Aerial Robotics Kharagpur Task 3.1

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I. INTRODUCTION

The problem was basically a coding and CV learning treasure hunt which involved multiple levels and learning basics of OpenCV while going through the levels. It was designed to make us learn concepts in a very fun and satisfying way.

II. PROBLEM STATEMENT

The hints to the first level and the resources for all the levels were provided along with an hint on how to start the puzzle.

III. RELATED WORK

This was a fairly difficult task since it involved learning new concepts at every checkpoint. And since my work environment only supported OpenCV in C++, the task was even tougher as there are many resources of OpenCV on the internet BUT majorly in Python which made me basically scourge the internet to learn and link resources to my project. For example the maze solving algorithms (as mentioned in the problem statement) were no where to be found in C++ so I had to design my own maze solving algorithm from scratch.

IV. INITIAL ATTEMPTS

Level 1 and the searching Level 2 were fairly simply although resizing and shifting the image-to-search and searching the image from the bigger image with different dimensions was kind of difficult.After the magic number 230 was found from the level 2 the decoding of the maze was simple as well. Then came the major task of solving the maze with an algorithm. After searching the internet for an operational algorithm for hours, I could only find Algo resources in python but not in C++. So I finally gave up and decided to design an Algo of my own. The initial Algo I made did a pixel by pixel traversing, marking the pixel as it went through and backtracking until it had another way to move while also marking the pixel it backtracked through so as to not take the same pixel again in some other path. I have attached an Screenshot of the path :

Here the red is the main path through which the maze was solved and the yellow part are the pixels where it backtracked from. After getting the final word and the treasure image, it was a puzzle as to how to convert an image into an mp3 file. The initial attempts I made was to try studying about what is an mp3 file online to get some hint but it was of no use.

V. FINAL APPROACH

A final approach was needed in the maze solving algorithms as it was not very efficient and the path was also not very clear. Hence I made the traversing pixel from one single pixel to a 9x9 pixel head (since the distance between the walls was found to be 9 pixels by openCV) which gave a clear path and took much less time to run. The base of this algorithm was the same backtracking principle while marking the pixels already taken. I have attached an Screenshot of the final path :
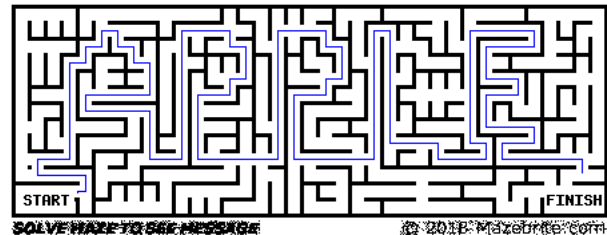
After I tried to learn about .mp3 from the internet I couldn't still solve the task. So I tried opening a sample .mp3 in .txt and found out it was nothing but a string of characters. This gave me an idea where I converted all the pixels color code into ASCII and exported the string as a mp3 file and it worked!!

VI. RESULTS AND OBSERVATION

The result of the maze solving task was a very efficient and aesthetic code. I made an edit which showed the Algo in an animation as it solved the maze and it was very satisfying to watch. It is still in the code I have submitted so please watch. I have also attached the relevant input and output images which were involved in the task while solving for the treasure.

CONCLUSION

It was a very interactive task which gave satisfaction and motivation at the end of every level. It was the only task I did in one whole stretch. It involved making us learn many openCV concepts at the many checkpoints. Overall this task took around 6 hours of rigorous coding and searching for me only to totally not get RickRolled in the end.