ABSTRACT

Title : Face and Hand Landmarks Detection using Python with Mediapipe and OpenCV

The detection and tracking of human facial and hand landmarks play a vital role in computer vision, particularly in applications such as human-computer interaction, sign language recognition, augmented reality, and biometric authentication. This paper presents a practical and efficient method for real-time face and hand landmark detection using Python. The approach leverages the power of Google's Mediapipe framework along with the OpenCV library to achieve accurate and responsive performance.

Mediapipe provides pre-trained models capable of detecting 468 facial landmarks and 21 hand landmarks with high fidelity. These models are lightweight enough to run in real-time on standard computing hardware. The implementation uses Mediapipe's Face Mesh and Hand modules to process live video streams or image inputs, extracting and displaying key points on the face and hands. OpenCV complements this setup by handling video capture, input preprocessing, and output visualization.

This method is tested using live webcam feeds and performs reliably across a range of lighting and motion conditions. By eliminating the need for extensive training data and complex model development, this system offers a straightforward and accessible solution for real-time applications. The integration of Mediapipe and OpenCV demonstrates a strong foundation for creating interactive systems focused on gesture and facial expression analysis.