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Autism Detection Using Artificial intelligence and Machine Learning

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ABSTRACT: ASD detection is quite important to both society and medicine. Nevertheless, the diagnostic process may be protracted, costly and highly reliant on clinical expertise. The rising prevalence of ASD coupled with the difficulties associated with its diagnosis underscore the urgent need for novel and efficient methods that identify autism among individuals. The problem will be solved through this study by designing an advanced autism detection system using cutting edge technologies such as artificial intelligence combined with machine learning strategies. Such a system can change how early identification is done, ensuring that people suffering from autism get relevant support as soon as possible Maybe most importantly, there is dramatic societal and economic effect of autism. As well, being a lifelong condition, managing it effectively can significantly reduce lifetime costs for persons affected by it as well as their families. Additionally, accurate and effective identification of AUTISM could facilitate timely interventions leading to positive long-term outcomes.

KEYWORDS: Autism spectrum disorders, Deep learning, Diagnosis, Early intervention, Facial expression, Recognition.
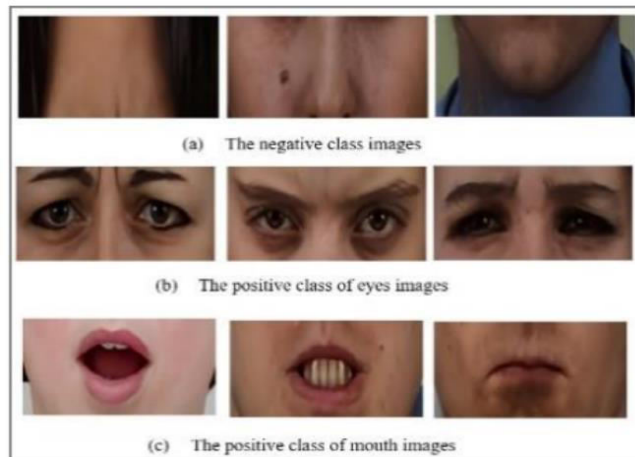
I. INTRODUCTION

ASD affects 1.3 million children annually, with increasing rates since 1996. [1] Best practices include developmental monitoring, screening, and diagnosis.[1] Early detection of autism spectrum disorder (ASD) is highly beneficial to the health sustainability of children. Current detection methods depend on the assessment of experts, which are subjective and costly. In our research, we suggested a blend of machine learning techniques. This would combine kids' physical and behavioral data to spot those with ASD. In our autism detection project, we trained the model using 'YES/NO' questions to capture indicators of autism spectrum disorder (ASD). We introduced a diverse range of images, showcasing both individuals with autism and those without, to help the model better understand subtle facial expressions and social interactions. The model learned to recognize patterns associated with ASD traits and provide accurate assessments for early intervention. So, this study's suggested machine learning method, merging different info, could greatly enhance how correct classifications are. Computer vision assesses emotions, interactions, and skills in ASD children. [1] Traditional diagnostic methods have limitations in assessing ASD children. [2] Technology enhances ASD detection and assessments using ML and DL methods.[2] Computer vision models extract joint attention skills and facial expressions in ASD children.

ASD impacts social relationships and communication skills. [1] Early intervention and medical care are crucial for ASD management. [1] ML techniques are used for early detection of ASD. Machine learning techniques are explored for early detection and care of ASD. [1] ASD detection in early years is beneficial for reducing treatment costs. Facial expressions are vital in communication, especially for autism children. [1].

II. RELATED WORK

Various studies have been conducted that detect and diagnose ASD with different ML techniques. A rule-based Technique which accesses the ASD traits and found out that it helps in enhancing the performance. The individual features that are essential features of normal and autistic children are analyzed using tree-based classifiers. For efficient diagnoses and prognoses of ASD data by utilizing various classifiers that few features are necessary to distinguish between ASD from different attention deficit hyperactivity disorder. Earlier the studies have examined speech affected disorders in children on small sample analysis and recoding short speeches. Many studies have revealed that many children affected with ASD exhibit language delays which involve an extended verbal-stage delay. Of the ones who develop speech delays like echolalia which involves repeating words with no specific reason. For using automated

speech recognition techniques in identifying as well as quantifying and accommodating each other's speech abnormalities with great clinical ability. The methods that are applied for assessing early ASD risk is associated with the major severity that are relevant regarding the symptoms and either helps in improvising their performance or worsen over time. Several recent researches utilize that the automated speech recordings of English-speaking children affected by Autism. Most prominent are the ones that utilize language environment analysis system (LENA) system. Most of the Autism affected children exhibit difficulty while using appropriate pragmatics [5]. In this section, we briefly review the related work on Autism Detection System and their different techniques. The literature survey conducted for this project revealed a rich landscape of research and advancements in the field of autism detection.

(a) The negative class images

(b) The positive class of eyes images

(c) The positive class of mouth images

III. METHODOLOGY

Utilizes deep learning for ASD classification using appropriate datasets. [1] Implements multimodal sensing technique for autism assessment. [1] Focuses on intervention theory and applications with ICF-based results. Feature Extraction Face, Eyes, Mouth Detection, Image Pre-processing, Facial Expression Classification. [1] Machine learning techniques used for ASD detection and classification. [4] Data pre-processing to enhance dataset quality and feature engineering. [4] Framework evaluates ML techniques for early ASD detection using various FS strategies. [5] Experiments conducted on four standard ASD datasets to compare classification outcomes. [5] Best-performing ML algorithms identified for each ASD dataset based on statistical measures. [5] Feature importance analysis guides healthcare practitioners in screening ASD cases. Implemented deep learning models for activity comprehension, joint attention, and emotions. [5] Methodology focused on diversity and fairness in data collection. [3] Scoping review of behavioural-based ASD screening studies from 2011-2021. [6]
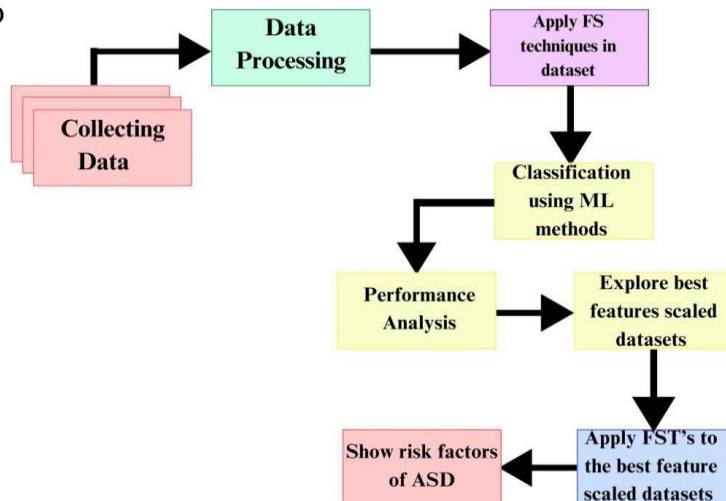
IV. PROPOSED METHODOLOGY

This section describes the complete proposed methodology of facial expression recognition for autistic children.
There are 4 steps in this system:
· Feature Extraction
· Facial features Detection
· Image pre-processing
· Facial Expression Classification
The way recognized facial expressions are through images of cropped eyes and mouths makes it a novel technique. It includes two branches: The first deals with images based in FER, and the second is input from sequential images (video) which diagnoses autism or non-autism children.[2]

V. SIMULATION RESULTS

FIG. REAL DATASET FOR AUTISM AND SPEECH PROBLEMS CHILDREN.

In the process of developing our project on autism detection, we diligently ensured that the model was trained using a collection of 'YES/NO' queries in order to capture the key indications of autism spectrum disorder (ASD). Furthermore, we integrated a range of images showcasing individuals with autism as well as individuals without autism, with the aim of enhancing the model's capability to discern subtle hints in facial expressions and social interactions. By means of iterative training, the model acquired proficiency in identifying patterns associated with ASD traits, thereby enabling it to deliver accurate assessments for early intervention.
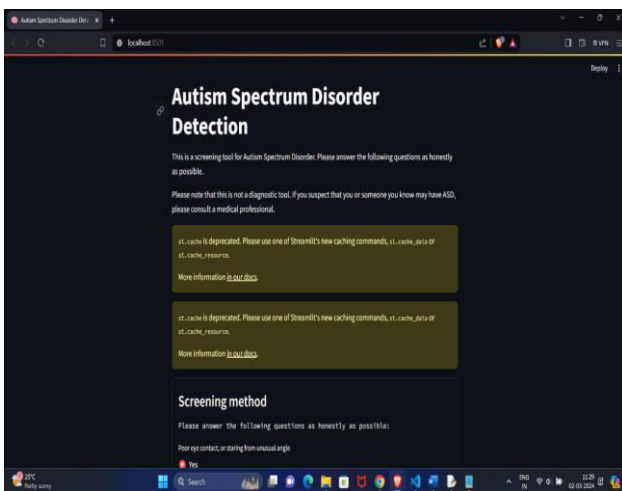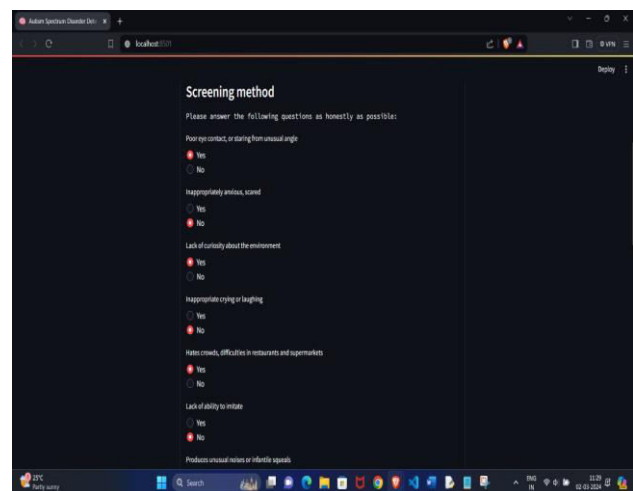

FIG. HOME PAGE

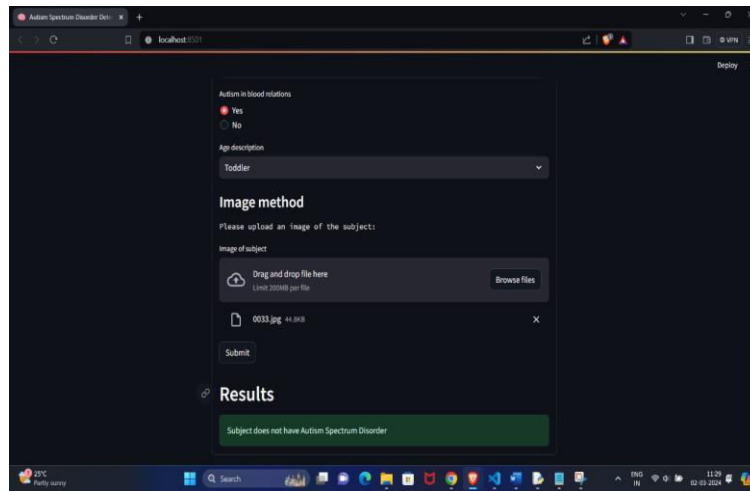FIG. ENTER APPROPRIATE INFORMATION

FIG. ADD IMAGE & GENERATE THE RESULT

VI. CONCLUSION AND FUTURE WORK

Autism detection system represents a vital step toward a more inclusive and informed society. By leveraging the capabilities of cutting-edge technology, extracting knowledge from data, and taking into account ethical aspects, our goal is to improve the identification of autism at an early stage, provide assistance and ensure increased availability for individuals within the autism spectrum. This project not only offers a practical solution but also signifies our commitment to fostering a more compassionate and equitable world for those affected by autism. By joining forces, we- have the power to create change. We can lend a helping hand to those who need our understanding and help the most.

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