AI-Enhanced Autism Assessment by Facial Recognition and Social Interaction

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Abstract:

Autism Spectrum Disorder (ASD) diagnosis presents significant challenges due to the condition's complexity and variability, with traditional methods often being time-consuming, expensive, and geographically constrained. These methods rely on behavioral assessments and clinical evaluations that are not easily accessible, especially in underserved regions, delaying critical early intervention. Existing approaches, including eye-tracking technology, facial expression analysis, and machine learning models, face limitations such as the reliance on specialized hardware, lack of multimodal data integration, and difficulties with scalability and generalizability across diverse populations. This paper proposes a novel web-based platform that integrates CNN (Convolutional Neural Network) and SVM (Support Vector Machine) for facial analysis and LSTM (Long Short-Term Memory) for vocal analysis for the early detection of ASD. By combining AI-driven machine learning algorithms for facial expression and speech pattern analysis, the platform offers a cost-effective, scalable, and non-invasive solution to improve diagnostic accuracy. The platform's multimodal approach — utilizing both facial recognition and vocal analysis — enhances diagnostic precision and reduces false negatives, which is vital for early intervention. Additionally, the platform includes community engagement features, offering continuous support for individuals with ASD and their families. The proposed platform offers a comprehensive, accessible, and accurate solution compared to existing methods, which often focus on single modalities. With 95% diagnostic accuracy

when both facial and vocal analyses are combined, this platform addresses the limitations of traditional diagnostic tools and provides a more inclusive, scalable solution to ASD diagnosis and care.

Keywords:

Autism Spectrum Disorder, Machine Learning, Facial Analysis, Vocal Analysis, Web-Based Platform, Community Engagement, Non-Invasive Diagnostics, Artificial Intelligence, Early Detection, Diagnostic Accuracy, Multimodal Approach, Speech Pattern Recognition, Face Recognition, Support Systems.