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A Systematic Review on Real-Time Posture Correction and Exercise Guidance for Elderly People Using Expert Systems and Computer Vision

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Abstract

Elderly individuals often face challenges staying physically active due to age-related issues such as mobility problems, balance difficulties, and stiff joints, which increase the risk of injuries and reduce the effectiveness of workouts. This research focuses on identifying the most effective technologies and methodologies to address these challenges by providing safe and personalized exercise guidance, particularly for home-based routines. The proposed solution integrates an expert system for personalized recommendations and health warnings, along with a computer vision framework to monitor posture and provide real-time corrective feedback. Using the PRISMA framework, a systematic literature review was conducted to explore existing technologies and methodologies. This process identified over 100 relevant studies, of which 30 were selected for detailed review. The analysis revealed that 40% of the studies highlighted the high accuracy of motion detection devices, such as Kinect cameras, while 30% emphasized the importance of expert systems for tailored exercise guidance. The findings suggest that combining expert systems with computer vision technologies is the optimal approach for enhancing safety, posture accuracy, and the effectiveness of exercises for elderly users. This research contributes to addressing the current gaps in fitness technology by providing a practical framework for supporting elderly individuals through guided, interactive home workouts.

Keywords: *Elderly Fitness, Expert System, Computer Vision, Posture Correction, Personalized Exercise*