

Interview questions:

1. We have a gray scale image with size of (W, H, 1), which is split into several pieces. Those split lines or curves are all 1s, while the rest of the image are all 0s. Implement a function to label those split regions, which means all **four-way connects** 0s are relabeled as a same number (>1) and all unconnected regions should not have same id. For example, in python if we have an input image like

[0, 0, 1, 0, 0]

[0, 1, 0, 0, 1]

[1, 0, 0, 1, 0]

[0, 1, 0, 1, 1]

Your output should be like:

[2, 2, 1, 3, 3]

[2, 1, 3, 3, 1]

[1, 3, 3, 1, 4]

[5, 1, 3, 1, 1]

2. After we get the output from the above question, implement a function that if we give any two integers (greater than 1, and must be present in the image), we would connect those two regions and labels as another integer which is not in the image. For example, if we have above image, and two integers as 3 and 5, the output should be like:

[2, 2, 1, 6, 6]

[2, 1, 6, 6, 1]

[1, 6, 6, 1, 4]

[6, 6, 6, 1, 1]

Another example would be the image with two integers as 2 and 4, the output should be

[2, 2, 1, 3, 3]

[2, 1, 3, 3, 1]

[1, 3, 3, 1, 4]

[5, 1, 3, 1, 1]