ARTIFICIAL INTELLIGENCE

ASSIGNMENT 1

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Problem:

Using Informed and Uninformed Search Algorithms to Solve 8-Puzzle

Source code:

Click icon to review the repository on github

Problem:

Using Informed and Uninformed Search Algorithms to Solve 8-Puzzle

Solution Description :

The searches begin by visiting the root node of the search tree, given by the initial state. Among other book-keeping details, three major things happen in sequence in order to visit a node:

First, we remove a node from the frontier set.
Second, we check the state against the goal state to determine if a solution has been found.
Finally, if the result of the check is negative, we then expand the node. To expand a given node, we generate successor nodes adjacent to the current node, and add them to the frontier set. Note that if these successor nodes are already in the frontier, or have already been visited, then they should not be added to the frontier again.
This describes the life-cycle of a visit, and is the basic order of operations for search agents in this assignment—
(1) remove, (2) check, and (3) expand.

Bonus :

Coloring and organizing of the output with all required measurements

Test Runs :

A*
mantanhatten

```
C:\Users\omar\.jdks\corretto-11.0.11\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.3.1\lib\idea_rt
.jar=58405:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.3.1\bin" -Dfile.encoding=UTF-8 -classpath
C:\Users\omar\IdeaProjects\Astar\out\production\Astar com.company.Eightpuzzle1

p = 1 = g+h = 0+1
---------------------
|    1 |    2 |    5 |
---------------------
|    3 |    4 |    0 |
---------------------
|    6 |    7 |    8 |
---------------------

p = 2 = g+h = 1+1
---------------------
|    1 |    2 |    0 |
---------------------
|    3 |    4 |    5 |
---------------------
|    6 |    7 |    8 |
---------------------
```

```
p = 3 = g+h = 2+1
---------------------
|    1 |    0 |    2 |
---------------------
|    3 |    4 |    5 |
---------------------
|    6 |    7 |    8 |
---------------------

p = 3 = g+h = 3+0
---------------------
|    0 |    1 |    2 |
---------------------
|    3 |    4 |    5 |
---------------------
|    6 |    7 |    8 |
---------------------
Running time (ms) = 16
Path to goal: top left left
cost of path: 3
Search depth: 3
Nodes expanded: 4

Process finished with exit code 0
```

Test Runs :

A*
eculdian

```
C:\Users\omar\.jdks\corretto-11.0.11\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.3.1\lib\idea_rt
 .jar=58274:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.3.1\bin" -Dfile.encoding=UTF-8 -classpath
 C:\Users\omar\IdeaProjects\Astar\out\production\Astar com.company.EightPuzzle

p = 1 = g+h = 0+1
----------------------
|    1 |    2 |    5 |
----------------------
|    3 |    4 |    0 |
----------------------
|    6 |    7 |    8 |
----------------------

p = 2 = g+h = 1+1
----------------------
|    1 |    2 |    0 |
----------------------
|    3 |    4 |    5 |
----------------------
|    6 |    7 |    8 |
----------------------
```

```
p = 3 = g+h = 2+1
----------------------
|    1 |    0 |    2 |
----------------------
|    3 |    4 |    5 |
----------------------
|    6 |    7 |    8 |
----------------------

p = 3 = g+h = 3+0
----------------------
|    0 |    1 |    2 |
----------------------
|    3 |    4 |    5 |
----------------------
|    6 |    7 |    8 |
----------------------
running time (ms) = 0
Path to goal: top left left
cost of path: 3
Search depth: 3
Nodes expanded: 4

Process finished with exit code 0
```

Test Runs :

BFS

```
C:\Users\omar\.jdks\corretto-11.0.11\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.3.1\lib\idea_rt
.jar=56387:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.3.1\bin" -Dfile.encoding=UTF-8 -classpath
C:\Users\omar\IdeaProjects\BFS\out\production\BFS com.company.Main
Starting BFS
Current state after:
----------------------
|    1 |    2 |    5 |
----------------------
|    3 |    4 |    0 |
----------------------
|    6 |    7 |    8 |
----------------------
Current state after:  Top
----------------------
|    1 |    2 |    0 |
----------------------
|    3 |    4 |    5 |
----------------------
|    6 |    7 |    8 |
----------------------
```

```
Current state after:  Bottom
----------------------
|    1 |    2 |    5 |
----------------------
|    3 |    4 |    8 |
----------------------
|    6 |    7 |    0 |
----------------------
Current state after:  Left
----------------------
|    1 |    2 |    5 |
----------------------
|    3 |    0 |    4 |
----------------------
|    6 |    7 |    8 |
----------------------
Current state after:  Top Left
----------------------
|    1 |    0 |    2 |
----------------------
|    3 |    4 |    5 |
----------------------
|    6 |    7 |    8 |
----------------------
```

```
----------------------
Path to goal:  Top Left Left
Cost to goal: 3
Nodes expanded: 8
Search depth: 3
running time:  343 MILLISECONDS
```

Test Runs :

DFS

```
C:\Users\omar\.jdks\corretto-11.0.11\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.3.1\lib\idea_rt
 .jar=56642:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.3.1\bin" -Dfile.encoding=UTF-8 -classpath
 C:\Users\omar\IdeaProjects\untitled3\out\production\untitled3 com.company.Main
Starting DFS
Current state after:
----------------------
|    1 |    2 |    5 |
----------------------
|    3 |    4 |    0 |
----------------------
|    6 |    7 |    8 |
----------------------
Current state after:  Top
----------------------
|    1 |    2 |    0 |
----------------------
|    3 |    4 |    5 |
----------------------
|    6 |    7 |    8 |
----------------------
```

```
Current state after:  Top Left
----------------------
|    1 |    0 |    2 |
----------------------
|    3 |    4 |    5 |
----------------------
|    6 |    7 |    8 |
----------------------
Current state after:  Top Left Left
----------------------
|    0 |    1 |    2 |
----------------------
|    3 |    4 |    5 |
----------------------
|    6 |    7 |    8 |
----------------------
Path to goal:  Top Left Left
Cost to goal: 3
Nodes expanded: 4
Search depth: 3
running time:  937 MILLISECONDS

Process finished with exit code 0
```