Wild Pig Maze by Nob Yoshigahara

An algorithmic approach

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Problem statements

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Figure 1: Nob Yoshigahara, Puzzles 101: A PuzzleMasters Challenge

Algorithm

Overview

1. Creating a $(0, 1)$ - matrix from the image of the maze.
2. Changing matrix to a directed graph.
3. Find a path of the directed graph and draw it to the image.

Step 1: Creating a $(0,1)$ - matrix from the image of the maze

Consist of THREE main stages:

1) Using PIL package to save the pixels of the image as a $(0,1)$ - matrix.

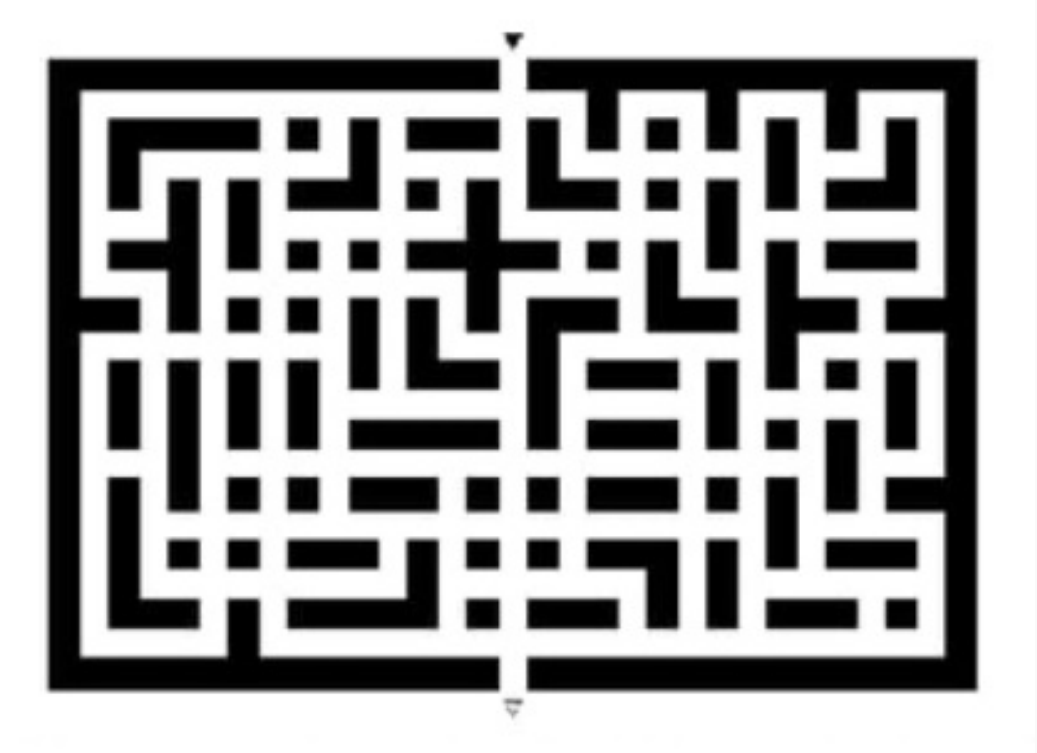


Figure 2: The bordered maze.

2) Determining coordinates of four corners of the maze.

Step 1: Creating a $(0,1)$ - matrix from the image of the maze

3) Shrinking the above $(0,1)$ - matrix into a smaller one (the desired matrix).
   We have two approaches:
   - Measure the width of the path.

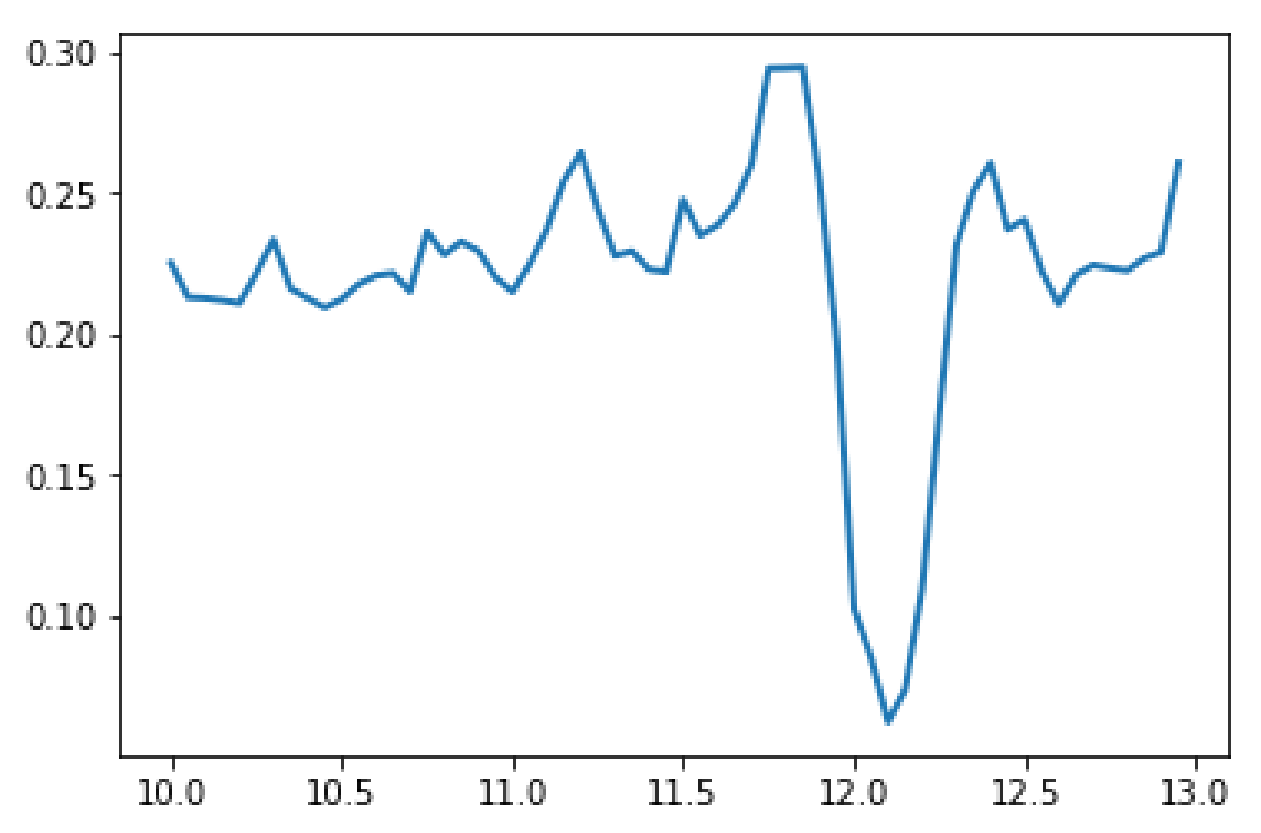


Figure 3: Error corresponding to the path's width.

Step 1: Creating a $(0, 1)$ - matrix from the image of the maze

- Determine the suitable size of the matrix.

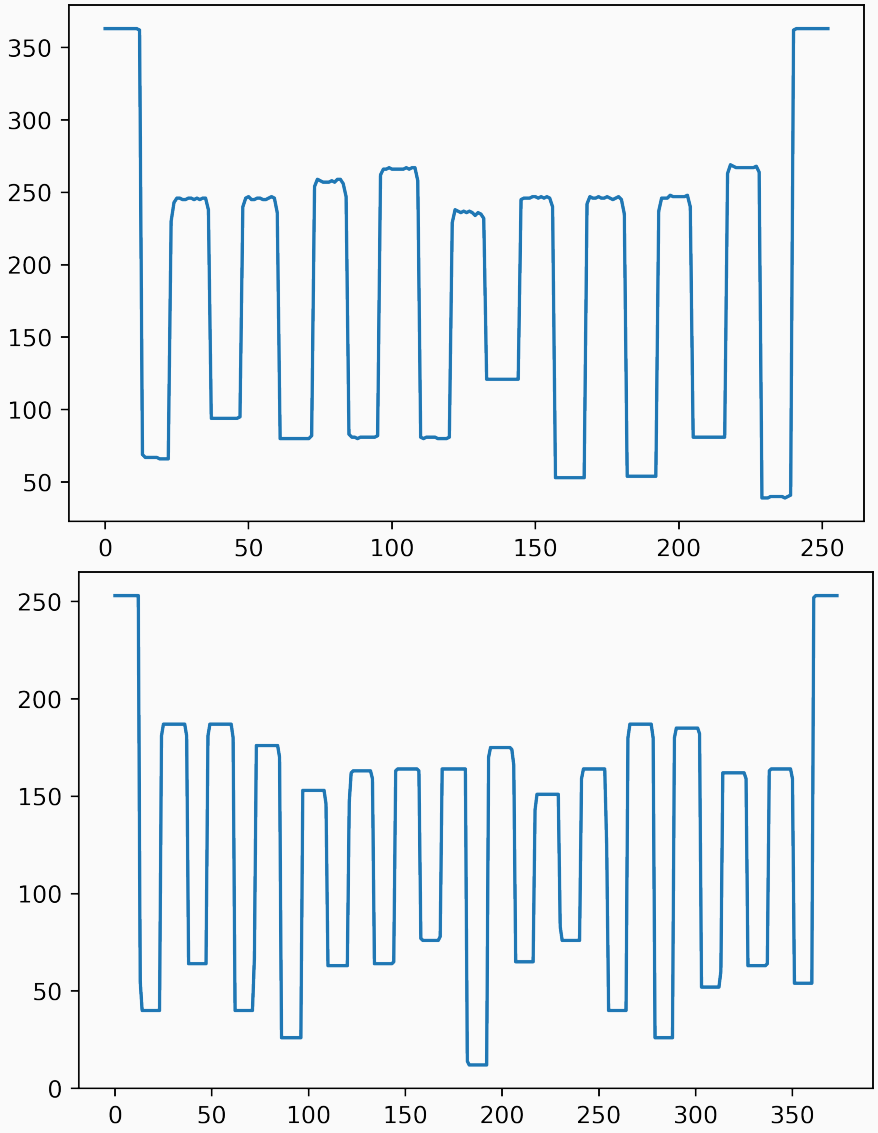


Figure 4: The horizontal sum and vertical sum.

Step 2: Changing matrix to a directed graph

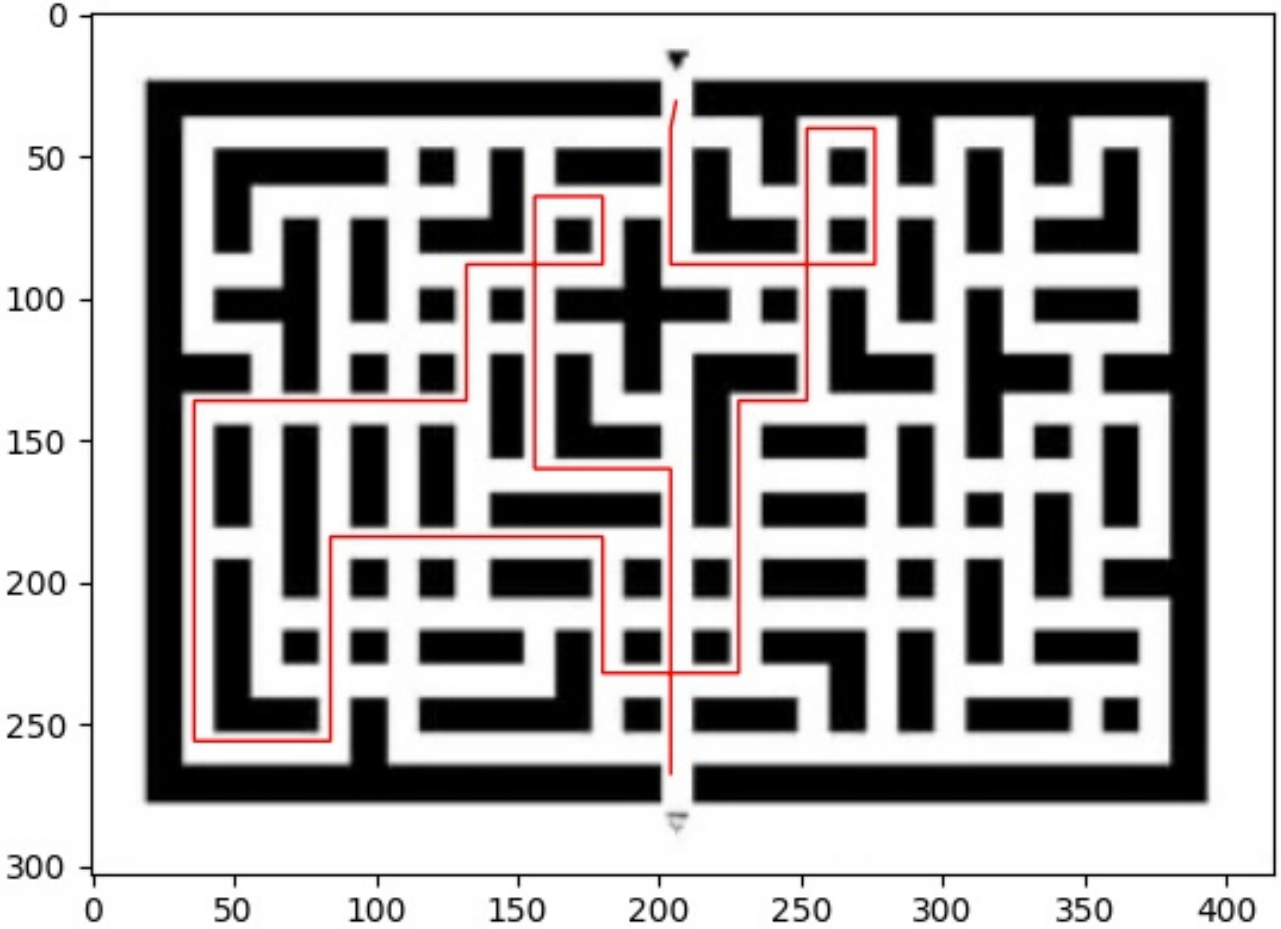
- Create a graph G.
- For each position which is empty, we add four vertices to the graph, which imply the position from the previous step.
- Add nodes to the graph which follow some rules.

Step 3: Find a path of the directed graph and visualize it

- Find a path of the directed graph which is output of Step 2.
- Visualize the path by using the matplotlib package in Python.

Results

Path in the maze



Statistics

- 379 lines of code.
- Commits counter:
  - Do Xuan Anh: 11
  - Le Quang Dung: 27
  - Hoang Anh Quan: 11
  - Trinh Huy Vu: 11

What we have learned

- Version control system: Git/Github.
- Packages in Python: matplotlib, networkx, numpy, PIL.
- Teamwork management.


Thank you!