

Reverse Pacman Game

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Problem Statement

Pacman is a classic arcade game where the aim for the Pacman character is to eat all the dots on the screen, while avoiding getting eaten by the enemies running through the maze. In our variation of the game, the enemies will be AI Agents and they would try to run away from the Pacman. The Goal for Pacman is to eat all the enemies. There will be two modes of the game. In mode one, the user can play the game manually using the keyboard and in Mode two, an AI Agent will learn to play the game intelligently using reinforcement learning techniques.

Solution Approach

The solution will be built in two parts:

The first part is concerning the Enemy AI Agents implementing one (or multiple) of the following techniques:

- Collision Avoidance – The enemies will avoid colliding with each other and with the walls in the game.
- Random Movement – One of the enemies can simulate random movement behavior.
- Flee AI – One of the enemies will implement a Flee AI which will try to get away from the Pacman.
- Path Finding Algorithms – One of the enemies will implement an AI which will try to find the path to a mirrored Pacman location (and hence, get away from the actual Pacman).

The second part would be for the Pacman AI Agent, and the Solution approach would be to implement some Reinforcement learning techniques so that the Pacman can learn to play the game.

Evaluation Techniques

For Evaluating the Enemies, since we are using different AI techniques for different enemies, we can measure their performance based on how easy it is to catch an enemy running on certain AI technique(s). The easy of catching can be defined by the number of times that enemy is caught by the Pacman agent.

The evaluation technique for the Pacman agent would be based on the number of enemies it can capture successfully and the time taken by the agent in doing so. We can try out multiple parameters for the algorithm and try which ones work the best. And give a comparison of the parameters that were used.

Importance of Project

The project is useful because it will compare various AI techniques and combinations in fleeing behavior and judge them based on efficiency. The evaluation of Reinforcement Learning will be an especially useful part of the project because it will help in addressing the tradeoff between exploitation and exploration in an unknown territory, which is an important open research question in Reinforcement Learning.