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(57) Abstract :

ABSTRACT [0011] autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by challenges in social interaction, communication, and repetitive behaviors. Early and accurate detection of ASD is crucial for timely intervention and improved outcomes. Traditional diagnostic methods rely heavily on behavioral assessments conducted by specialists, which can be time-consuming, subjective, and inaccessible in many regions. This project proposes a deep learning-based approach for automated ASD detection using facial image analysis, leveraging the power of convolutional neural networks (CNNs) to identify subtle patterns associated with the condition. The proposed system utilizes a pre-trained ResNet50 architecture, fine-tuned on a dataset of facial images labeled as ASD or non-ASD. [0012] The model extracts hierarchical features from input images and classifies them with high accuracy. To enhance performance and interpretability, the system integrates gradient-weighted class activation mapping (Grad-CAM), which highlights regions of the face that most influence the model's decision, providing visual explanations for clinicians and caregivers. The model is trained and evaluated on a publicly available dataset containing labeled facial images of individuals with and without ASD. Experimental results demonstrate that the system achieves high classification accuracy, precision, recall, and F1-score, indicating its effectiveness in distinguishing between ASD and non-ASD cases. This work contributes to the development of accessible, non-invasive, and scalable tools for early ASD screening, with potential applications in telehealth, pediatric clinics, and community health programs.

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