Artificial and Computational Intelligence

Assignment 1

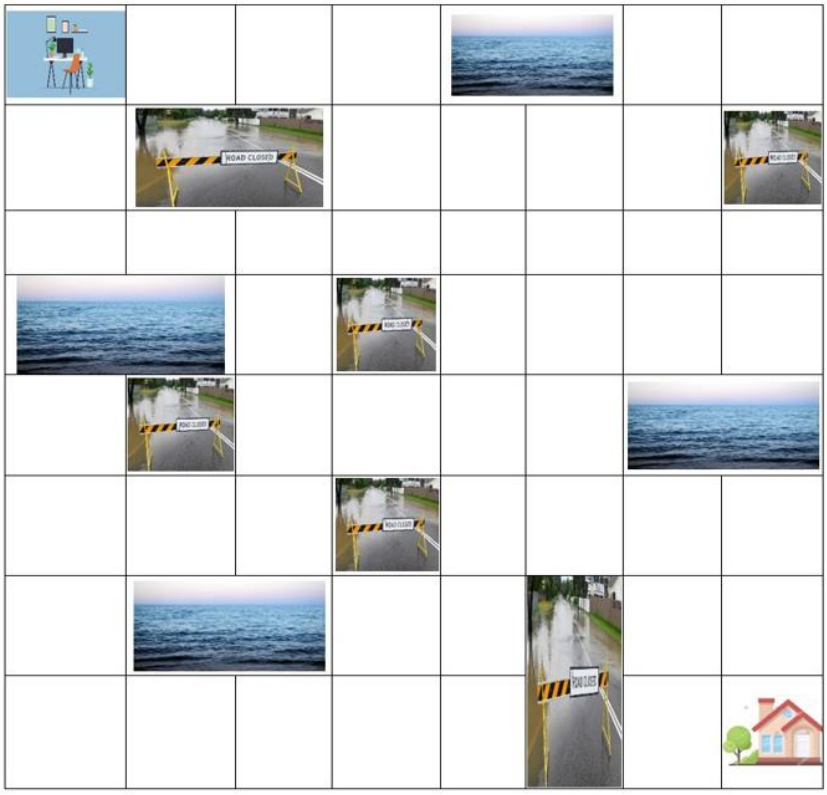
Grid Navigation Agent

Problem statement

Assume you are in your office in Nellore in Andhra Pradesh. The city is facing heavy rains due to Cyclone Michaung. Most of the areas are inundated with water. You need to reach home safely. You have a navigation agent which you can use to find the safe routes without water. The agent is fed with the map of the city marked with areas of flood. The agent has to find the route that is the safest to take you home by choosing the next grid considering different factors. 5 points to be added each time the agent passes adjacent (Up, Down, Left, Right) safe places and 5 points to be deducted while the agent passes near water bodies and 3 points to be deducted if roads in the area are flooded with water.

The following figure gives the initial grid positions. The desired solution must have maximum points but must have travelled through less number of squares. The environment is fully observable. The agent travels on empty cells and the water bodies and flooded areas are marked as blockades. You cannot travel through them, but can travel adjacent to these cells. No diagonal movements are allowed.

Initial Board configuration



Use the following algorithms to solve the problem:

1. **Greedy Best first search**
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 reach home. [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.