

Assignment 1

CS-415- Artificial Intelligence

Artificial Intelligence

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Assignment 1 (Total Marks :10)

Q1 During a holiday, a flight is planning to travel from Arad to Bucharest. However, there is no direct route between these two cities. Instead, the cities are connected to each other in a graph-like manner, with distances specified between connected cities. The flight aims to find the most optimal route for this journey. To assist in finding the optimal path, additional information is provided: the straight-line distance from each city to Bucharest. By using A* search with the straight-line distance as the heuristic, you can determine the most optimal route from Arad to Bucharest and assist the flight.

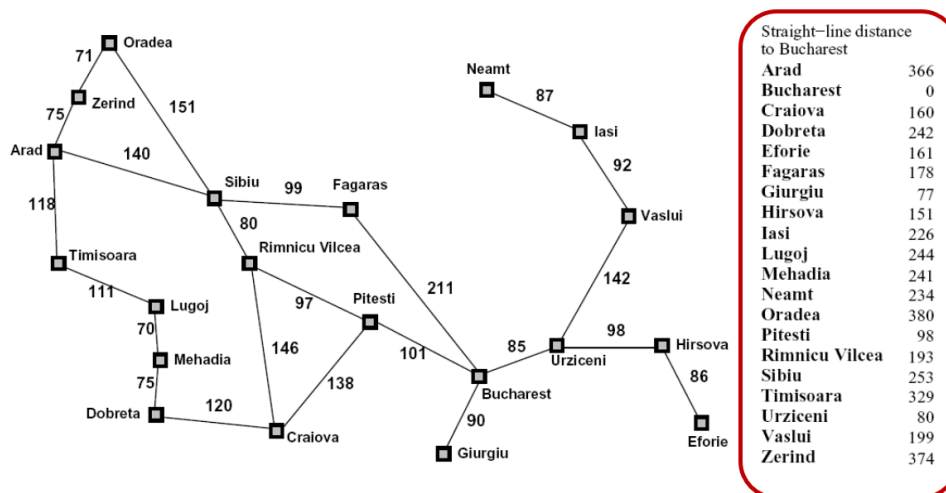
CLO1 (C3)

Figure 1 Romania with step cost in kilometers.

Input: Your text file should list each node followed by the destinations it can reach, along with the corresponding distances and heuristics. You will need to read this file, then prompt the user to input the starting point and the destination point.

Output: The output will display the total distance from the starting point to the destination, followed by the sequence of nodes traversed to calculate this distance.

Sample Input:

In the text file:

Arad 366 Zerind 75 Sibiu 140 Timisoara 118

Zerind 374 Arad 75 Oradea 71

Oradea 380 Zerind 71 Sibiu 151

... ..
Bucharest 0 Pitesti 101 Fagaras 211 Giurgiu 90 Urziceni 85
Giurgiu 77 Bucharest 90
... ..

The text file is arranged as follows:

- Each line starts with a node followed by the heuristic of that node.
- Then, the neighboring nodes and the distances from the parent node are given as pairs. All neighboring city-distance pairs are listed after the heuristic.

For example, the text file starts with Arad, which has a heuristic of 366. It is the parent node to Zerind, Sibiu, and Timisoara, which are 75, 140, and 118 km away from Arad, respectively. Note that Bucharest, being the end node, has a heuristic of 0.

Your task is to read this file, then prompt the user to input the starting point and the destination point. The output will display the total distance from the starting point to the destination (A* computes the distance), followed by the sequence of nodes traversed to calculate this distance.

In Console:

Start node: Arad

Destination: Bucharest

Sample output Path: Arad -> Sibiu -> Rimnicu -> Pitesti -> Bucharest

Total distance: 418 km

If there is no path found from the Start node to the End node, simply print “NO PATH FOUND”.

Instructions for the Assignment:

- This is a programming assignment and must be completed in Python.
- Each student must submit the Python file (.py) along with the text input file.
- The Python file name must include your Roll Number, e.g.,
2019800107_AI_Assignment_1.py. Submissions past the deadline will incur a 10% penalty per day, and assignments will not be accepted if they are more than three days late.

CLOs

CLO1	Use various AI problem solving, search, and logical reasoning techniques.	C3
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