**CSE 537 - Artificial Intelligence**

**Report: Project 2**

**(Multi-Agent Pac-Man)**

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## Designing Agents namely Multi-Agent for classic Version of Pac-Man including Ghosts

## Q1. Reflex Agent – Improvements in game considering food & ghost locations

**Methodology Used:** Reflex agent uses following strategy to evaluate action:

* Consider the location of nearest ghost; if a ghost is about to catch Pacman should run towards other direction. In this case the function should return a large negative number
* If the step eats a food, Pacman should favor this step. In this case return a very high value
* Consider distance to nearest food. Evaluation function would be reciprocal to this.

A sum of these three strategies is returned by the evaluation function. We are using Manhattan distance to compute distances.

**Execution Details**

The basic set1 with testClassic Layout could be cleared successfully with our defined evaluation function

**Set 1:**

python pacman.py -p ReflexAgent –l testClassic

*Pacman Game status:* Win

*Total Score:* 564

**Set 2:** We use the mediumClassic layout with one ghost – 10 games were run and results are as below.

python pacman.py -–frameTime 0.1 -p ReflexAgent –k 1 –n 10

*Average Score: 1052.2*

*Scores: 1485.0, 971.0, 1373.0, 1460.0, 675.0, 1056.0, -75.0, 1306.0, 980.0, 1291.0*

*Win Rate: 9/10 (0.90)*

*Record: Win, Win, Win, Win, Win, Win, Loss, Win, Win, Win*

**Set 3:** Usage of mediumClassic layout with two ghost - 10 games were run and results are as below.

python pacman.py -–frameTime 0.1 -p ReflexAgent –k 2 –n 10

Average Score: 855.8

Scores: 1089.0, 238.0, 273.0, 1368.0, 1256.0, 1703.0, 1679.0, 259.0, 331.0, 362.0

Win Rate: 5/10 (0.50)

Record: Win, Loss, Loss, Win, Win, Win, Win, Loss, Loss, Loss

**Note: Repeated Run with 2 ghosts – Pac-Man wins with 50% signifying evaluation functions to quite good.**

Set 4: Usage of openClassic layout repeatedly ie ten times

python pacman.py -p ReflexAgent –l openClassic –n 10 -q

Here are scores of each run, average score and win rate.

Average Score: 1257.5

Scores: 1260.0, 1257.0, 1257.0, 1258.0, 1244.0, 1260.0, 1264.0, 1257.0, 1259.0, 1259.0

Win Rate: 10/10 (1.00)

Record: Win, Win, Win, Win, Win, Win, Win, Win, Win, Win

## Q2. Adversarial search Agent in the provided Minimax Agent Class

**Methodology Used:** <<add – here >>>

Execution Set 1:

python pacman.py –p MinimaxAgent –l minimaxClassic – a depth=4

*Pacman Game status:* Win

*Total Score:* 516

Note: Minimax agent won 655/1000 games in one of our runs.

python pacman.py -p MinimaxAgent -l minimaxClassic -a depth=4 --numGames 1000 --frameTime 0 --fixRandomSeed --textGraphics

Win Rate: 436/1000 (0.44)

(This looks less ??)

python pacman.py -p AlphaBetaAgent -l minimaxClassic -a depth=4 --numGames 1000 --frameTime 0 --fixRandomSeed --textGraphics

Win Rate: 656/1000 (0.66)

Q3. Alpha-Beta pruning

Methodology Used: <<Add-here>>

Analysis

<<<<ADD- HERE>>>>>>>

# References

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