Artificial and Computational Intelligence

Assignment 1

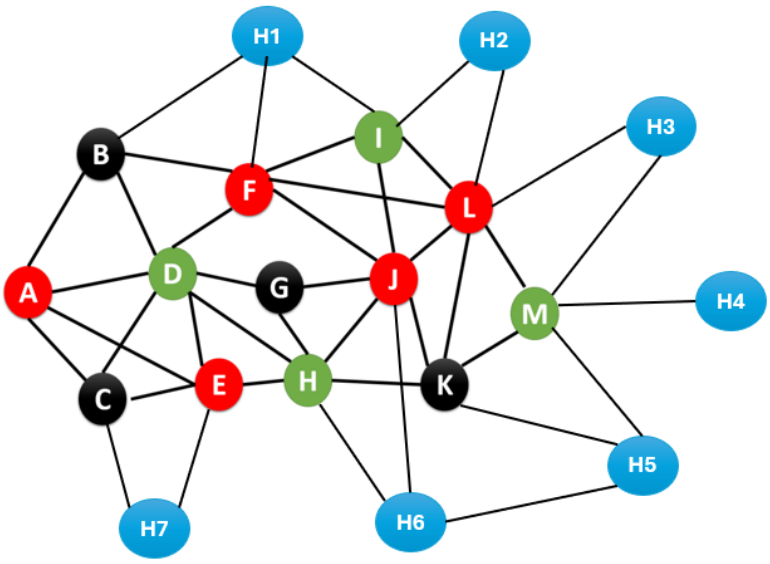
Network Routing Agent

Problem Statement: 3

In the fast-growing field of logistics and transportation, the use of delivery drones has gained significant attention. Efficient and timely delivery is critical for maintaining customer satisfaction and operational efficiency. One of the major challenges is to develop an intelligent route planning system that can navigate drones to deliver packages in the shortest possible time while avoiding obstacles, no-fly zones, and dynamically changing environmental conditions.

Objective:

Develop a Python application using uninformed search algorithms to plan optimal routes for delivery drones in a real-time urban environment. The application should consider factors such as distance, delivery priorities, obstacles, and no-fly zones.



GREEN: Roads and buildings

BLACK: Obstacles (e.g., tall buildings, restricted areas)

RED: No-fly zones

BLUE: Delivery points (multiple delivery locations)

Use the following algorithms to solve the problem:

UCS (Uniform Cost Search)

DFS (Depth First Search)

Answer the following:

1. Explain the environment of the agent [20% weightage]
2. Define the heuristic and or fitness function for the given algorithms and the given problem. [20% weightage]
3. Use appropriate data structures and implement search algorithms (uninformed) to find the path with shortest path as provided in the graph. **The starting point and destination are to be obtained from the user as input. [40% weightage]**
4. Find and print space and time complexity using code in your implementation. [20% weightage]

NOTE:

- You are provided with the python notebook template which stipulates the structure of code and documentation. Use well intended python code.
- Use separate MS word document for explaining the theory part [PEAS]. Do not include theory part in the Python notebook except Python comments.
- The implementation code must be completely original and executable.
- Please keep your work (code, documentation) confidential. If your code is found to be plagiarized, you will be penalized severely. Parties involved in the copy will be considered equal partners and will be penalized severely.