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Fitter: Intelligent Workout Feedback System Using Machine Learning

A Project Proposal by

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ABSTRACT

The market for customized fitness solutions has increased substantially as health-consciousness has risen among people. The current generation of fitness applications achieves limited accuracy in real-time feedback because they use manual tracking approaches together with general exercise plans while relying on wearable devices. This research presents Fitter as an intelligent workout feedback system powered by machine learning and computer vision to examine post-workout videos for delivering exact performance feedback to users.

A video-based interface replaces wearables since it detects posture mistakes through body focal points found by estimation models. A hybrid CNN-based classifier in the system evaluates exercise form while providing feedback about standard errors that include improper joint angles as well as imbalanced movements. A Flask API functions as the data transfer mechanism between React.js frontend components and machine learning backend elements to facilitate unbroken information processing and feedback transmissions.

The project used experimental positivist research methods together with an iterative prototyping protocol. The evaluation incorporated assessments by experts as well as practical user testing which utilized precision, recall, F1-score, accuracy and AUC to evaluate the model performance. The project demonstrated best performance compared to other available solutions by delivering workout form detection accuracy surpassing 93% while offering great usability in detection capabilities. The system received endorsement from subject matter experts who alongside the focus groups approved its practicality for deployment.

Subject description

- Computing methodologies → Machine learning → Machine learning applications → Computer vision
- Applied computing → Physical sciences and engineering → Health informatics → Sports and fitness applications

Keywords: Workout feedback, machine learning, pose estimation, video analysis, exercise form correction