypes Using several machine learning techniques and a k-dimensional subspace clustering algorithm. Our ensemble also incorporates statistical methods at several stages of analysis. We apply this model to a sample of 208 probands drawn from the Simon Simplex Collection Missouri Site patients. The results provide. The results provide useful evidence that is helpful in elucidating the phenotype complexity within ASD. Our model can be extended to other disorders that exhibit a diverse range of heterogeneity.

### III. METHODOLOGY

We collected commonly available features and identified essential and flexible features to support for finding the autism disorder.

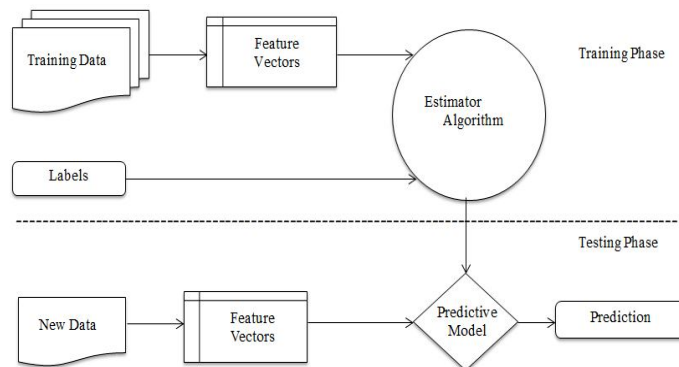


Fig 1 System Architecture

**Training Data:** The training data is the actual dataset used to train the model for performing various actions. **Feature Vectors:** Feature vectors are usually represented in numeric or symbolic characteristics, which can be easily analyzed. **Estimator algorithm:** It is used for choosing best or most likely accurate data model based on their observations. **Labels:** Labels are the discrete attribute whose value needs to be predicted based on the values of other attribute. **Predictive Model:** It is used to identify the future outcomes based on historical data. **Prediction:** It is an output of an algorithm after it has been trained on a historical dataset and applied to new data.

We have proposing an effective prediction model by adopting advanced machine learning techniques i.e. ADA Boost using which autism can be predicted quite early stage for better accurate result. In this prediction model, dataset consist of set of questionnaires which is represented using flask interface and it also consist of attributes like age, gender, jaundice(whether the patient is suffering or not) etc. This questions test will be conducted by patient’s guardian or by Health Care Professionals. Further if the disorder is detected domain specialized doctors are suggested from the specified cities. The evaluation result shows that the proposed prediction module provide better result in terms of accuracy, performance and comparing it with the existing models using real dataset collected from people. ADA Boost is one of the first boosting algorithms to be adapted in solving practices. ADA Boost helps you combine multiple “Weak Classifiers” into a single “Strong Classifiers”. The weak learners in ADA Boost are decision trees with a single split, called decision stumps. ADA Boost works by putting more weight on difficult to classify instances and less on those already handled well. ADA Boost algorithm can be used for both classification and regression problem.

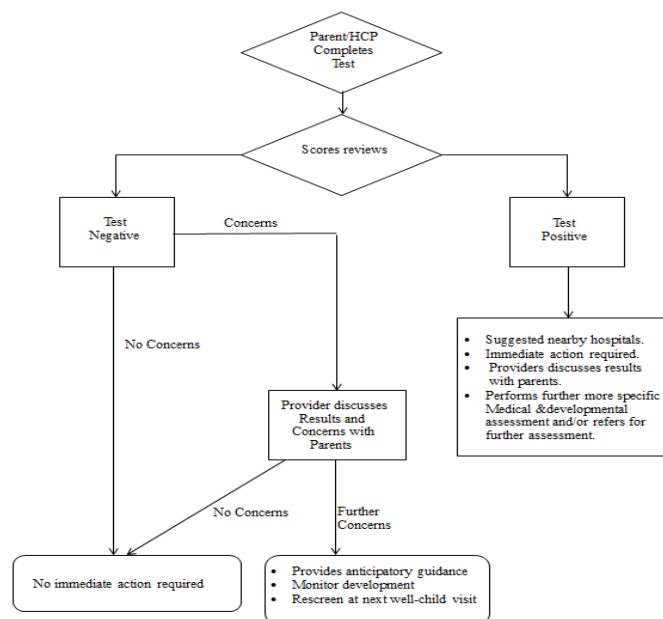


Fig 2 Flow Chart

Here we have explained that the parents or the guardian would take up the questions since the baby will not be in the stage to respond.

Based on the answers the staffs who is asking the questions will be giving the results whether the baby has the disorder or not. If the screen provides negative then the respective parents will be informed about the results as to not to worry about the disorder. In case of any further suggestions needed would be asked to the doctor directly and be confirmed once again. If not it is not necessary to consult a doctor again.

If the result gives a positive sign then it's a must to take the treatment immediately. Since the more delayed would cause the problem more. The provider would discuss the results and accordingly suggest the doctors with the parents or doctors. This would help the parents or guardians to take action quickly based on their wish.

#### IV. CONCLUSION

Autism Spectrum Disorder is a neurological disorder which is characterized by the presence of persistent communication and social issues. It is also called as spectrum disorder because of its characteristics and symptoms which affects the children in different ways. Some can have server effects and would be dependent completely and some can afford to do independent tasks with lesser help. Lack of autism awareness delays the parents to identify the symptoms at an early stage. People with autism have difficulties like communication, social interaction, sensory, behavior. Researchers have struggled to find a cause for the disorder without great success. Despite this difficulty, research continues in ever more sophisticated directions. Based on the research the algorithms which are already used are Random Forest, SVM and Decision Tree which broadly makes use of Machine Learning. This will predict the affected children and give the results of affected children based on the questions asked. This project have a major contribution in using ADA Boost algorithm which has a higher accuracy, performance and have more comparing with the existing models using real data set collected from people. Further if the disorder is detected domain specialized doctors are suggested form the specified cities.

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