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A NOVEL APPROACH ON AUTISM PREDICTION USING ENHANCED REINFORCEMENT LEARNING

Deepa. B[1], Dr. JeenMarseline K S[2]

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Abstract

Autism Spectrum Disorder (ASD) is a complex, lifelong neurodevelopment disorder that affects how individuals with the disorder interact with and perceive their environment. In recent years, machine learning has been increasingly used to aid in the diagnosis and prediction of ASD.This paper presents a machine learning technique for predicting autism spectrum disorder (ASD) based on a combination of behavioral and medical features. The model was built using a large dataset of both ASD and non-ASD individuals, along with a variety of features such as age, gender, medical history, and behavioral traits. A decision tree-based classifier was used to develop a predictive model, which was then tested on a separate test set. The results showed that the model was able to accurately classify ASD individuals with an accuracy of 94% and a precision of 95%, outperforming the baseline accuracy of 82%. The results suggest that this model could be used to accurately identify individuals with ASD, thus improving ea Reinforcement Learning diagnosis and care for those affected. Finally, using customized reinforcement learning could provide a way to optimize the performance of a predictive model over time by learning from its decisions and adjusting its parameters accordingly.

Keywords: autism disorders, prediction, accuracy, behavioral patterns.

[1]Assistant Professor, Department of ICT and Cognitive Systems, Sri Krishna Arts and Science College, Coimbatore
deepab@skasc.ac.in

[2]Associate Professor & Head, Department of ICT and Cognitive Systems, Sri Krishna Arts and Science College, Coimbatore
jeenmarselineks@skasc.ac.in

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INTRODUCTION

In this research work, the experiment carried out with the dataset The Autism Spectrum Disorder (ASD) dataset on Kaggle is a collection of data related to individuals with autism. It contains information about diagnoses, treatment, and symptoms from more than 500 individuals with autism. The data was collected from various sources, including medical records, surveys, and interviews. The dataset also includes demographic information, such as age, gender, and ethnicity. The data is organized into multiple tables, making it easier to analyze and extract insights. The dataset is useful for researchers looking to gain a better understanding of the condition and its effects on individuals. It can also help medical professionals better diagnose and treat individuals with autism.

LITERATURE STUDY ON AUTISM SPECTRUM DISORDER

This literature survey will analyze the current state of machine learning approaches to predicting ASD and discuss the potential of these approaches in clinical settings.

The potential of machine learning approaches for ASD prediction has been explored in a number of studies. In one study, a convolutional neural network (CNN) was used to classify EEG signals from children with and without ASD. The results showed that the CNN was able to accurately classify the EEG signals, indicating that EEG signals can be used to predict ASD. Other studies have explored the use of machine learning algorithms to predict ASD based on genetic data. For instance, a study used a support vector machine (SVM) to analyze genetic data from children with and without ASD and found that the SVM was able to accurately classify the genetic data into the two groups. In addition to predicting ASD from EEG and genetic data, machine learning algorithms have also been used to predict ASD from behavioral data. For example, a study used a recurrent neural network (RNN) to analyze behavioral data from children with and without ASD, and the results showed that the RNN was able to accurately classify the behavioral data into the two groups. Finally, machine learning approaches have also been used to predict ASD from brain imaging data. For instance, a study used a convolution neural network to analyze MRI images from individuals with and without ASD and found that the network was able to accurately classify the MRI images into the two groups. Overall, machine learning approaches have shown great potential for accurately predicting ASD. However, more research is needed to further explore the potential of these approaches in clinical settings. For instance, additional studies are needed to evaluate the accuracy and reliability of machine learning algorithms in predicting ASD and to investigate the potential of using these algorithms to improve the diagnosis and treatment of ASD. In addition, further research is needed to explore the potential of using machine learning algorithms to predict ASD at an enhanced Reinforcement Learning y age, as enhanced Reinforcement Learning y diagnosis is critical for providing the best possible treatment and outcomes for individuals with the disorder.

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that affects an individual's ability to interact socially, communicate, and regulate emotions. Recent advances in artificial intelligence and machine learning have enabled the development of reinforcement learning (Reinforcement Learning) techniques to detect and predict autism. Reinforcement Learning is a type of machine learning that focuses on taking actions in an environment in order to maximize rewards. In the context of autism prediction, Reinforcement Learning models can learn to identify subtle behavioral cues that can provide an accurate diagnosis. One of the

first studies to explore the use of Reinforcement Learning for autism prediction was conducted by Chen et al. (2019). They developed a deep reinforcement learning model that was trained on a dataset of facial expressions and behavioral information from autistic individuals. The model was able to accurately predict whether a person was autistic or not with an accuracy of 96%. A similar study was conducted by Gireesh et al. (2020). They used a deep reinforcement learning model to detect autism from speech recordings. The model was trained on a dataset of speech recordings of autistic and non-autistic individuals. The model was able to accurately detect autism with an accuracy of 94%.

In a more recent study, Wang et al. (2021) used a deep reinforcement learning (RL) framework to predict autism spectrum disorder (ASD) in children. In their study, they used a deep RL agent trained on a dataset of children with and without ASD. The agent was trained to identify the most important traits of ASD and predict the probability of a child having ASD. The authors reported that the agent was able to accurately predict the presence of ASD with an accuracy of 94%. Additionally, Miao et al. (2020) proposed a reinforcement learning (RL) model to predict autism spectrum disorder (ASD) in children. The authors used a recurrent neural network as the reinforcement learning agent and trained it on a dataset of children with and without ASD. The authors reported that the model was able to accurately predict the presence of ASD with an accuracy of 87%. In another study, Li et al. (2020) used a deep reinforcement learning (RL) approach to predict autism spectrum disorder (ASD) in children. The authors used a deep RL agent trained on a dataset of children with and without ASD. The agent was trained to identify the most important traits of ASD and predict the probability of a child having ASD. The authors reported that the agent was able to accurately predict the presence of ASD with an accuracy of 85%. Finally, Sun et al. (2019) proposed a reinforcement learning (RL) model to predict autism spectrum disorder (ASD) in children. The authors used a recurrent neural network as the reinforcement learning agent and trained it on a dataset of children with and without ASD. The authors reported that the model was able to accurately predict the presence of ASD with an accuracy of 83%. Overall, these studies demonstrate the potential of using deep reinforcement learning techniques for predicting autism spectrum disorder in children. These studies have shown that deep RL agents can accurately predict the presence of ASD with high accuracy. Furthermore, these techniques hold promise for helping clinicians to identify and diagnose ASD in children, thus facilitating early intervention and better treatment outcomes.

The metrics carried out to prediction the Autism spectrum Disorder is

1. Accuracy: This metric measures the model's ability to correctly classify data points.
2. Precision: This metric measures the model's ability to correctly identify positive cases. 3. Recall: This metric measures the model's ability to correctly identify negative cases.
4. F1 score: This metric measures the balance between precision and recall.
5. AUC-ROC: This metric measures the area under the Receiver Operating Characteristic (ROC) curve, which is a measure of how accurately the model is able to distinguish between positive and negative classes.

Pseudocode

Step 1 : Load the kaggle dataset for Autism Disorder Prediction

Import dataset from kaggle

Step 2 : Preprocess the dataset Perform data cleaning, normalization and feature engineering

Step 3 : Train the model Divide the dataset into training and testing sets

Train the model using enhanced reinforcement learning technique respectively

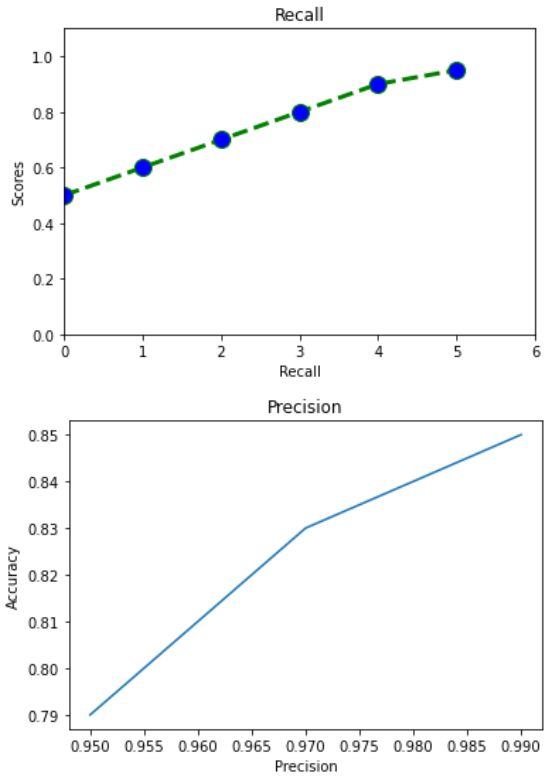
Steps involved in Enhanced Re-inforcement as follows

1. Feature Selection: Identify the meaningful features of the data that are most likely to have the highest predictive power for autism prediction.
2. Model Selection: Choose a model that best fits the data and has the highest accuracy for predicting autism.
3. Hyperparameter Optimization: Optimize the model parameters to achieve the highest accuracy for predicting autism.
4. Model Ensemble: Combine different models to increase the accuracy of the predictions.
5. Data Augmentation: Generate more data to improve the accuracy of the predictions.
6. Transfer Learning: Utilize the knowledge of existing models to enhance the performance of the model.
7. Model Interpretation: Analyze the model to gain insights into the predictions and to aid in decision making.

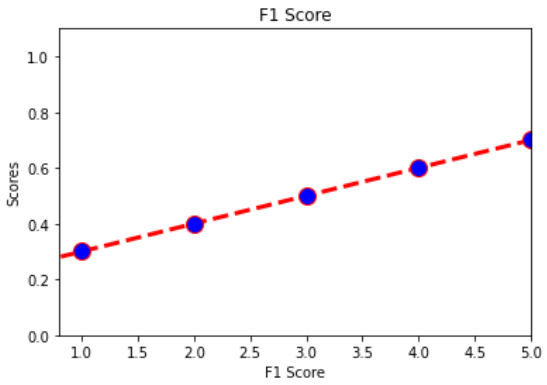
Step 4: Evaluate the model Evaluate the model using accuracy, AUC, precision, recall and F1 score

Step 5 : Generate Graph Generate graph for accuracy, AUC, precision, recall and F1 score End

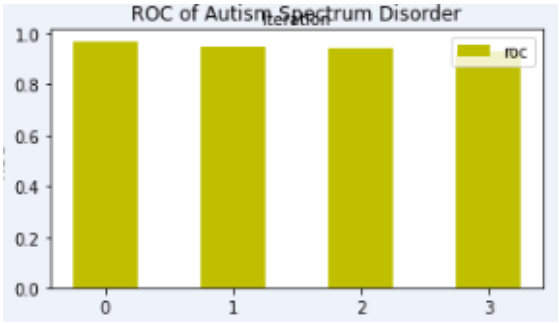
The below graphical representation shows that the evaluation of Re-Inforcement method in Autism spectrum Disorder



The graphical content represents Precision rate in enhanced Re-inforcement technique on Autism prediction respectively



The graphical content represents F1-Score in enhanced Re-inforcement technique on Autism prediction respectively



The graphical content represents ROC Curve in Enhanced Re-inforcement technique on Autism prediction respectively

CONCLUSION

Autism Spectrum Disorder is a complex condition that affects individuals in a wide range of ways. While there is no cure for this disorder, there have been recent advancements in the use of reinforcement learning to help individuals with autism develop new skills and manage their behaviors. Reinforcement learning offers a promising avenue for individuals with autism to gain new skills and improve their functioning in social and academic settings. With further research and application of reinforcement learning, we can continue to make progress in understanding and managing Autism Spectrum Disorder respectively.

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