Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Computer Science and Technology
300 level 2nd Semester Examination – Dec. / Jan. 2017
CST362-3 Digital Image Processing

Uva Wellassa University

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Instructions to candidates
Duration: Three (03) hours
Number of questions: Seven (07)
Mark allocation: 160
Answers only six (06) questions including Question 1.

1.

a. Briefly describe the computational representation of 8x8 RGB image. (4 mark)
b. Illustrate the image acquisition process using light source and reflection. (5 mark)
c. Briefly describe the sensors and how they have been used to sense a scene. (5 mark)
d. Analyze the major goals of image processing. (5 mark)
e. Give an example for each Low, Mid and High-level image processing activities. (3 mark)
f. Argue on the role of image processing in Law and Policy enforcement. (5 mark)
g. Write any use of image processing in any other domain other than computer science. (5 mark)
h. Give any three (03) tools that can be used for image processing. (3 mark)

2.

a. What is meant by a pixel? (3 mark)
b. Briefly describe any two (02) adjacencies in pixel relationship with examples. (4 mark)
c. Use any two (02) neighborhoods to find the number of objects in Figure 01 and give all the steps clearly.

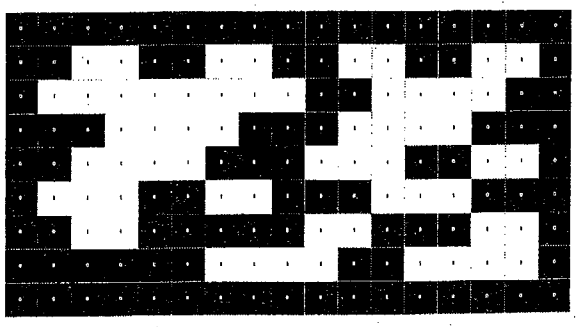

Figure 01: Objects in a scene (7 mark)

d. Derive the equation for Euclidian distance with the aid of a diagram. (5 mark)
e. Describe the use of 'connected component counting' to identify the defects in gears. (6 mark)

(7)

3

a. Describe the use of histogram in image processing applications. (4 mark)

b. Briefly, explain how histogram can be used for image enhancement. (4 mark)

c. Perform histogram equalization for the following piece of image.

240	112	210	100
75	16	15	15
72	251	251	251
71	241	247	85

(7 mark)

d. Describe the use of Fourier Transform (FT) in image processing. (4 mark)

e. Propose any two (02) different methods to automate Sri Lankan currency note detection. (6 mark)

4.

a. Write any three (03) methods to improve the quality of an image. (6 mark)

b. Compare 3x3 Mean and 3x3 Median filter used in Gaussian noise removal. (4 mark)

c. Suggest a method to remove Salt and Pepper noise in an image. (2 mark)

d. Briefly describe how the brightest point of an image can be found. (3 mark)

e. Compare and contrast Low pass and High pass filters. (5 mark)

f. Briefly, explain how median filter works. (5 mark)

5.

a. Briefly describe any two (02) use of edge detection in image processing techniques. (4 mark)

b. Compare and contrast the Canny and Sobel operators in edge detection. (5 mark)

c. Analyze the use of derivation function in edge detection techniques. (4 mark)

d. Discuss the use of edge detection in *Malaria parasite recognition in a blood sample.* (6 mark)

e. Analyze the use of filters to improve the quality of space-related images taken by telescopes like Hubble. (6 mark)

6.

a. Briefly, explain the purpose of morphological operations. (5 mark)

b. Describe the dilation process with the aid of a diagram. (5 mark)

c. State that how morphological operations can be used to detect the boundary of an object with an example (use the notations and equations). (7 mark)

d. State the role of morphological operation in fingerprint matching. (3 mark)

e. Propose a method to extract the region of interest from an raw image. (5 mark)

7.

a. What is meant by segmentation in image processing? (3 mark)
b. Critically argue on the statement "Histograms are useful to segment an image". (5 mark)
c. Compare and contrast the Otsu and Watershed methods. (5 mark)
d. Briefly describe the use of region growing techniques with the help of a sample 5x5 image matrix. (6 mark)
e. Explain the role of segmentation in calculating total values of coins given in Figure 02. (6 mark)

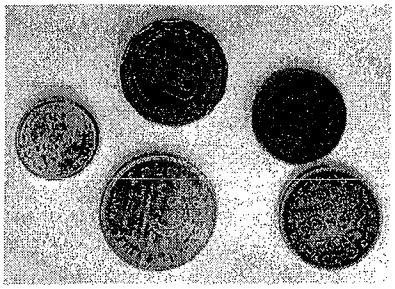

Figure 02: Coins

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