ABSTRACT

Gait recognition is recognized as a robust biometric method for identifying individuals based on walking behavior. Conventional systems that rely on markers or wearable sensors often achieve high performance in constrained settings but lack practicality due to cost limited adaptability and reduced effectiveness under subtle variations. This research introduces a markerless gait recognition system that combines BlazePose for two-dimensional pose estimation with a Multilayer Perceptron model trained on extracted biomechanical features.

The system is designed to operate under real-world conditions where individuals may carry lightweight objects or perform minor activities such as holding or using a mobile phone. Instead of filtering out these variations the system treats them as valuable biometric traits. A total of 3400 gait videos were collected from 17 participants under five walking scenarios recorded from frontal and lateral viewpoints to reflect daily movement patterns. The extracted pose landmarks were transformed into structured numerical features including joint angles step length walking speed and body proportion ratios which were normalized and used as input to the classifier.

This research demonstrates that the system achieves a classification accuracy of 99.56 percent with a false acceptance rate of 0.03 percent across all participants and walking conditions. The model maintains high reliability even when keypoints are missing or when camera viewpoints and activity types differ. The findings confirm that dynamic and structural gait features effectively support precise individual recognition.

The system developed in this study is expected to support the creation of efficient scalable and non-intrusive biometric solutions suitable for applications in surveillance access control and mobile identification.

Keywords: Gait Recognition, Minor Variation, Biometric, BlazePose, MLP.