

Artificial and Computational Intelligence

Assignment 1

Blood Supply drone agent

Problem Statement:

You have been assigned the critical task of designing an Emergency Blood Supply Logistics System for a hospital situated in an area affected by a crisis. The hospital urgently requires a supply of blood, and various blood banks within the region are potential sources. Your objective is to develop an efficient system that determines the optimal route for a Blood Supply drone agent to collect blood from multiple blood banks and deliver it to the hospital. Use the Average Distance to Unvisited Blood Banks as a heuristic wherever necessary (ie : Calculate the average distance from the current node to all unvisited blood banks)

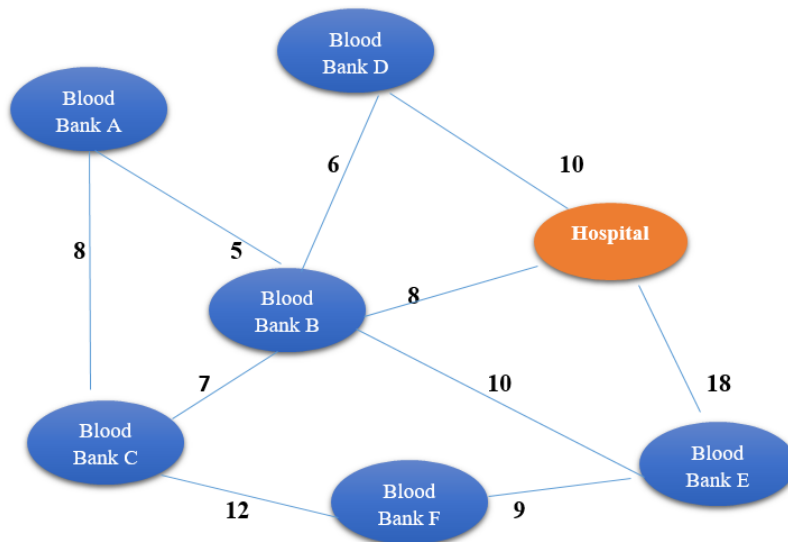
Constraints:

- The Blood Supply Vehicle can start from any blood bank.
- The vehicle should visit each blood bank exactly once.
- The final destination for the vehicle is the hospital.

Implement an algorithm to find the optimal path for the Blood Supply drone agent, minimizing the total travel distance while ensuring that all blood banks are visited exactly once.

Use the following algorithms to solve the Supply drone agent problem:

1. A*
2. Hill Climbing Algorithm



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 (informed and local search) to find the path that covers all the blood bank with shortest distance in the city as provided in the graph. The starting point is 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.