

COMPUTER VISION-DRIVEN CLASSIFICATION OF PARKINSON'S DISEASE SEVERITY VIA MOBILE POSE ESTIMATION AND AI MODELS



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Abstract:

Parkinson's disease (PD) is becoming increasingly prevalent because of global population aging, while the high cost of treatment and limited access to specialist care underscore the need for accessible diagnostic solutions. This study presents a smartphone-based application for PD detection and severity classification using computer vision and artificial intelligence. A custom video dataset comprising healthy individuals and patients with mild and severe PD was collected. Human pose keypoints were extracted using MediaPipe Pose, with Y-axis coordinates selected to capture vertical motion patterns. Deep learning models, including 1D Convolutional Neural Networks (1D-CNN), Long Short-Term Memory (LSTM), and Gated Recurrent Units (GRU) were evaluated alongside traditional machine learning methods using TSFEL-extracted features. GRU, GRU-LSTM, and Random Forest achieved the best performance, with classification accuracies exceeding 80%. A Flutter-based mobile application was developed for real-time video capture and pose estimation using Google ML Kit. Keypoint data are transmitted to a cloud-hosted Flask API for inference using the best-performing model. The proposed system demonstrates the potential of smartphone-based, non-invasive, and cost-effective tools for accessible PD screening and severity assessment.

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Parkinson's disease, artificial intelligence, machine learning, deep learning, computer vision, mobile health application, pose estimation

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