UNIVERSITY OF ASIA PACIFIC

Department of Computer Science & Engineering

Course Title – Artificial Intelligence and Expert Systems Lab.

Course Code – CSE-404.

Project – Implementation of a small map (Home - UAP) using A* search algorithm.

SUBMITTED BY

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Section – **A**1

SUBMITTED TO

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Problem Title: Implement small map (From Home to UAP) and find the optimal path using A* Algorithm

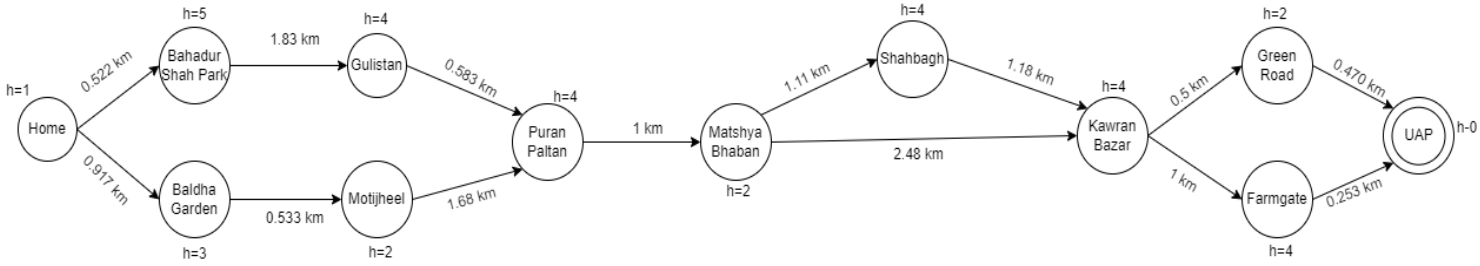
Problem Description: Implementation of a small address map from Home to UAP. Find the optimal path using A* Algorithm. A* algorithm is a search algorithm that search for the shortest path between Start node to Goal node.

Objective: There are several paths between Puran Dhaka to UAP. All those paths are not optimal path. The objective of this problem is to implement A* search algorithm and find the optimal path from my Home (Puran Dhaka) to UAP.

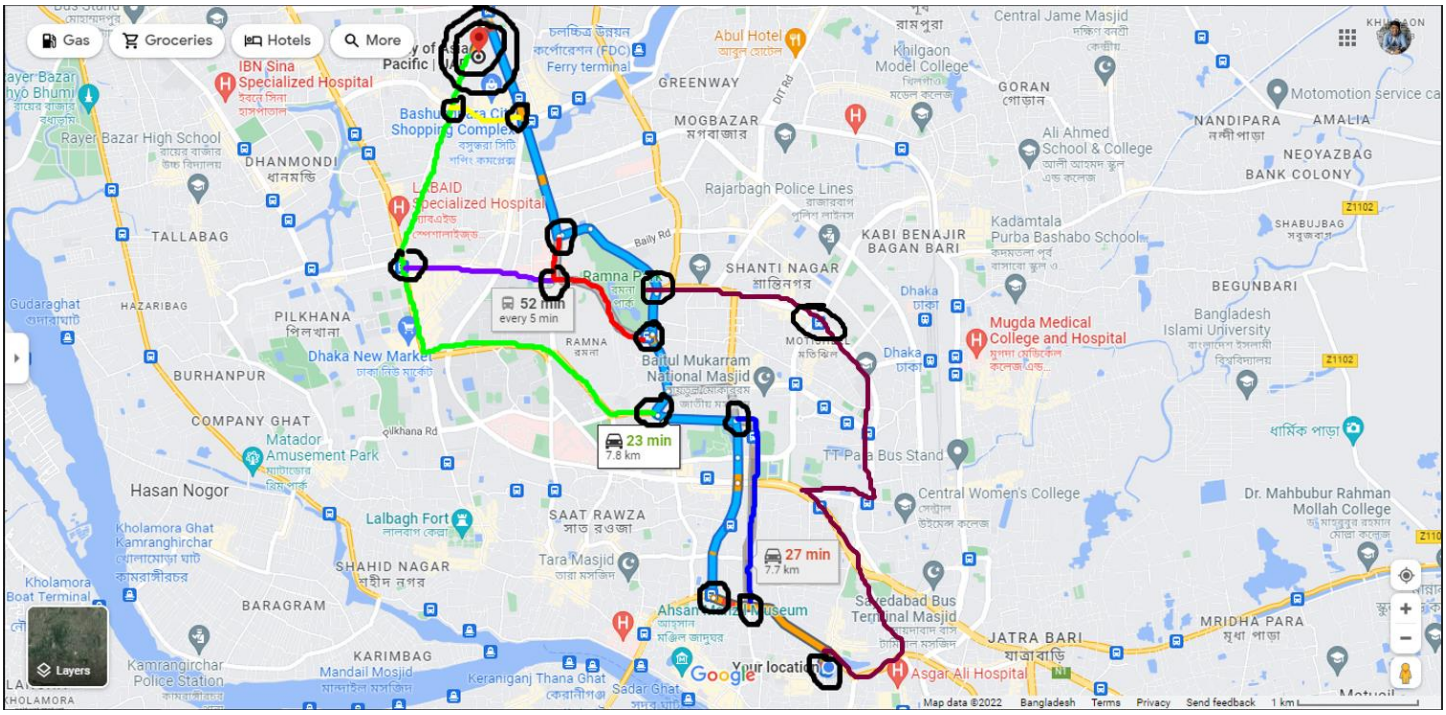
Tools & Languages:

- Diagram.net (Design Road Map)
- Google Map
- Language – Python
- IDE: Google Collab

Diagram:



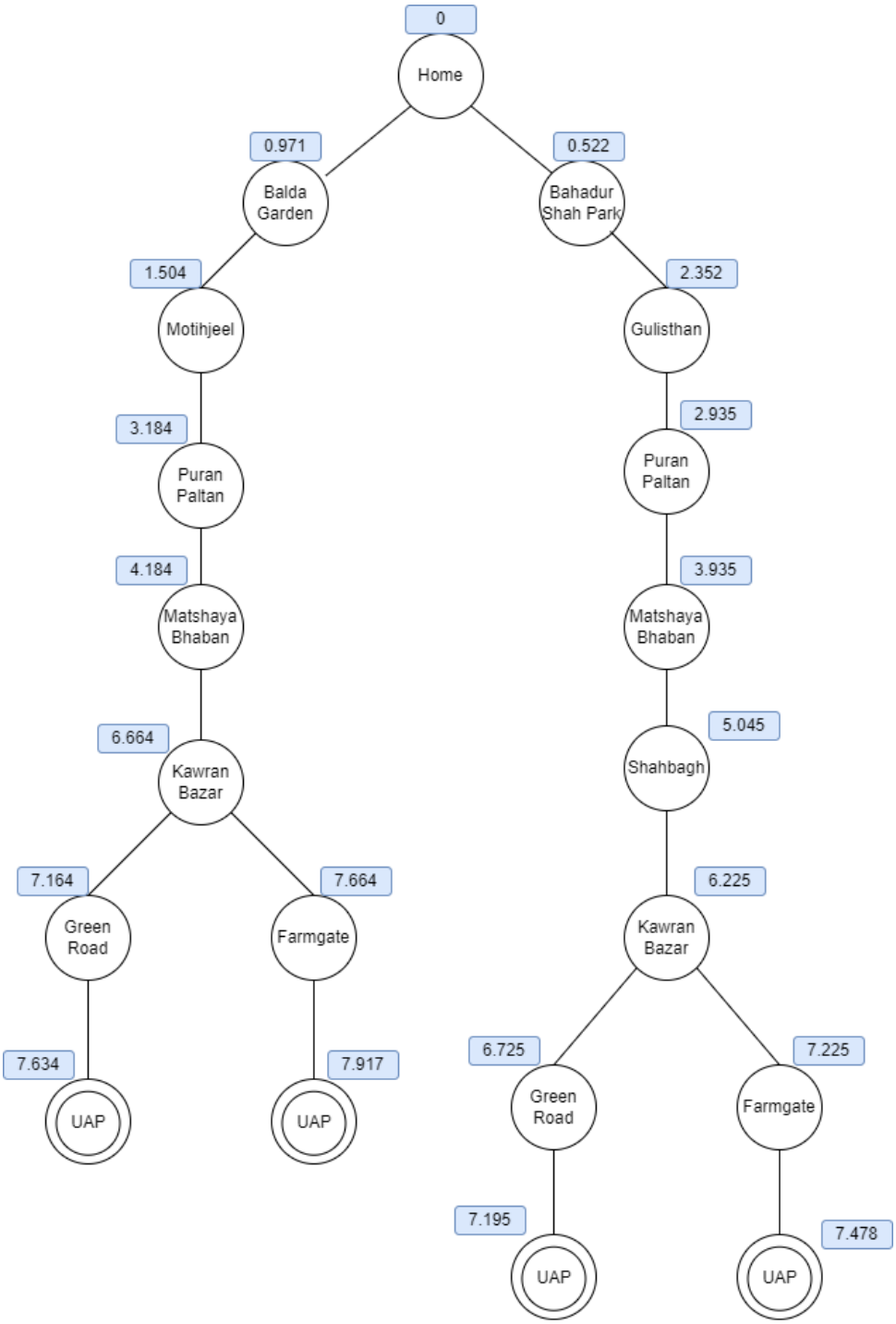
Google MAP:



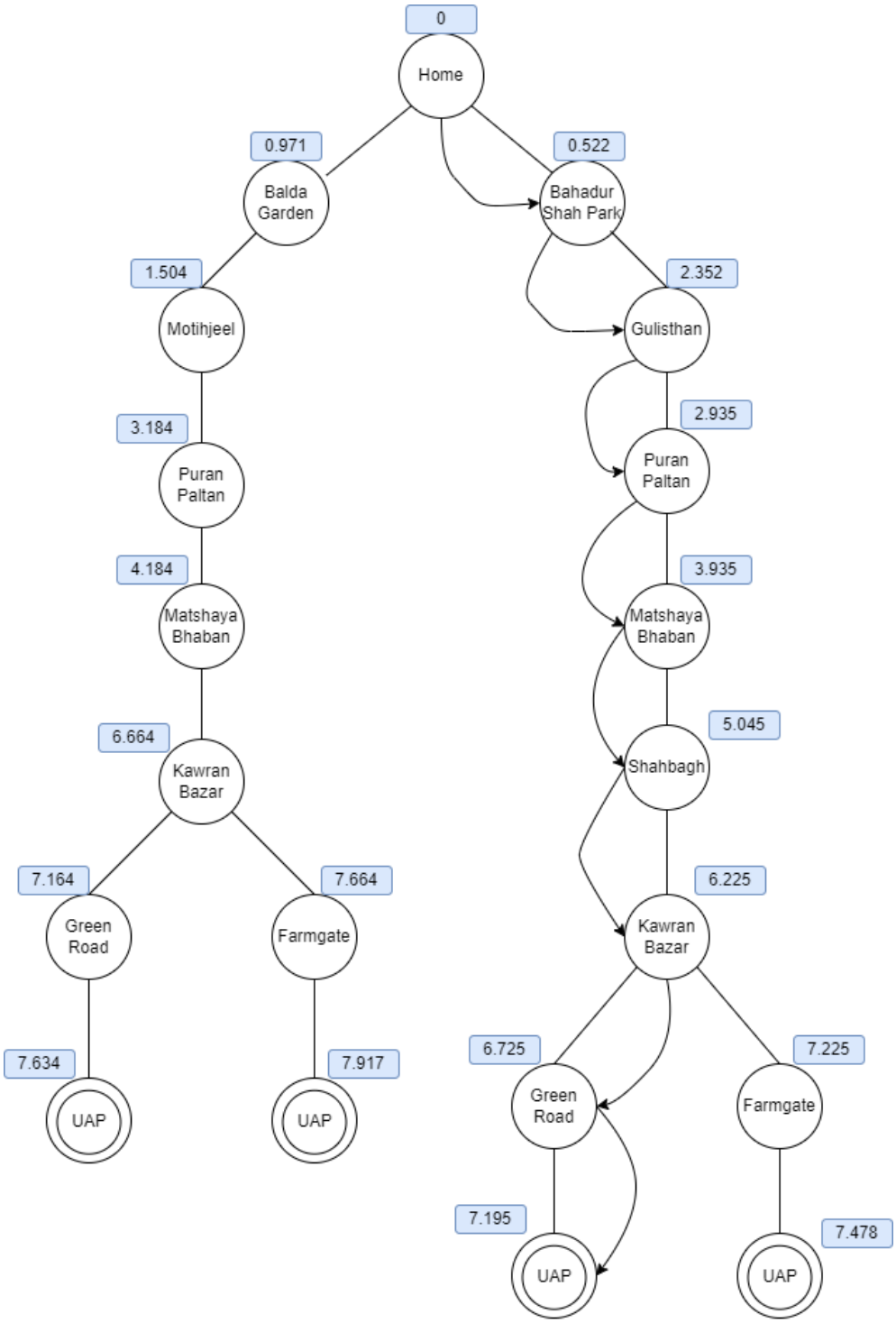
Heuristic Value:

- Home - 20 % 4 = 0-> 1
- Bahadur Shah Park - 20 % 15 = 5
- Baldha Garden - 20 % 12 = 8 % 5->3 (8>5)
- Gulistan - 20 % 8 = 4
- Motijheel - 20 % 9 = 2
- Puran Paltan - 20 % 11 = 9 % 5-> 4 (9>5)
- Matshya Bhaban - 20 % 13 = 7 % 5-> 2 (7>5)
- Shahbagh - 20 % 8 = 4
- Kawran Bazar - 20 % 11 = 9 % 5-> 4 (9>5)
- Green Road - 20 % 9 = 2
- Farmgate - 20 % 8 = 4
- UAP - 0 (Destination)

Search Tree:


0
Home
0.971
Balda Garden
0.522
Bahadur Shah Park
1.504
Motihjeel
2.352
Gulisthan
3.184
Puran Paltan
2.935
Puran Paltan
4.184
Matshaya Bhaban
3.935
Matshaya Bhaban
6.664
Kawran Bazar
5.045
Shahbagh
7.164
Green Road
7.664
Farmgate
6.225
Kawran Bazar
7.634
UAP
7.917
UAP
6.725
Green Road
7.225
Farmgate
7.195
UAP
7.478
UAP

Shortest Path:

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Path found: ['HOME'--> 'Bahadur Shah Park'--> 'Gulistan'--> 'Puran Paltan'--> 'Matshya Bhaban'--> 'Shahbagh'--> 'Kawran Bazar'--> 'Green Road'--> 'UAP']
Total Path Cost 7.20 Km
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Source Code: Google Colab

Slide: Canva/Road Map

Challenges & Conclusion:

The main road block for this project was to find out multiple paths. Though I know some roads but I have picked 12 node-point (including Home-node, UAP-node). Then I've to use the "measure Distance" feature to calculate the distance. After successful implementation of A* search, I have got the most optimal path as output.

Finally, I can state that A* algorithm is a powerful and beneficial algorithm with all the potential. So, we can use this algorithm for approximate the shortest path in real-life situation, like – in maps, games, robotics etc.