

### Abstract

Fitness activities play a pivotal role in enhancing physical health and well-being. However, improper execution of exercises can lead to inefficiencies and potential health risks. This research introduces an innovative solution to address this concern by developing a program that recognizes and evaluates the correctness of a user's workout posture in real-time. Leveraging the capabilities of computer vision and machine learning, our system employs a camera to provide live, interactive feedback to users during their exercise routines.

At the heart of our system lies MediaPipe, a versatile framework for crafting cross-platform machine learning solutions. This framework, compatible with a wide range of Windows and Linux computers equipped with webcams, ensures accessibility for users across diverse platforms. Our model, built on MediaPipe, can detect and track key joints and body parts throughout the workout session. Precise evaluation of exercise accuracy is achieved by analyzing the angles formed between vectors representing these body parts.

This novel solution marks a significant advancement in fitness technology, empowering users to exercise with confidence and precision. The real-time feedback mechanism not only enhances workout efficiency but also reduces the risk of exercise-related injuries. By seamlessly integrating computer vision, machine learning, and the user-friendly MediaPipe framework, our program sets the stage for a more informed and effective fitness journey. It underscores the importance of maximizing the benefits of physical activities while prioritizing safety, ensuring that individuals can achieve their fitness goals with greater confidence and accuracy.

Keywords: Fitness, Computer Vision, Machine Learning, Camera-Based Monitoring

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