
Review On Autism Spectrum Disorder Detection Using Machine Learning Algorithm

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ABSTRACT

Autism Spectrum Disorder may be a condition associated with brain development that impacts how a person perceives and socializes with others, causing issues in social interaction and communication. The disorder additionally includes restricted and repetitive patterns of behavior. The term “spectrum” in autism spectrum disorder refers to the wide selection of symptoms and inflexibility. Autism spectrum disorder includes conditions that were antecedently considered separate - Autism, Asperger’s syndrome, childhood disintegrative disorder and an unspecified form of pervasive developmental disorder. Some people still use the term “Asperger’s syndrome” which is mainly thought to be at the mild finish of autism spectrum disorder. Autism Spectrum disorder begin in early childhood and eventually lead to problems with social functioning-for example ,in social interaction, school, and work. Children usually show symptoms of autism within first year of life. A small number of children appear to be developing normally in the first year and then go through a regression phase when they develop autism symptoms between 18 and 24 months of age. Although there is no cure for autism spectrum disorder, early intensive treatment can significantly improve the lives of many children.

The aim of this paper is to study different machine learning algorithm to detect and predict Autism Spectrum Disorder.

Keywords— Autism Spectrum Disorder, Machine Learning, Classification

I. INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurological developmental disorder. It affects the way people communicate how they treat others and how they treat themselves own and learn. Symptoms and signs appear when the child is very young. It’s a lifetime condition and cannot be completely cured. One study found that 33 % of children with difficulties other than autism have some ASD symptoms that do not fit the full classification writing standards.

Childhood autism is an exciting decision-making problem and is traditionally experimented with by professional clinicians who are very much experienced.

It is still a challenge in diagnosing and assessing the severity of autism disorder. People with autism learn, and think may vary from one person to other. Several factors may affect the development of autism and are frequently followed by sensory sensitives and medical issues.

This paper systematically outlines the different classifications Techniques for predicting ASD and suggested methods for classifying patients with ASD or no ASD.

II. DESCRIPTION OF MODELS

This section focus on the various models studied, and their methodologies. All these models use different machine learning techniques to predict ASD in children.

A. Autism Spectrum Disorder Screening: Prediction With Machine Learning Models

¹Kruthi C H,²Tejashwini H N,³Poojitha G S,⁴Shree Lakshmi H S,⁵Shobha Chandra K

This paper [1] aims to propose a prediction model supported by ML fashion and develop a user interface for predicting ASD for people of any age. As the result of this analysis, an autism prediction model was developed by incorporating Random Forest-CART (Classification and Regression Trees)

and Random Forest-ID3 and concertededly an interface was developed predicated on the proposed prediction model. The proposed model was estimated with AQ-10 screening tool and real data sets collected from people with and without autistic traits.

Using the AQ-10 scores, the suggested model will predict Autism complaints with 99 delicacies by incorporating the CART model in the case of children, adolescents, and grown-ups independently.

The proposed model will prognosticate ASD complaint traits for various age groups, while numerous different being approaches are incomprehensible at this point. Likewise, this analysis provides different machine literacy approaches in terms of their performance. The results showed that Random Forest CART showed more advanced performance than the Decision Tree-CART algorithmic rule, while the projected (incorporating Random Forest-CART and Random Forest-ID3) algorithmic rule gives advanced performance scrutiny.

The analysis results showed that the proposed prediction model handed better results in terms of delicacy, particularity, perceptivity, perfection, and false positive rate (FPR) for the data set.

Tools used: AQ 10

Prediction model: Random Forest -CART

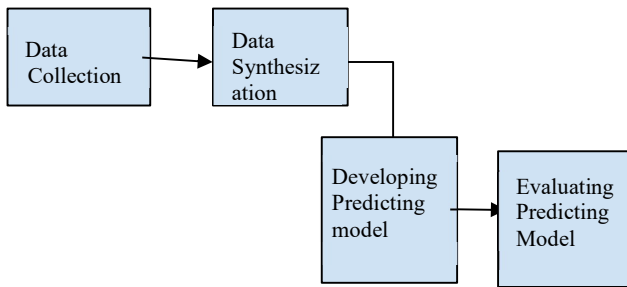


Fig: System Architecture

B.Predicting Autism Spectrum Disorder Using Machine Learning Technique

¹Jaber Alwidian, ²Ammar Elhassan, ³Rawan Ghnemat

In this paper [2], the authors found that the Association Classification Technique(AC) as a data mining technique in predicting whether a person has autism or not.seven well- known algorithms was named to conduct analysis and evaluation of the performance of the AC technique with reference to finding correlations between the features to help decide initial on whether an existent has autism; this is mainly crucial for children. The analysis for the efforts and the performance in the prediction tasks for the AC algorithms was conducted for the common criteria of including Precision, Accuracy F- Measure as well as Recall. Eventually, a relative performance analysis among the algorithms was used as final result for the study. The results show greater performance for the WCBA algorithm in utmost test scripts with delicacy of 97 although, the most of algorithms displayed excellent delicacy when applied in this area.

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Technique	Association Classification
Algorithm	CMAR, CBA, FACA, MCAR, FCBA,

	ECBA and WCBA
Statistical Measures	(F1, Precision, and Recall)
Dataset	UCI

C.Grading Autism Children Using Machine Learning Techniques

¹Dr.C.S.Kanimozhiselvi, ²Mr.D.Jayaprakash, ³Ms.K.S.Kalaivani

This paper [3] focused on the development of some classification models using machine learning algorithms such as Naive Bayes Algorithm, Decision Tree Algorithm, K Nearest Neighbours Algorithm, Support Vector Algorithm with real-world clinical dataset CARS and its application in grading childhood autism helps the clinical paediatrician to diagnose the grades of autism in the earlier stages. This could serve as an additional mechanism to detect autism and treat children by the pediatricians. The possibility of autism is indicated with a vague grade representation like ‘Mild-Moderate’ or ‘Moderate-Severe’ rather than giving a clear indication of grades like ‘Mild’, ‘Moderate’ or ‘Severe’. . In this paper decision tree algorithm provides the greatest accuracy of 1.00 for training set and 0.96 for test set.

D.Detection Of Autism Spectrum Disorder In Children Using Machine Learning Techniques

¹Kaushik Vakadkar, ²Diya Purkayastha, ³ Deepa Krishnan

This paper [4] used five ML models (Logistic Regression, Naïve Bayes, Support VectorMachine, K-Nearest Neighbors, and Random Forest Classifiers) to classify individual subjects as having ASD or No-ASD, by making use of various features, such as age, sex, ethnicity, etc., and evaluated each classifier to determine the best performing model. Out of the five models that we applied to our dataset; Logistic Regression was observed to give the highest accuracy.

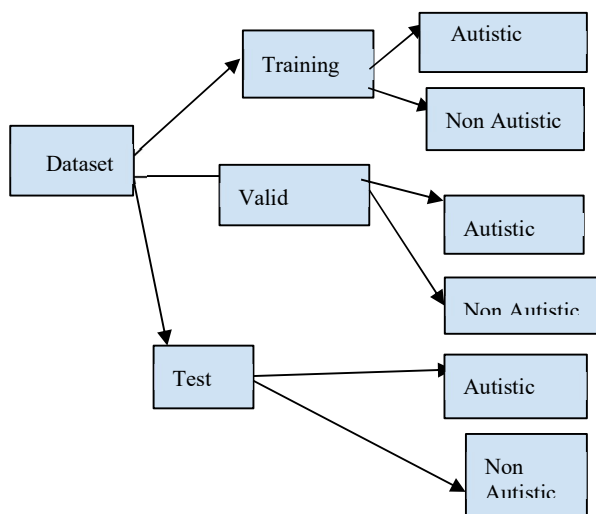
E.Identification Of Autism In Children Using Static Facial Features And Deep Neural Networks

¹K. K. Mujeeb Rahman , ²M. Monica Subashini

In this paper[5], static features are take out from autistic child photographs. This is used as a biomarker to differentiate them from developing children.

Five pre-trained CNN models: MobileNet, Xception, EfficientNetB0, EfficientNetB1, and EfficientNetB2

Data set :Kaggle



F. Identification Of Newborns At Risk For Autism Using Electronic Medical Records And Machine Learning

¹Rayees Rahman, ²Arad Kodesh,, ³Stephen Z. Levine, ⁴Sven Sandin,,⁵Abraham Reichenberg, ⁶Avner Schlessinger

The aim of the current study [6] was to test the ability of machine learning (ML) models applied to electronic medical records (EMRs) to predict ASD early in life, in a general population sample.

DataSource	Israeli Health Maintenance Organization,
Features used	Prescribed medications, medical histories, sociodemographic characteristics
Normalization	Softmax normalization technique
ML methods	Logistic, Regression, Artificial neural network, Random Forest
Evaluation model	10-fold cross-validation

III. RESULT AND DISCUSSION

This article reviewed six different studies on autism spectrum disorder prediction using different machine learning algorithms.

Ref	Reviewed Model	Methodology	Dataset	Accuracy
1	Machine Learning	Random Forest-CART & Random Forest-ID3	AQ-10	Random Forest CART-96.9%, Random Forest-ID3-99.2%
2	Association Classification	CMAR, CBA, FACA, MCAR, FCBA, ECBA, and WCBA	UCI	WCBA-86 ECBA -81 FCBA-82 FACA-83 MCAR-83 CMAR-77 CBA-81
3	Machine Learning	Naive Bayes, Decision	CARS	Naive Bayes-87, Decision Tree-

		Tree , K Nearest Neighbour, Support Vector Algorithm		95,SVM-87,KNN-87
4	Machine Learning	Logistic Regression (LR), Naïve Bayes (NB), Support Vector Machine (SVM), K-Nearest Neighbors (KNN), and Random Forest Classifier (RFC).	kaggle	LR-97,NB-94,SVM-93,KNN-90,RFC-81
5	CNN	MobileNet, Xception, EfficientNetB0, EfficientNetB1, and EfficientNetB2,DNN	public dataset	MobileNet-92.81 Xception-96.63 EfficientNetB0-93.38 EfficientNetB1-95.06 EfficientNetB2-94.31
6	Machine Learning	Logistic,Regression,Artificial neural network,Random Forest	Israeli Health Maintenance Organization,	Logistic regression-94.9 Random Forest-96.5,Artificial Neural network-95.5

IV. CONCLUSION

The autism spectrum could be very wide. Some people may have very substantive problems, others might not. The usual thread is differences in social issues, convey, and conduct compared with people who aren't at the spectrum. In this paper, we have reviewed six different models for predicting autism spectrum disorder using machine learning techniques. As per our study, it was observed that Random Forest-ID3 method provide accuracy of 99.2%.

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