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Metaheuristic Algorithms in Video Games: A Case Study of Pac-Man

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Abstract

This paper explores the application of the Particle Swarm Optimization (PSO) algorithm to enhance decision-making in the classic Pac-Man game. The objective is to optimize Pac-Man's movement strategies to avoid ghosts while maximizing scores by efficiently collecting pellets. PSO's adaptability and capacity for real-time decision-making in dynamic environments make it a suitable choice. This study evaluates the algorithm's performance in terms of survival rate, score improvement, and level completion time. Results show a substantial improvement in Pac-Man's ability to navigate the grid, avoid collisions, and achieve higher scores compared to non-optimized approaches. Future research directions include enhancing multi-agent collaboration using advanced heuristic algorithms.

Keywords: Particle Swarm Optimization, Pac-Man, optimization

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