Aerial Robotics Kharagpur Documentation Task 3

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Abstract— **This is the documentation of the puzzle task**

The puzzle task had 4 levels which had to be solved using different techniques and one level had the clue for the next level.

I. INTRODUCTION

The puzzle task had 4 levels which had to be solved using different techniques and one level had the clue for the next level.

The first level had an image with some initial gray scale pixels.

II. INITIAL ATTEMPTS

I had got stuck quite a few times during this task. While segmenting the maze I had taken the color as (230,0,0) as I had been confused with the monochromatic term. Thus I ended up getting only a few dots.I tried dilating and eroding them to get lines but failed. Next I tried connecting them using Hough line transform but failed. Finally I figured out the mistake and was able to segment the maze.

III. FINAL APPROACH

Step 1: The initial image had a few gray scale pixels and on printing the ASCII characters corresponding to those pixels I got the message which indicated to the next levels.
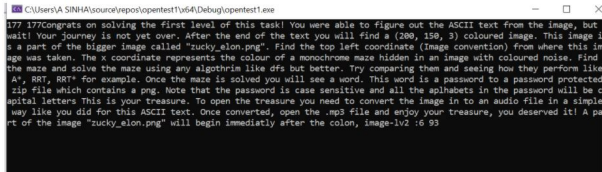
Step 2: The second image was a larger image which contained a part from the first image as was instructed in the previous message. The top left point of the image was found to be (230,460) using template matching.

Step 3: There was a third image which had a monochromatic maze hidden in colored noise. The color of the maze was same as the x coordinate of the image which was 230. On segmenting all points having color in the blue channel as 230 the maze was segmented. The maze was solved using different algorithms like Dijkstra, A* with different heuristics. Algorithms like RRT and RRT* were also studied. All algorithms gave the same path as the maze had only one possible path and these algorithms guarantee a solution if one exists.

On solving the maze the word APPLE appeared which was the password for the zip file for the last level.

Step 4: The zip file was unlocked with the password APPLE and it had a gray scale image which contained the data for an mp3 file. File handling was used to write the data into an mp3 file one by one. The final mp3 file was a rick roll.

IV. RESULTS AND OBSERVATION

For the maze solving, the RRT and RRT* algorithm work better than A* and Dijkstra. The performance of the A* varies with the heuristic. Since there is only one path, all algorithms give the same path. Also overestimation of the heuristic gives faster results here as there are no chances of finding a non optimal path.

In general I learnt how information can be stored in form of an image and the ways to decode it.

CONCLUSION

This was quite a fun task involving many things to learn. I enjoyed this task a lot along with learning new things about path planning.

REFERENCES

[1] https://www.youtube.com/watch?v=2FYm3GOonhk&t=8525s
[2] https://www.youtube.com/watch?v=QR3U1dgc5RE
[3] https://www.geeksforgeeks.org/a-search-algorithm/