Duong Khanh Duy – ITITIU20194

**LAB 01**

**PART 1:**

1. **RandomAgent:**

* The agent will random choose 4 directions and stop to decide its next action. Therefore, it takes a lot of time or possibly forever to fully find a path to collect all foods. And there are an option for the pacman to stop. -> There is a change that pacman stops.

1. **myLayout:**

A screenshot of a computer game

Description automatically generated

1. **BetterRandomAgent:**

* There is no stop option so we can reduce the number of state to discover. The process is smoother than the old version, yet it still takes time.

1. **ReflexAgent:**

* This looks like a native greedy method where the agent seeking for food only 4 direction which is adjacent to the agent. However, it is not optimized since if the agent isn’t neighbor to any food, it will choose random operation to decide its next action. The process is faster than RandomAgent, especially in openSearch environment.

1. **PacMan perceives:**

* His position: gameState.getPacmanPosition()
* The position of all the ghosts: gameState.getGhostPositions()
* The locations of the walls: gameState.getWalls()
* The positions of the capsules: gameState.getCapsules()
* The positions of each food pellet: gameState.getFood()
* The total number of food pellets still available: gameState.getNumFood()
* Whether it has won or lost the game: gameState. isLose(), gameState.isWin()
* His current score in the game: gameState.getScore()

**PART 2**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Depth-First Search | | | Breadth-First Search | | | Uniform-Cost Search | | |
| Maze | #nodes explored | Solution length | Is it optimal? | #nodes explored | Solution length | Is it optimal? | #nodes explored | Solution length | Is it optimal? |
| Tiny | 15 | 10 | No | 15 | 8 | Yes | 15 | 8 | Yes |
| Medium | 146 | 130 | No | 269 | 68 | Yes | 269 | 68 | Yes |
| Big | 390 | 210 | Yes | 620 | 210 | Yes | 620 | 210 | Yes |

DFS explores less nodes comparing with BFS and UCS; however, it does not find the optimal solution since the solution length is longer than two other methods. BFS and UCS yield similar results which are the shortest solution.