University of Asia Pacific

Artificial Intelligence and Expert System Lab

Course Code: CSE 404

Project Name: Implementation of a small address map using A* search algorithm.

Submitted By:

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INTRODUCTION:

The assigned problem is implementation of a small address map from my home to UAP, using A* search algorithm and find out the optimal path. A* algorithm is a searching algorithm that searches for the shortest path between the initial state to the final state.

So, here in this project I will find the most optimal path from my home (Shyamoli) to my university (UAP) using A* search algorithm.

OBJECTIVE:

In this project, I have to find the shortest path from my home to my university. There are several paths I can use to go to my university but every path is not optimal. That's why i need to find out the optimal path and A* Algorithm is the best fit herre.

A* ALGORITHM:

It is an informed search algorithm. Informed search algorithm contains an array of knowledge such as how far a node is from the goal, path cost, how to reach the goal node etc. A* search algorithm combines both UCS and greedy best first search algorithms.

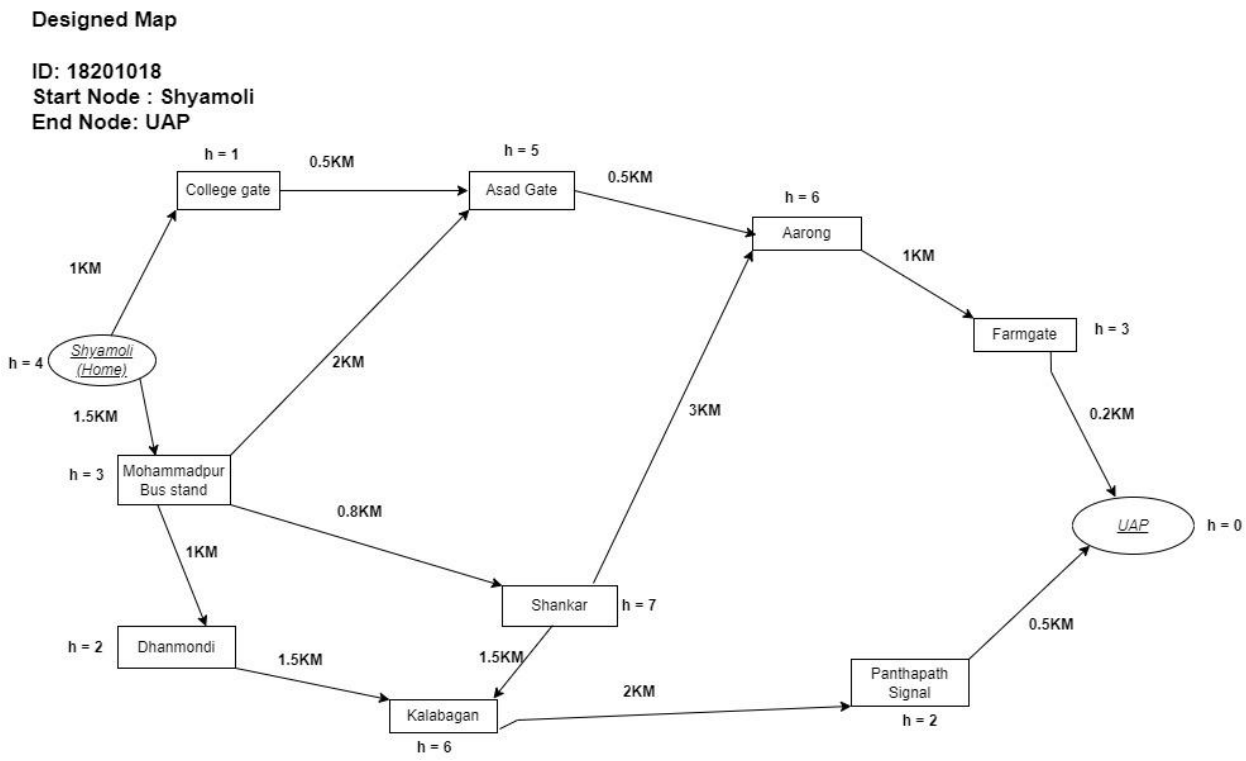
Here,
g(n) = cost of traversing from one node to another
h(n) = Heuristic cost
f(n) = Evaluation function = Estimated cost of the lowest solution.

For using this algorithm,
A* algorithm, f(n) = g(n) + h(n).

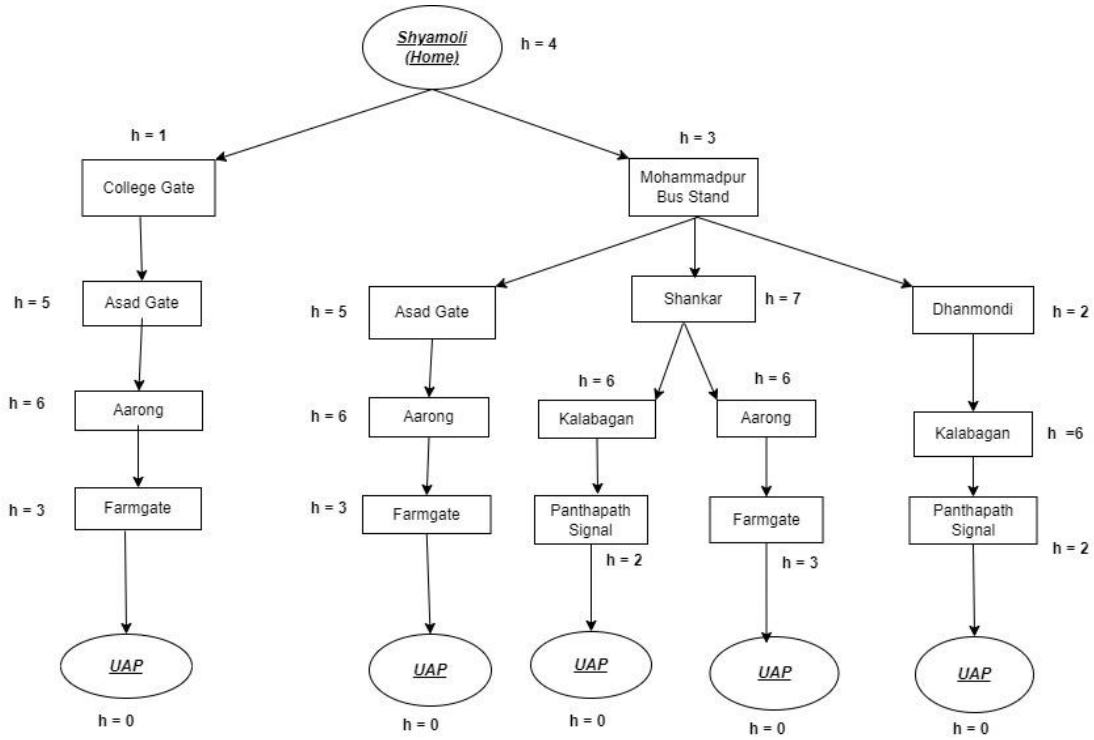
TOOLS & LANGUAGES:

- ☐ Programming Language: Python
- ☐ IDE: Visual Studio Code
- ☐ Map Design: Diagrams.net

DESIGNED MAP:



SEARCH TREE FOR THE DESIGNED MAP:



IMPLEMENTATION WITH PYTHON:

The implementation of A* Algorithm is attached to the report.

OUTPUT:

```
The Optimal Path = ['Shyamoli (Home)' - 'College Gate' - 'Asad Gate' - 'Aarong' - 'Farm gate' - 'UAP']
The path cost = 3.20
```

RESULT:

After Using A* Search Algorithm on this designed map, on output we can find the shortest path :

Shyamoli (Home) → College Gate → Asad Gate → Aarong → Farmgate → UAP

So, This is the most optimal and shortest path.