Uva Wellassa University of Sri Lanka
Faculty of Science & Technology
Department of Computer Science & Technology.
CST Degree Programme
Year III Semester II
End Semester Examination – September/October 2012

CST362-3 Digital Image Processing (theory)

Instructions
Answer all eight questions.
No. of questions: Eight (08)
No. of pages: Two (02)
Time: Two hours (2 hr)
Total marks allocated: 20%

Index No:

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1. Determine the number of kilobytes necessary to store an uncompressed gray-scale image of size 640 × 480 pixels using 8 bits per pixel. [5 marks]

2. Answer the following questions about histograms:

   (i) How a histogram depends on the exposure of an image? Describe characteristic features of a histogram of an underexposed, overexposed and properly exposed images. [5 marks]
   (ii) How a histogram depends on the contrast of an image? Describe characteristic features of a histogram of images that have low contrast, high contrast, normal contrast. [5 marks]
   (iii) Explain the goal of histogram specification and describe how histogram specification is done. [10 marks]
   (iv) What kind of histograms are used for color images? [5 marks]

3. What are the similarities and differences between filters and point operations? [10 marks]
4. Explain how a mathematical operation of linear convolution is used to describe linear filters. [10 marks]

5. Describe principles and mathematical operations applied for detection of edges and corners in images. [5 marks]

6. Calculate the amount of memory required to represent a contour with 1000 points in the following ways:

   (i) as a sequence of coordinate points stored as pairs of int values [5 marks]
   (ii) as an 8-chain code using Java byte elements [5 marks]
   (iii) as an 8-chain code using only 3 bits per element [5 marks]

7. Explain what is the "Hough transform", and how it is used. [10 marks]

8. What are the main characteristic features of the following geometric transformations:

   (i) Affine [10 marks]
   (ii) Projective [10 marks]