8 The image histogram

6 points

Introduction

An image histogram is the distribution of pixels for each tonal value in an image.
Image histograms are present on many modern digital cameras. Photographers can use them as an aid to show the distribution of tones captured, and whether image detail has been lost to blown-out highlights or blacked-out shadows.
Your task is to write an algorithm to calculate the histogram of a given grayscale image.
The input to your program will be a *W by H* image represented by the grayscale values of every pixel in it. The pixel values will be in the range 0-255, which corresponds to the black-white range. You can assume that the number of pixels in an image can be represented using a 32 bit integer.
The output of your program will be a list of 256 integers. Each one will count the number of pixels that appear in the input with the same value as the position of that integer in the output list. For example, the first integer in the output list will represent the number of pixels with the value 0, the second integer will represent the number of pixels with the value 1, and so on...

Input

The input of the program will be as follows, the first input line contains two unsigned integer values that represent the image width (*W*) and height (*H*) in pixels. Following that, we will have *H* input lines each of them containing *W* integer values that represent the gray value of the pixel.

```
4 3                     ← this is a 4 by 3 image.
1 2 1 0                 ← image row 1
0 0 0 5                 ← image row 2
255 5 255 255           ← image row 3
```

Output

The program must output the histogram in a 16x16 matrix that is read from left to right and from tops to bottom.

```
4 2 1 0 0 2 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 3
```