HW1. Uninformed and Informed Search

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1 Introduction

In this assignment, you will implement informed and uninformed search algorithm.

2 Multi-Agent Pac-Man

In this assignment, we referred to Multi-Agent Pac-Man project(`http://stanford.edu/~cpiech/cs221/homework/prog/pacman/pacman.html`) from Stanford University. We will use the file attached in KLMS. Don't forget to use **Python 3.6** when scripting your code.

3 Project Instruction

3.1 Breadth-first-search

Breadth first search is an search algorithm that traverses tree like data structure exploring the neighbor nodes first. Sequence of exploring tree is explained in picture below.

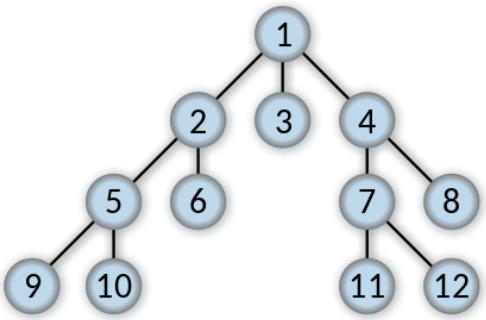

Figure 1: Sequence of exploring tree with BFS.

Breadth-first-search can be implemented with a queue. By putting neighbor nodes of current node into a queue and exploring next node with queue sequence, we can explore the neighbor nodes first.

3.2 A* algorithm

A star algorithm is kind of Breadth-first-search algorithm that uses heuristic function to find shortest path efficiently. Unlike Breadth-first-search algorithm, A* first explores the nodes which have high evaluation

function value. Evaluation function is sum of cost of the path from the start node to node N, and estimated cost which is needed to reach to goal from node N (heuristic).

$$F(x) = g(n) + h(n)$$

3.3 What to do

You should implement BFS and A* algorithm in order to get Pac-man to the goal. Pac-man can move in four directions which are 'North', 'South', 'East', and 'West' ('Stop' is not considered). Legal actions that Pac-man can take depends on Pac-man's situation. For example, If East and South side of Pac-man is blocked by wall, legal-actions are 'North' and 'west'. So, considering legal-action as a node, visit unexplored area in BFS order and reach to the goal. In case of A*, you are required to implement A* algorithm only (no need to visit unexplored point with Pac-man).

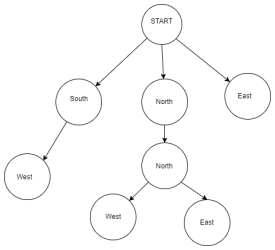

Figure 2: Example Tree of legal actions of Pac-man

While exploring tree with BFS, please visit neighbor node in East, West, South, North order and print the sequence of x,y coordinate that Pac-man first visit in result.txt file. Starting location of Pac-man is considered to be (0,0).

3.4 What to Submit

Please submit **searchAgents.py** file only. Any late submissions will not be accepted.

3.5 How to Run the Code

To try out the Pac-man, run **pacman.py** from the command line. This agent will just stop at every action. If you implement search agent, the agent will move appropriately to search food.

```
python pacman.py
```

To activate the BFSAgent, use -p BFSAgent:

```
python pacman.py -p BFSAgent
```

To activate the AstarAgent, use -p AstarAgent:

```
python pacman.py -p AstarAgent
```

To run Pac-man with no graphic, use -q

```
python pacman.py -p AstarAgent -q
```