ISSN 2277-2685
IJESR/April-June. 2025/ Vol-15/Issue-2s/1087-1093
S Tejaswi *et. al.,* / International Journal of Engineering & Science Research

Detection Of Autism Spectrum Disorder

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ABSTRACT

Autism spectrum disorder (ASD) presents a neurological and developmental disorder that has an impact on the social and cognitive skills of children causing repetitive behaviors, restricted interests, communication problems and difficulty in social interaction. Early diagnosis of ASD can prevent from its severity and prolonged effects. This project aims to assist in the early detection of Autism Spectrum Disorder (ASD) by integrating machine learning models for behavioral screening and image classification into a unified web-based application using Streamlit. The application employs two distinct pre-trained VotingClassifier models: one for processing user responses to ASD screening questionnaires and another for analyzing uploaded images of autistic and non-autistic subjects. Screening data is preprocessed and classified using trained models, while images are resized, preprocessed, and classified based on extracted features.

Users interact with the app by answering survey questions and optionally uploading images, with the results of both screening and image-based predictions displayed upon submission. The application emphasizes accessibility and user-friendliness while providing a disclaimer that it is not a diagnostic tool but a supplementary aid for ASD awareness and early intervention. This dual-model approach enhances reliability and accuracy in identifying potential ASD traits.

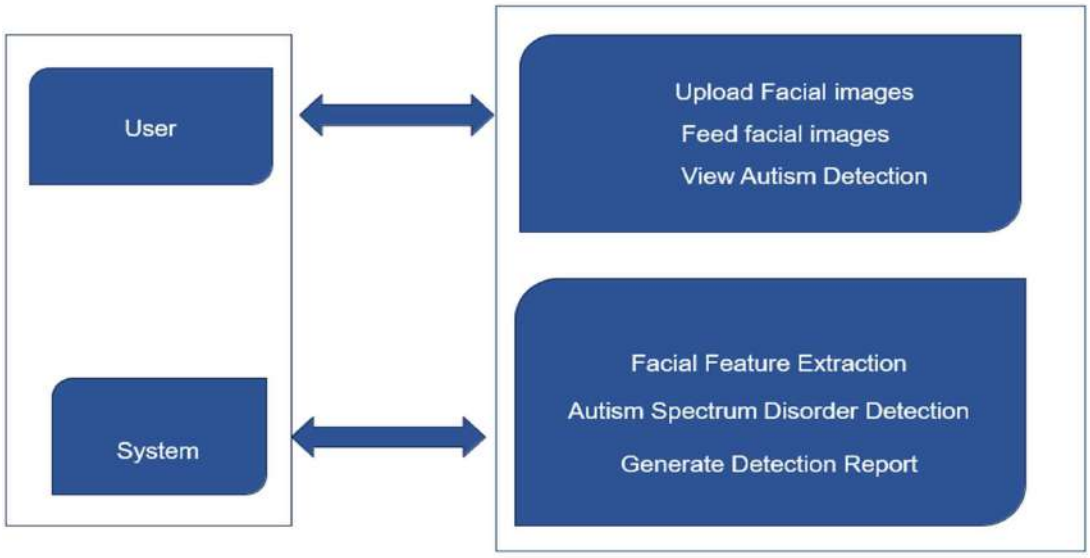
1-INTRODUCTION

Autism Spectrum Disorder (ASD) is a developmental disorder that affects an individual's ability to communicate and interact socially, often accompanied by repetitive behaviours and obsessive interests. Caused by a combination of genetic and environmental factors, it impacts the nervous system, affecting cognitive, social, emotional, and physical well-being. Symptoms of ASD vary widely in range and severity, with common signs including difficulty in social communication, repetitive behaviours, and obsessive interests. Diagnosis typically requires extensive evaluations and assessments by certified professionals, including tools like the Autism Diagnostic InterviewRevised (ADI-R) and Autism Diagnostic Observation Schedule-Revised (ADOS-R). However, these traditional methods are lengthy and demanding, resulting in significant delays in diagnosis and intervention.

Early detection and treatment of ASD are critical to reducing its symptoms and improving an individual's quality of life. However, the current diagnosis process is subjective, time-consuming, and often involves waiting times of 13 months or more from initial suspicion to confirmation. This delay can result in lost opportunities for early intervention, which is crucial for managing ASD effectively. Machine learning-based methods offer a promising alternative by enabling quicker, more accurate risk assessments and streamlining the diagnostic process.

DESIGN

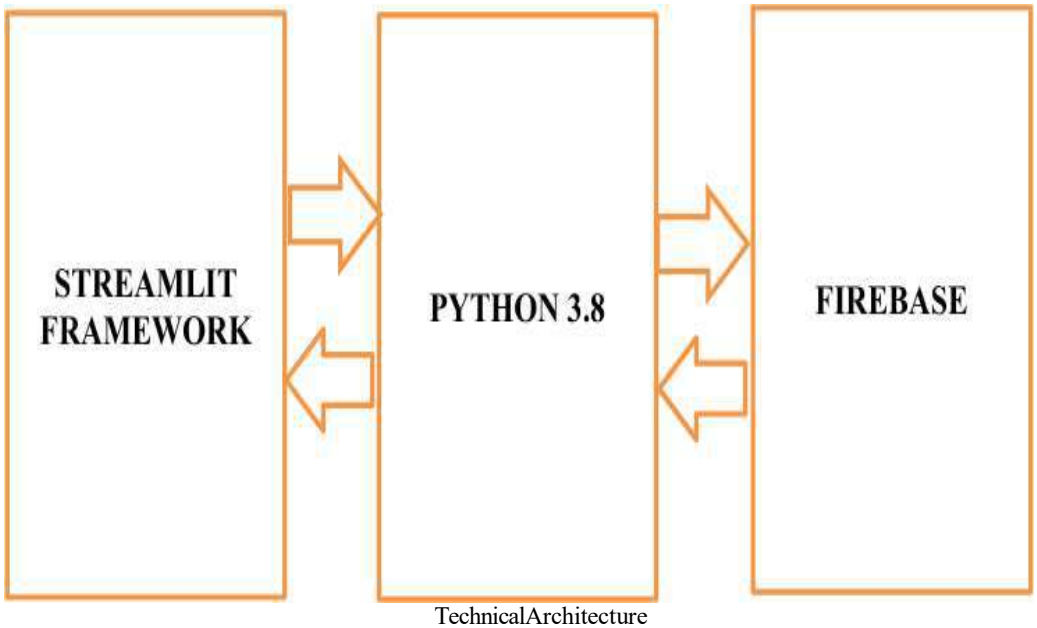
Software Architecture



Design represents the number of components we are using as a part of the project and the flow of request processing i.e., what components in processing the request and in which order.

3.1.1 Software

An architecture description is a formal description and representation of a system organized in a way that supports reasoning about the structure of the system.



TechnicalArchitecture

Algorithms

Logistic Regression

Logistic regression is used for binary classification where we use sigmoid function, that takes input as independent variables and produces a probability value between 0 and 1.

Logistic Regression's primary aim is in finding the model with the best fit that describes the relationship between the binomial character of interest and a set of independent variables . It makes use of a logistic function to find an optimal curve to fit the data points.

METHODOLOGY

Existing System

The current system for diagnosing Autism Spectrum Disorder (ASD) relies heavily on clinical evaluations by healthcare professionals such as pediatricians, psychologists, and psychiatrists.

These evaluations include detailed behavioral assessments, observations, and standardized tests like ADOS and ADI-R.

However, this process is subjective, time-consuming, and can vary in accuracy due to symptom variability and overlaps with other disorders, potentially causing delays in diagnosis and intervention.

Proposed System

The proposed system aims to enhance the diagnosis of Autism Spectrum Disorder (ASD) by integrating machine learning algorithms and data analysis techniques into the diagnostic process.

This is to create a comprehensive, user-friendly system that can significantly improve the diagnostic process for ASD, benefiting a wide range of stakeholders from parents to healthcare professionals.

REQUIREMENTS

Functional Requirements

Modules

User

- Register and Login
- Input and Predict
- View Prediction Results

System

- Train and Test ASD Datasets
- View Model Accuracy in Visual Formats
- Monitor Prediction Accuracy Results
- Manage User Access
- View Prediction Data Summary

Non-Functional Requirements

- **Security :** Ensure the confidentiality, integrity, and availability of sensitive patient data.
- **Scalability** : Scalable to handle increasing amounts of data and users without significant degradation in performance.
- **Usability :** Enabling healthcare professionals to easily input data and interpret results without extensive training.
- **Performance :** Able to process and analyze large datasets efficiently, providing predictions within a reasonable time frame (e.g., within a few seconds to minutes).

Hardware Requirements

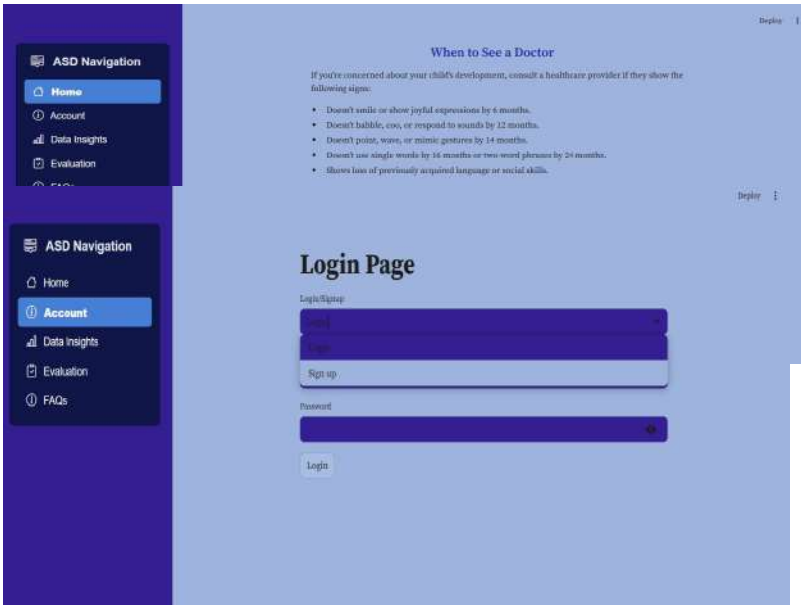
- Processor

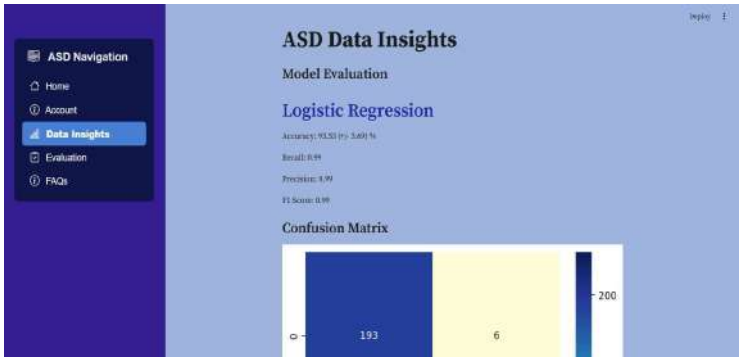
- RAM
- Hard Disk

Software Requirements

- Operating System
- Programming Language
- IDE
- Database

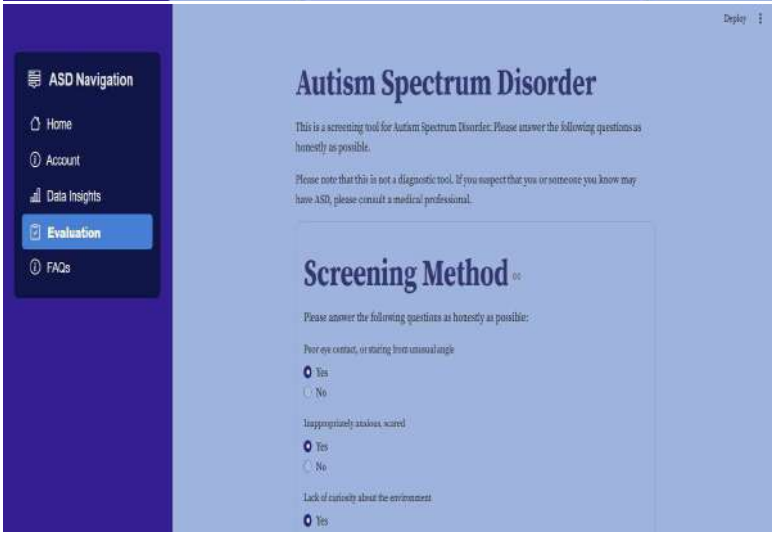
SCREENSHOTS




ASD Navigation
Home
Account
Data Insights
Evaluation
FAQs
ASD Data Insights
Model Evaluation
Logistic Regression
Confusion Matrix
193
6
200
0

ASD Navigation
Home
Account
Data Insights
Evaluation
FAQs

ASD Navigation
Home
Account
Data Insights
Evaluation
FAQs


ASD Navigation
Home
Account
Data Insights
Evaluation
FAQs
Autism Spectrum Disorder
This is a screening tool for Autism Spectrum Disorder. Please answer the following questions as honestly as possible.
Please note that this is not a diagnostic tool. If you suspect that you or someone you know may have ASD, please consult a medical professional.
Screening Method
Please answer the following questions as honestly as possible:
Poor eye contact, or staring from unusual angle
Yes
No
Inappropriately anxious, scared
Yes
No
Lack of curiosity about the environment
Yes

ASD Navigation
Home
Account
Data Insights
Evaluation
FAQs
Image Method
Please upload an image of the subject:
Browse files
Submit

The person is predicted to have Autism Spectrum Disorder (ASD).

ASD Navigation
Home
Account
Data Insights
Evaluation
FAQs
Resources & Further Reading
Research Papers
Support Groups
Online Resources
Books

ASD Navigation
Home
Account
Data Insights
Evaluation
FAQs
FAQs & Resources
Frequently Asked Questions (FAQs)
What is Autism Spectrum Disorder (ASD)?
Autism Spectrum Disorder (ASD) is a developmental disorder that affects communication, behavior, and social interaction. It is referred to as a "spectrum" because it encompasses a wide range of symptoms and severity levels. Some individuals with ASD may be non-verbal, while others may have advanced language and cognitive skills.
How is Autism Spectrum Disorder diagnosed?
Diagnosis of ASD typically involves a comprehensive evaluation by a team of professionals, including pediatricians, psychologists, and speech therapists. Early diagnosis is crucial for effective intervention. Diagnostic tools include interviews, behavioral observations, and standardized tests.
What are the methods used to detect Autism?
Various methods are used for detecting ASD, including behavioral assessments, screening tools like the M-CHAT (Modified Checklist for Autism in Toddlers), and sometimes brain imaging. In

CONCLUSION AND FUTURE SCOPE

In conclusion, Autism Spectrum Disorder (ASD) presents significant challenges in social interaction, communication, and repetitive behaviors, making early diagnosis and intervention vital for improving the outcomes and quality of life for affected individuals. This innovative approach holds the potential to revolutionize the diagnosis process, making it more objective, reliable, and beneficial for individuals with ASD and their families.

Future Scope

- The project has significant future potential, including integrating real-time analysis for live video feeds to enhance ASD detection.
- Expanding datasets with diverse demographics can improve model accuracy and applicability globally. A mobile-friendly version can make the tool accessible in underserved areas.
- Additionally, integrating the system into telemedicine platforms and customizing intervention plans can revolutionize early diagnosis and support.

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