

ABSTRACT

YOLO AND REPNET BASED REAL-TIME UNIVERSAL REPETITION COUNTER SYSTEM FOR PHYSICAL HOME WORKOUT

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Repetition counting is an important feature in exercise evaluations systems. Currently, human pose estimation has been used to address the issue of traditional wearables and electronic sensors in physical exercises. This pose estimation utilizes the detection of angles for its repetition counter system. While effective and accurate for specific exercises, this method requires tailored calculations for each exercise type, leading to a lack of flexibility when dealing with unregistered exercises.

This research proposes an innovative approach to address these limitations by incorporating periodicity detection into the repetition counting process. The RepNet model is utilized for periodicity detection, enabling the creation of a flexible system that is not restricted by exercise type. To enhance accuracy, the new YOLO11 model is integrated for human detection, ensuring that the system processes only relevant data. Together, these models form a comprehensive and universal repetition counting system capable of accurately calculating repetitions in real time. A user study was conducted to evaluate the system's accuracy and efficiency in practical scenarios. The combined YOLO11-RepNet system achieved an overall Mean Absolute Error (MAE) of **0.555 counts**, demonstrating its reliability and effectiveness as a real-time exercise repetition counter.

Keywords: Home Workouts, Computer Vision, Exercise Repetition Counter, Human Detection, RepNet, YOLO11