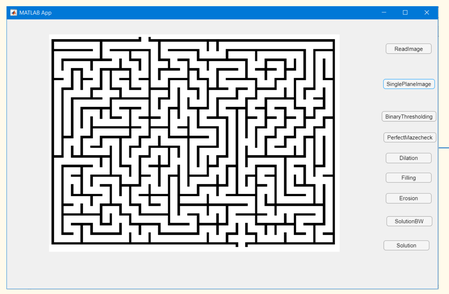
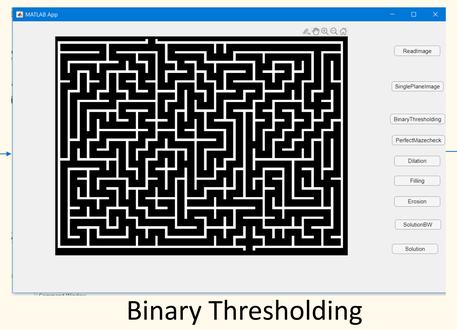
Solving Maze using Image Processing

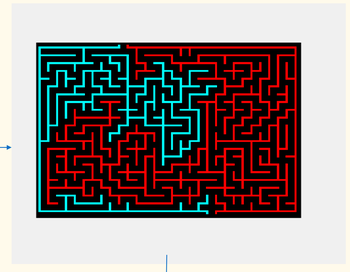
Steps to solve a Maze

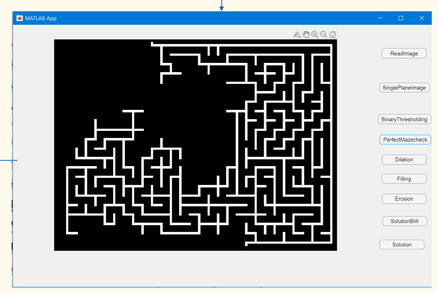


Single Plane image

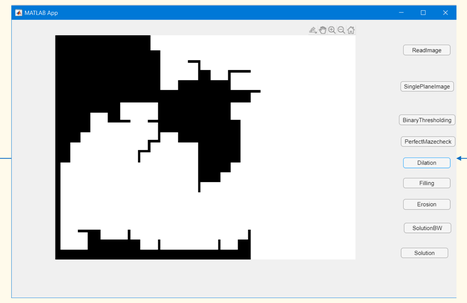


Binary Thresholding

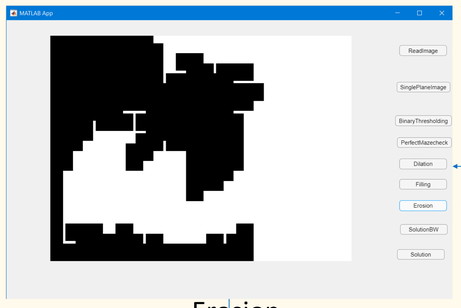




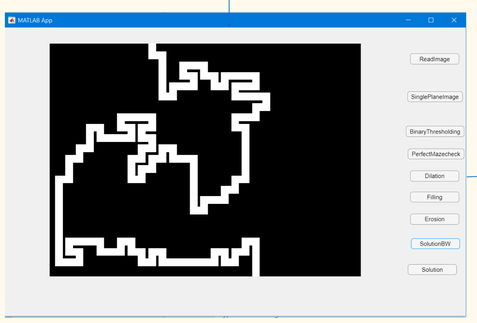
Perfect Maze Check



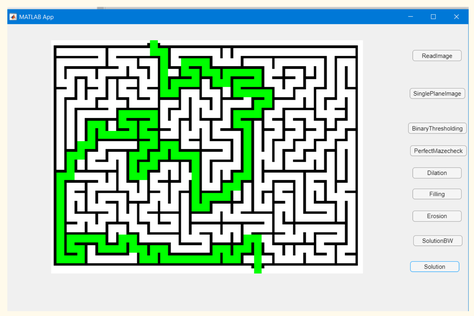
Dilation



Erosion



Black and White Solution



Final Solution

Maze Solving Procedure

Read Image : We first read the image input image in the app through read image button which selects the desired maze image

Single Plane Image: Extracting the most prominent plane.

Binary Thresholding: The colors are classified into two types either black or white

Perfect Maze: It checks whether the maze is made up of two continuous walls

Dilation: It is used to increase the size , it is done to make small or thin features more visible, it expands the size of a maze so they can be identified

Filling: It is used to identify and fill the areas enclosed by walls. It is used to identify and fill area enclosed by outer walls of maze, which is used to locate the start and end points of the maze

Erosion: Now we use erosion to reduce the size of few areas or features in image. It is used to thin walls of a maze so that the path becomes better visible.

Black & White Solution: when we subtract the eroded image of the maze with filled version, we will now be able to identify the path through maze by removing walls of the maze. By eroding the image walls will be thinned and areas that are part of solution will be relatively unchanged. Subtracting eroded from Filled image will leave the areas that have been eroded. The remaining shows the path

Abstract

Maze solving using Image Processing can be done using morphological operations. Itis a technique for solving mazes in which the maze is represented as a binary image, with the walls of the maze represented as white pixels and the paths through the maze represented as black pixels. The technique uses morphological operations, such as erosion, dilation and filling to simplify the image of maze and to extract the structure of the maze . Erosion is used to shrink the white pixels and remove small branches, while dilation is used to expand the black pixels and fill in small gaps in the maze. These operations are applied one after the other and the eroded image is subtracted from original to get final path.

Results And Conclusion

In this project we could ne able to find the path of maze using morphological operations. we Don’t need to go for very complex machine learning and deep learning algorithms to find path for simple mazes which is clear and has only a single way in and out, however this can be further optimized for various scenarios can be implemented with other algorithm.

Team-4

Arlagadda Naga Likhith
Kothuru Gurunadh
Vimal Chinthapalli

References

1. [1] Using morphological operations —Erosion based algorithm for edge detection, Warqaa Shaher AlAzawee;Ikhlas Abdel-Qader;Jareer Abdel-Qader2015 IEEE International Conference on Electro/Information Technology (EIT)

2. [2] Fingerprint feature extraction using morphological operations. Paramvir Singh;Lakhwinder Kaur,2015 International Conference on Advances in Computer Engineering and ApplicationsYear: 2015 | Conference Paper | Publisher: IEEE