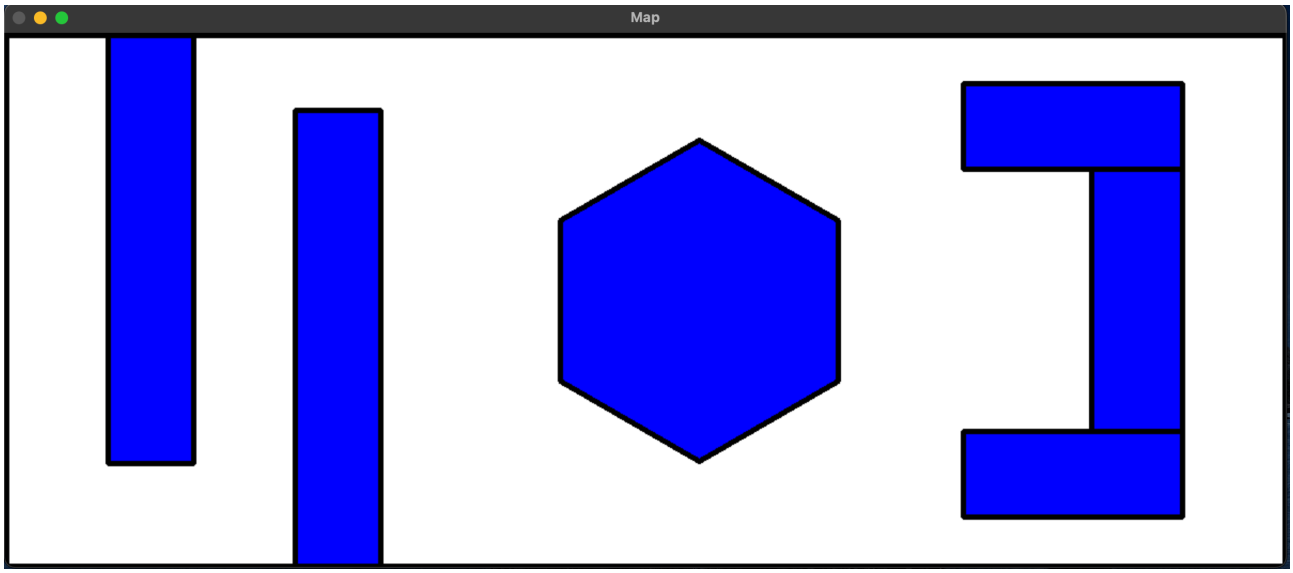
README

Given below are the instructions to execute a code written for the implementation of '2D Optimal Path Planning' for a mobile robot in a workspace space with obstacles, using A* Algorithm.

- In the map (dimensions: 1200 * 500) shown below:
  - The 'Free Space' for the point robot is depicted by 'White' pixels
  - The 'Obstacle Space' are denoted by 'Blue' pixels
  - A 'Clearance Space' of user-defined value from obstacles and walls are given by 'Black' pixels

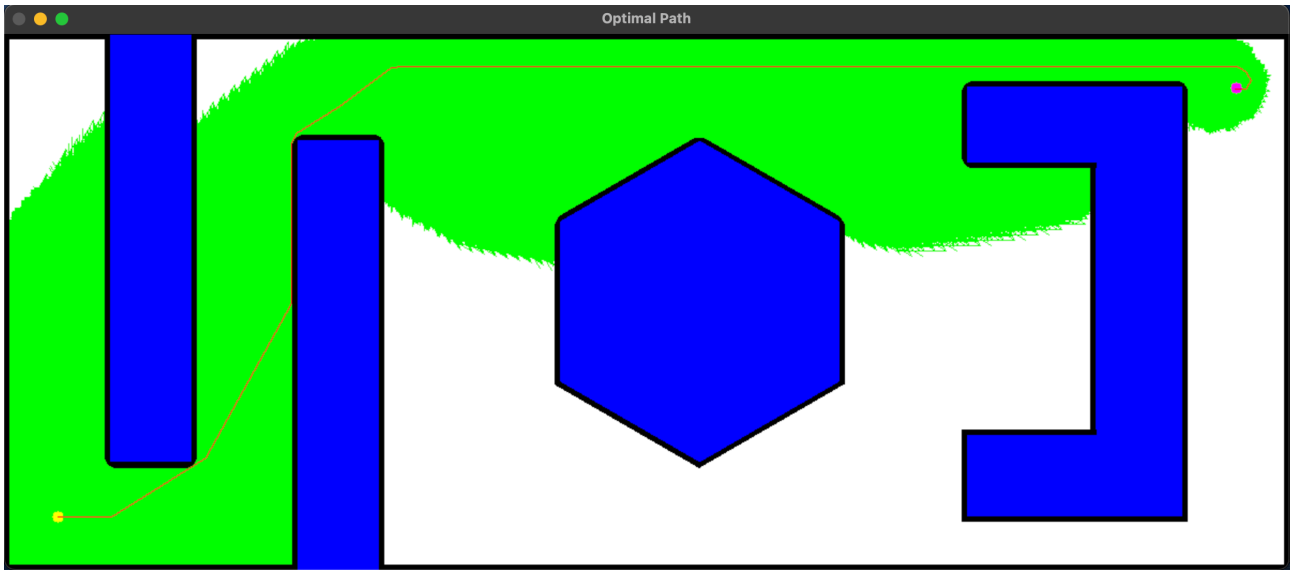


The workspace space map of the point robot is already fed into the code as shown above.

Instructions to execute the code:

- The source code is a python file written using Visual Studio Code and I've attached the (a_star_Caleb_Dillon_Hamsaavarthan.py) format for execution.
- Run '.py' in the VS Code for execution.
- Enter the (x, y), where x in range [0,1200] and y in range [0,500], coordinates for the 'Start' and 'Goal' respectively, one at a time node as requested by the code, with the respect to the origin (0,0) at the bottom-left corner of the map shown above.
- Followed by the orientation of mobile robot at the source and goal nodes respectively, from the values [180, 150, 120, …, 30, 0, -30, -60, …, -150].
- If the given coordinates are not reachable (belongs to obstacle space), the code will prompt with "The given coordinates are not reachable. Try again with different coordinates".

- Provided with valid ‘Start’ and ‘Goal’ coordinates, the code will display the ‘Optimal Path’, as example shown below, for 5 seconds. (Press any ‘key’ to quit).



- The output of an animated video ‘A*_output.mp4’, will be created as a demonstration for node exploration and optimal path travelling for reference.
- The ‘Start’ and ‘Goal’ nodes are denoted by ‘Yellow’ and ‘Purple’ circles respectively.

Libraries used in the code:

- cv2
- heapq
- math
- numpy
- time

Link to the GitHub Repository:

https://github.com/DillonMUMDGithub/GroupProject3_ENPM661/tree/main

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