Project Title & Team Name: Early Detection of Autism using Machine Learning – Data Dreamers- TEAM 16

Team Members:

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Tech -Skills: Machine Learning / Big data

Impact Area: Healthcare/Mental Health

User Group: People with disabilities

Problem statement:

- Autism spectrum disorder (ASD), a neurodevelopmental disorder is a Repetitive behavioral patterns and ongoing difficulties with social interaction and communication are hallmarks. Early diagnosis and intervention have been shown to significantly improve autistic children's cognitive, social, and emotional development. A considerable portion of toddlers are identified too late, frequently after important developmental milestones have passed, despite growing awareness. According to recent research, one in 160 children worldwide and one in 44 children in the US have been diagnosed with ASD. An evidence-based approach to assessment is essential for precise diagnosis and suitable treatment planning (Yu et al., 2023).

- **Limited Access to Specialists**: Rural/low-income areas often lack pediatric neurologists or child psychologists.
- **Time-Consuming & Costly Methods**: Current diagnosis relies on long interviews and professional assessments.
- **Parental Unawareness & Stigma**: Parents may miss early signs or avoid seeking help due to cultural stigma.
- **Diverse Symptoms**: Autism looks different in each child, making early detection without structured tools difficult.

Proposed Solution:

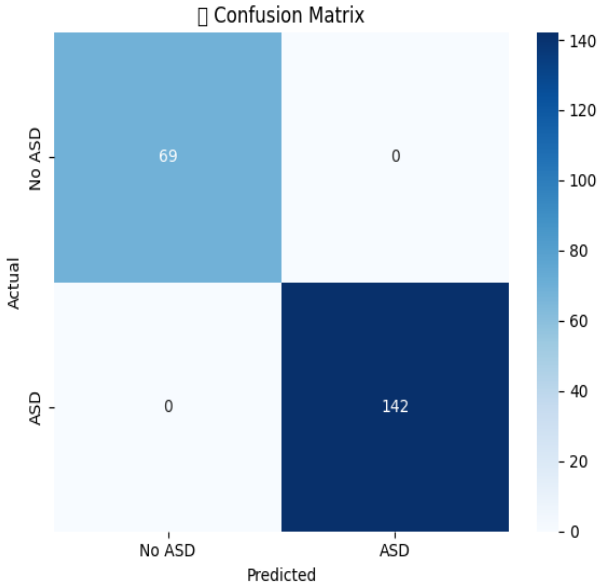
We propose an AI model that uses the BERT language model to analyze behavioral input data and predict the likelihood of ASD in toddlers. The system provides intuitive visualizations of behavior patterns and delivers age-specific therapy recommendations. With secure user login and progress tracking, the platform empowers parents to monitor developmental milestones, enabling early and accessible support without waiting for formal clinical evaluation.

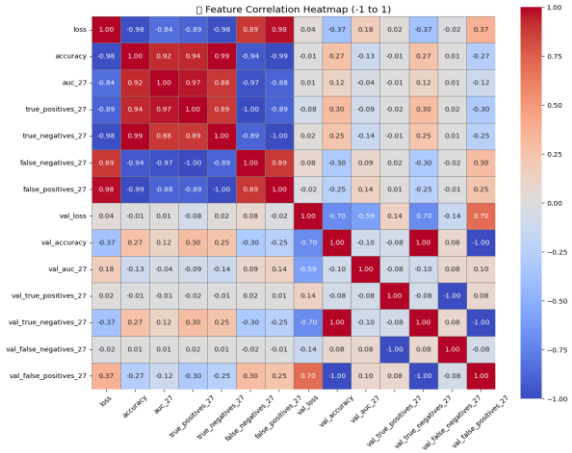
Implementation: (Tech,Tools,datasets,methods):

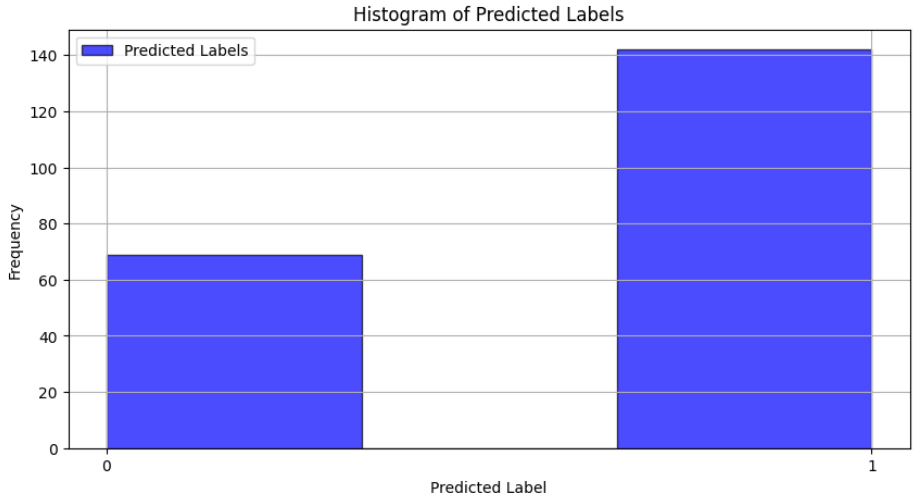
- **Dataset**: Toddler Autism Dataset (July 2018)
- **Tools**: Python, Pandas, Seaborn, Scikit-learn, Flask
- **Methods**:

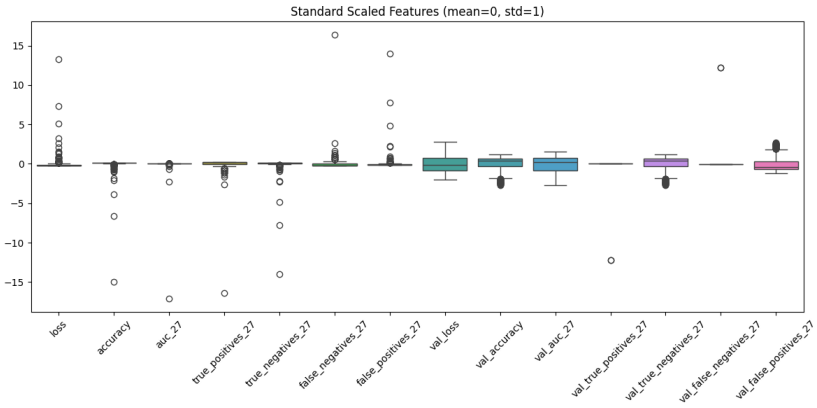
1. Data Preprocessing & Cleaning
2. Visualization (ASD vs Non-ASD, Gender Distribution, etc.)
3. Model Training using classification algorithms
4. Web dashboard for visualization

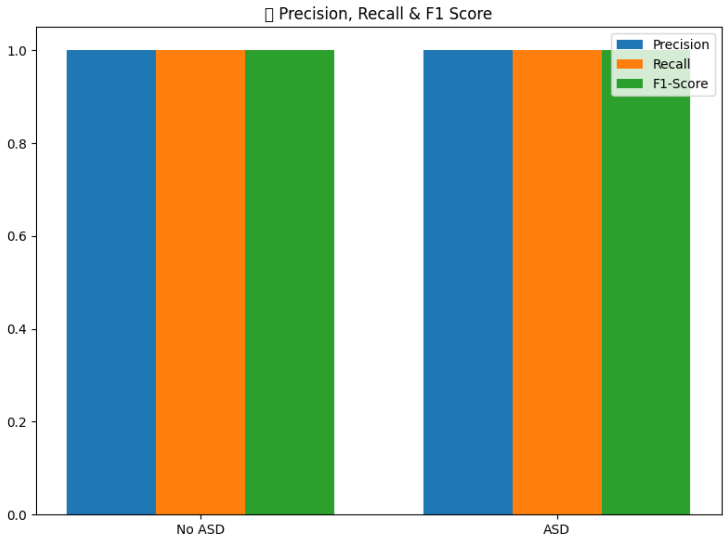
Results:

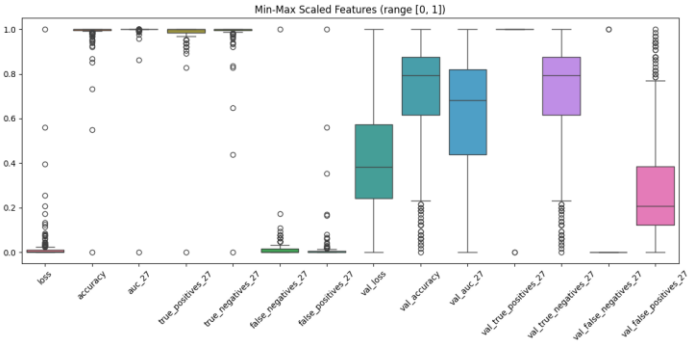

Confusion Matrix
No ASD
ASD
Actual
69
0
0
142
No ASD
ASD
Predicted
140
120
100
80
60
40
20
0


Feature Correlation Heatmap (-1 to 1)
loss
accuracy
auc_27
true_positives_27
true_negatives_27
false_negatives_27
false_positives_27
val_loss
val_accuracy
val_auc_27
val_true_positives_27
val_true_negatives_27
val_false_negatives_27
val_false_positives_27
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00


Histogram of Predicted Labels
Predicted Labels
Frequency
Predicted Label
0
20
40
60
80
100
120
140
0
1







Impact(Social Benefits & Next steps,Scalability):

Social Benefits:

- Empowers parents & healthcare providers with **early screening**

- Reduces burden on formal diagnostic services
- Promotes **early therapy and better outcomes**

Next Steps:

- Integrate more datasets for better generalization
- Mobile app for wider accessibility
- Partner with pediatric clinics/schools

Reference

Ezerins, M. E., Simon, L. S., Vogus, T. J., Gabriel, A. S., Calderwood, C., & Rosen, C. C. (2024). Autism and Employment: A Review of the "New Frontier" of Diversity Research. *Journal of Management*. https://doi.org/10.1177/01492063231193362

Yu, Y., Ozonoff, S., & Miller, M. (2023). Assessment of Autism Spectrum Disorder. *Assessment*. https://doi.org/10.1177/10731911231173089