

Quiz 2 Results for Stephen Giang

! Correct answers are hidden.

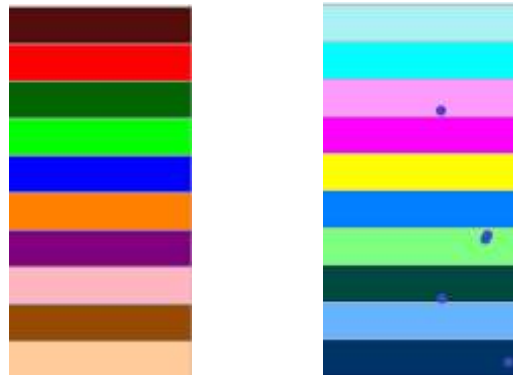
Score for this quiz: **10.5** out of 12

Submitted Oct 14 at 3:11pm

This attempt took 26 minutes.

Question 1

1.5 / 1.5 pts



input

output

In the above, the left is the input image and the right is the output image. Which of the following operations is applied to the input image to obtain the output image

☐ linear mapping

☐ piecewise linear mapping

☐ binarization

☒ Negatization

Incorrect

Question 2

0 / 1.5 pts

Which of the following statement(s) is (are) true about mapping of an input image $f(x,y)$ to an output image $g(x,y)$? Assume both input and output image values range between 0 and 255.

☐

If the input image $f(x,y)$ is light, then the mapping $g(x,y) = f(x,y) - 40$ produces better contrast

☐

Binarization of $f(x,y)$ to produce the output is a linear mapping.

☒

The lookup table is more efficient than regular implementation for the mapping $g(x,y) = 2f(x,y)$

☒

The mapping $g(x,y) = 16 \cdot \sqrt{f(x,y)}$ produces a lighter output image than the input image.

Question 3

1.5 / 1.5 pts

An 8-bit grayscale image has a perfectly equalized histogram. One pass of mapping with the following transformation (mapping) is applied to the image:

$$g(x,y) = \frac{1}{2}f(x,y) \text{ for } 0 \leq f(x,y) \leq 160$$

$$g(x,y) = f(x,y) \text{ for } 160 < L \leq 255$$

Let the moralized output histogram (vertical axis) be denoted by h , and the greylevel (horizontal axis) be denoted by L . Which of the following is correct of the normalized histogram of the output image $g(x,y)$.

☐

$h=1/256$ for $0 \leq L \leq 160$; $h=1/256$ for $160 < L \leq 255$

☐

$h=1/256$ for $0 \leq L \leq 160$; $h=2/256$ for $160 < L \leq 255$

☐

$h=1/256$ for $0 \leq L \leq 160$; $h=2/256$ for $160 < L \leq 255$

☒

$h=2/256$ for $0 \leq L \leq 80$; $h=0$ for $80 < L < 160$; $h=1/256$ for $160 < L \leq 255$

Question 4

1.5 / 1.5 pts

An 8-bit image has a normalized histogram defined by

$$h(l) = \frac{1}{206} \text{ for } 0 \leq l < 100 \text{ and } 200 \leq l < 256$$

$$h(l) = \frac{1}{412} \text{ for } 100 \leq l < 200$$

Suppose that each pixel is ANDed with 1000 0000, and is set to white if the result of ANDing is non-zero, otherwise is set to black if the result is zero. What is the normalized number of black pixels in the output image? Write the number with 2 decimal points in the box below.

0.55

Question 5

1.5 / 1.5 pts

Suppose that $f[x][y]$ is the image array, and $M[j][k]$ is an m by m mask where $M[0][0]$ is the coefficient at upper left corner of the mask. The following pseudo-code is used to perform the convolution on the pixel located at (x, y) and to stores it in $g[x][y]$.

ConvolutionAlgorithm

sum = 0;

for k = ? to ? {

for j = ? to ? {

sum = sum + $f[?][?]$ * $M[?][?]$; }

$g[x][y] = \text{sum};$

In the following answers the question marks (?) are replaced with code. Which of the following is correct for getting convolution

☐ for k = 0 to m { for j = 0 to m {sum = sum + $f[x][y]$ * $M[j+m][k+m]$; }}

☒ for k = -m/2 to m/2 { for j = -m/2 to m/2 {sum = sum + $f[x+j][y+k]$ * $M[j+m/2][k+m/2]$; }}

☐ for k = -m/2 to m/2 { for j = -m/2 to m/2 {sum = sum + $f[x+j][y+k]$ * $M[j][k]$; }}

☐ for k = 0 to m { for j = 0 to m {sum = sum + $f[x+j][y+k]$ * $M[j+m/2][k+m/2]$; }}

☐ for k = -m/2 to m/2 { for j = -m/2 to m/2 {sum = sum + $f[x-j][y-k]$ * $M[j+m/2][k+m/2]$; }}

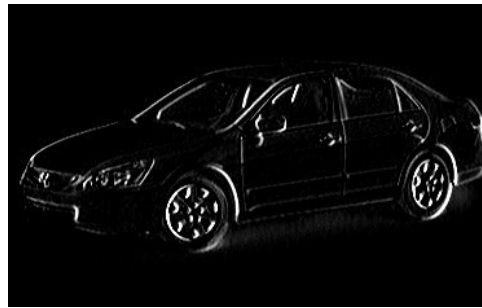
Question 6

1.5 / 1.5 pts

Below are two gradient images obtained by applying Sobel masks.



A



B

Which of the following(s) is (are) correct?

- ☒ A is the gradient in x direction and B is the gradient in y direction
- ☐ A is the gradient in x direction and B is the gradient in y direction
- ☐ A is the gradient magnitude and B is the gradient in x direction
- ☐ A is the gradient magnitude and B is the gradient in y direction

Question 7

1.5 / 1.5 pts

Consider the images below, which of the following operation is applied to the left image to obtain the right image?



☐ Averaging filter

☐ Edge detection

☐ mid-point filter where lower and higher values under the mask are discarded and the middle values are averaged.

☒ Unsharp masking

Question 8

1.5 / 1.5 pts

Which of the following is correct for the median filter of size m by m ? In all answers assume less than $\frac{m^2}{2}$ pixels under the mask are corrupted by noise.

☐ For the median filtering to be effective the image must have only salt or paper noise, but not both.

☐ Median filter is not effective for the Gaussian noise.

☒ Median filter is effective when image has both salt and pepper noise.

☐ The computation complexity of median filtering is less than average filtering.

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