ALGORITHMS.

Dynamic Programming - Assignment

Design an algorithm (using pseudocode) that takes in as an input, two 2-D int arrays that are assumed to be 2 black-and-white images: initialImage x, whose dimensions are

IxJ, and finalImage y, whose dimensions are IxK. The algorithm will compare x to the y, row-by-row, as defined below. Your algorithm will employ a dynamic programming

scheme to compare X to Y identifying the minimal difference between each row.

Because you are working with black-and-white images only, you should assume that each image is a 2-D int array consisting of 2 possible values: 0 or 1, where 0 represents

black and 1 represents white. Thus, this 2-D grid of 0 and 1 values comprise a 2-D black-and-white image. Each row of this image is then simply a 1-D int array filled with

either 0s or 1s. Therefore, you must define how you will measure the difference between the strings of 0s and 1s in each row.

Remember that you will do the comparison one row in the images at a time.

First, compare X to Y . (Here X is the first row in image X and Y is the first row in image Y ). Next, compare X to Y ... Each one of these comparisons will require

the construction of a D (distance) matrix.

In the following example, the first row of X is X , and the first row of Y is Y = 00110.



After the D matrix is completed, the minimum number in the bottom row is the minimal mismatch for this row. You will assign this value to the variable minVal . This number

tells how different row X1 is from row Y1 . You will then repeat this comparison for all rows i and aggregate the difference when complete into variable totalDifference = Σi

minVali

As a result, the algorithm will compare the total difference to a threshold value called thresh. If total value is above the threshold, the images are declared different, otherwise

they are declared to be similar images. You can assume that the thresh variable is supplied as an input to your algorithm.

Part1

Design pseudocode for the image comparison algorithm discussed above, given input Images X, Y, and thresh. The output is a declaration: The images are similar, or the

images are different.

Part 2

Discuss the optimality of the dynamic programming solution. Discuss the time complexity of this algorithm in terms of the size of the inputs X and Y.

