**CSCI 6511 Artificial Intelligence**

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**Project 1 Report – Uninformed and Informed Search**

## 1. User Guide

### 1.1 Run single case test on terminal

python main.py v.txt e.txt [start] [end]

Note:

a. v.txt and e.txt should be the absolute path of the file

b. DO NOT contain SPACE in the path

c. if not specify start and end, a random pair will be generated

Example:

```
PS D:\GWU\2020Spring\6511Artificial_Intelligence-AmrinderArora\Project_1> python main.py D:\GWU\2020Spring\6511Artificial_Intelligence-AmrinderArora\Project_1\graphs\graph100_0.1\v.txt D:\GW
U\2020Spring\6511Artificial_Intelligence-AmrinderArora\Project_1\graphs\graph100_0.1\e.txt 1 99
----------Start----------
[INFO] Reading vertex file from:
   D:\GWU\2020Spring\6511Artificial_Intelligence-AmrinderArora\Project_1\graphs\graph100_0.1\v.txt
[INFO] Reading edge file from:
   D:\GWU\2020Spring\6511Artificial_Intelligence-AmrinderArora\Project_1\graphs\graph100_0.1\e.txt
---------------------------------
[INFO] Running dijkstra algorithm
start node:  1
goal node:  99
----------Result for dijkstra----------
-Total searching time in second is: 0 seconds
-Total searching time in stamp is: 0.0009975433349609375
-Shortest distance is  105
-The path from start to end is ['1', '32', '56', '99']
---------------------------------
[INFO] Running astar algorithm
start node:  1
goal node:  99
----------Result for A*----------
-Total searching time in second is: 0 seconds
-Total searching time in stamp is: 0.0009970664978027344
-Shortest distance is  105
-The path from start to end is ['1', '32', '56', '99']
-Visited nodes for astar are  ['1', '10', '62', '48', '31', '58', '92', '76', '32', '59', '38', '53', '95', '57', '84', '63', '71', '88', '65', '93', '79', '74', '56', '85', '68', '77', '99'
]
-Number of nodes visited:  27
PS D:\GWU\2020Spring\6511Artificial_Intelligence-AmrinderArora\Project_1>
```

### 1.2 Run all cases test on terminal

python testall.py

Note:

a. all start and end nodes are generated randomly for each graph in testall.py

Example:

```
PS D:\GWU\2020Spring\6511Artificial_Intelligence-AmrinderArora\Project_1> python testall.py


_________Testing for graph1000_0.1_________
_________dijkstra_________
start node:  701
goal node:  844
----------Result for dijkstra----------
-Total searching time in second is: 0 seconds
-Total searching time in stamp is: 0.03593635559082031
-Shortest distance is  60
-The path from start to end is ['701', '844']
_____________A*_____________
start node:  701
goal node:  844
----------Result for A*----------
-Total searching time in second is: 0 seconds
-Total searching time in stamp is: 0.0020189285278320312
-Shortest distance is  60
-The path from start to end is ['701', '844']
-Visited nodes for astar are  ['701', '738', '793', '996', '741', '986', '782', '892', '849', '743', '971', '899', '879', '981', '779', '975', '720', '778', '844']
-Number of nodes visited:  19
```

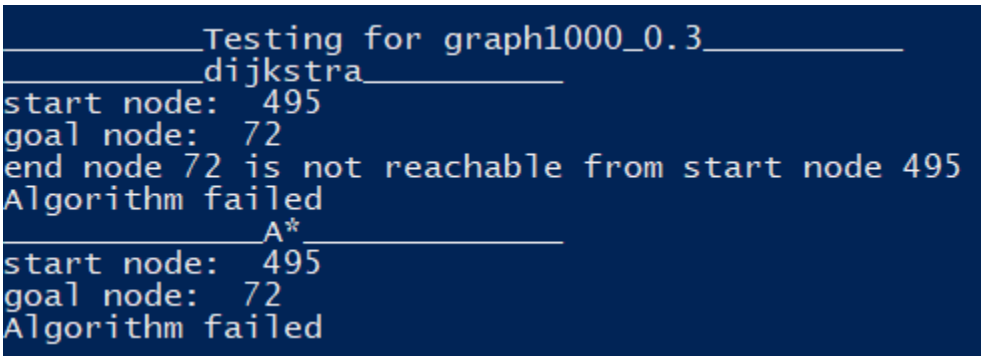
## 2. Result Analysis

### 2.1 Testing Method

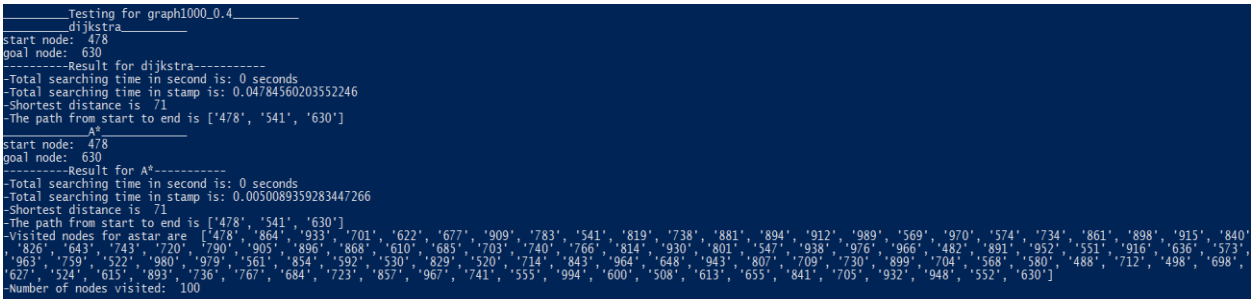
· Generate random starting node and destination node pair for Dijkstra and A* search

· Note that sometimes random generated nodes are not reachable

· If two nodes are not reachable, information will be showed on log




· Test for the shortest distance, path and total time cost for each algorithm




### 2.2 Testing Result

a. Total time cost of a same searching problem using Dijkstra is higher than using A*

b. All nodes are visited in Dijkstra; a relatively small number of nodes are visited in A*