

# Autism Prediction Using Machine Learning

## Overview:

This project focuses on developing a Machine Learning-based Autism Prediction Model to improve early detection of Autism Spectrum Disorder (ASD). Using clinical and behavioral data, the model classifies individuals as ASD Positive or Negative, assisting in faster and more reliable screening.

## Dataset:

- 800 records, 22 features (AQ-10 scores, age, gender, medical history, etc.)
- Target Variable: Whether an individual has ASD (0 = No, 1 = Yes)

## Key Features & Implementation:

- Exploratory Data Analysis (EDA) to understand patterns and feature importance.
- Data Preprocessing:
  - Handled missing values and outliers
  - Used SMOTE to balance class distribution
  - Applied Label Encoding for categorical variables
- Machine Learning Models Used:
  - Decision Tree
  - Random Forest (Best Model: 93% Accuracy)
  - XGBoost
  - Support Vector Machine (SVM)
  - K-Nearest Neighbors (KNN)
  - Logistic Regression & Naïve Bayes
- Hyperparameter Tuning with RandomizedSearchCV for optimal model performance.

## Results & Evaluation:

- Random Forest achieved 81.87% accuracy on test data.
- Confusion Matrix & Classification Report used for assessment.
- Potential Future Enhancements:
  - Deep Learning models (ANN/CNN) for improved accuracy.
  - Web/Mobile Deployment for real-world usage.

#### Tech Stack:

Python, Pandas, NumPy, Matplotlib, Seaborn, Scikit-Learn, XGBoost, SMOTE

#### Impact:

This project demonstrates how AI can support early autism screening, making diagnosis more accessible and efficient. Future work aims to integrate deep learning and deploy the model as a user-friendly application.

GitHub Repository: [Your GitHub Link Here]

Live Demo: [If hosted, add a link]