CIS*6020: Artificial Intelligence

Assignment 2

Solve Nonogram Puzzle and Generate Nonogram from Image

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1 Solve Nonogram Puzzle

In this part of the assignment, we are taking input from Text File, cleaning the file and storing the Row and Column blocks values of the Nonogram puzzle in a DataFrame and iterate of each row and column to list all the possible combinations of Black Blocks and White Cells.

Basis the valid combinations, we discard combinations that have "consecutive Black Blocks" OR any combination that does not agree with prefilled nonogram at each stage. Once we have a list of valid combinations, we check if only 1 possibility is there, in which case we plot the column or the row at its place. If there are more than one possible combinations, we find out cells of that column or row that are remaining constant in each possibility and fill those cells and repeat this process until the whole puzzle is solved or it could not be solved any further.

We were able to solve Example 1 to 4 within 2 seconds for each. For Example 5, only a small part of the puzzle is getting solved as the Input Nonogram has more than one valid possible combinations as solution.

Note: When we run the nonogram.py file, it needs to have Examples stored in the Current Working Directory. An output file will be created and also opened. You might have to zoom in into the image to see the nonogram due to small pixel size of the generate puzzle output.

2 Generate Nonogram from Images

In this part of this assignment, we will use the cv2 library to read and define the characteristics of the image. Here are the steps belows:

- Once the image is read, we will turn it into gray-scale image
- Resize the pixel size of the image to a solvable puzzle size
- Sharpen the image by using Interpolation and a small Kernel to bring out the contours of the image
- Threshold the sharpened image to generate the puzzle
- Once the Puzzle image is generated, save it to .png file in the Current Working Directory.
- Use the puzzle image to count the Black Blocks and the White Spaces and save the puzzle values in a text file at the same directory using the File Naming Conventions mentioned in the assignment documentation.