UNIVERSITY OF CALGARY
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
SCHULICH SCHOOL OF ENGINEERING
ENEL697 DIGITAL IMAGE PROCESSING
TEST NO. 2
WINTER 2008 SESSION
14 April 2008

Instructions:

1. This is a closed-book, closed-notes test.
2. The use of only a nonprogrammable calculator with no text storage facilities is permitted.
3. Answer all four questions.
4. Total marks = 20.
5. Time permitted = 90 minutes.

Question 1: Explain the method of gamma correction with an equation.
Explain the purpose and effects of the method.
(4 marks)

Question 2: Give the equation that defines the grayscale transformation for histogram equalization with discrete gray levels.
Give a step-by-step explanation on how the method may be applied to a given digital image.
Explain the effects, advantages, and disadvantages of the method.
(6 marks)

Question 3: Give the definitions of the Sobel masks for the horizontal and vertical components of the gradient operation.
Using equations, explain how the gradient magnitude and direction may be computed at each pixel in a digital image.
(4 marks)

Question 4: Explain the general methodology of the Hough transform.
Explain how the Hough transform may be used to detect straight lines in a digital image.
Draw an image with three straight lines and the corresponding result expected in the Hough space. Explain the relationship between the image space and the Hough space.
(6 marks)

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