Laboratory assignment

Component Multi-Agent System for Pac-Man Simulation

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March 12, 2025

1 Description of the MAS framework for implementing SP1

1.1 Programming Language

The implementation of the Pac-Man simulation will use Python with the PADE framework.

1.2 Relevant Agent-Based Features

The Pac-Man simulation using PADE will implement the following features:

- Agent design:
  - Pac-Man agent: Controls movement, dot collection, and ghost avoidance
  - Ghost agents: Four ghosts with different behaviors (Blinky, Pinky, Inky, Clyde)
  - Environment agent: Manages maze state and game progression
- Concurrent/parallel execution:
  - Each agent runs independently in the PADE container
  - Game clock ensures coordinated movement
  - Agents operate simultaneously while maintaining game rules
- Agent communication:
  - Blackboard pattern for centralized communication
  - Central knowledge repository accessible to all agents
  - Environment agent updates the blackboard with maze state, agent positions, and game events
  - Ghost and Pac-Man agents read from and write to the blackboard for coordination
- Agent perception and decision-making:
  - Simple pathfinding for ghost navigation
  - Decision trees for ghost behavior modes (chase, scatter, frightened)
  - Limited perception radius for realistic agent awareness
  - Agents query the blackboard for information outside their perception radius