Artificial and Computational Intelligence

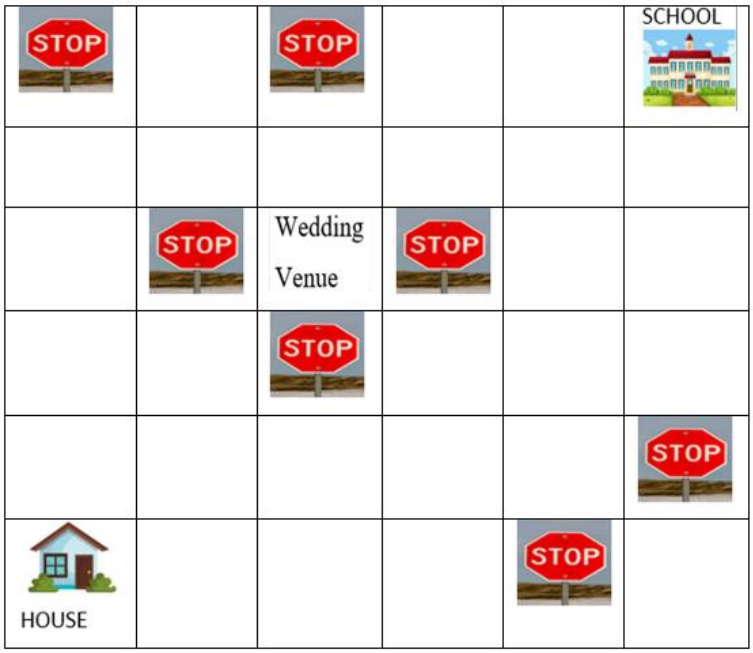
Assignment 1

GPS Navigation Agent

Problem Statement:

The picture of a city is given below in the grid format. A mother wants to drop her child in the school. But due to the marriage function of a VIP in that city, many roads are blocked and routes are diverted through some other roads. The mother and child start from house and have to school in time because they started from the house as usual without knowing the diversion in ways to school. There is a GPS agent to help them to find the shortest, quickest and safest route among the available paths and reach the school in time. 7 points to be added each time the agent passes through traffic free cells ie adjacent to empty cell and 5 points to be deducted while the agent passes adjacent to STOP sign. The Possible actions are Move Up, Move Down, Move Left, and Move Right only.

Graph representation



Use the following algorithms to solve the problem:

1. **A***
2. **Genetic 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 given informed and local search algorithm and Print the path taken by the agent to the destination. [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. 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.