

Certain Investigations in Cognitive Disorder Prediction in Healthcare Using Machine Learning Techniques.

Research Significance

Autism Spectrum Disorder (ASD) is one of many mental illnesses that can have a variety of effects on individuals. Globally, the prevalence of autism spectrum disorder has been steadily rising in recent years. The main symptoms of ASD include difficulty interacting with others, difficulties with speech and nonverbal communication, repetitive behaviors, avoidance of eye contact, and abnormal facial expressions. The number of children with ASD is rising at a rate of 1:68 annually. Therefore, it's critical to determine and examine the causes of ASD as well as its treatment.

Literature Review

There is increasing interest in applying machine learning to the prediction and classification of ASD, according to recent research.

XGBoost model with minimal background and medical features achieved an AUROC of approximately 0.895 in a large-scale diagnostic study using the SPARK database (30,660 participants: 15,330 with ASD, 15,330 without).

Comprehensive reviews point to a number of challenges, including the fact that many machine learning studies employ homogeneous samples, which restricts generalizability; that many models have not been tested in actual clinical settings; and that the interpretability of ML models is still not sufficiently addressed.

Research Methodology

Preprocessing will be done after gathering multimodal data, including behavioral, sensor, and video modalities as well as demographic, clinical, and background characteristics.

Three modelling techniques will be used in the research to predict the severity's outcome: a Transformer-based multimodal fusion model that incorporates cross-

attention to capture intermodality interactions and integrate heterogeneous modalities.

A deep kernel/Deep Gaussian Process model that supports risk stratification and decision-making by offering predictions with uncertainty estimates.

A contrastive multimodal representation learning framework that improves feature generalization and robustness to missing modalities by aligning and embedding various modality inputs into a common latent space through contrastive loss.

The proper metrics will be used to assess each model. Techniques for interpretability are used.