University of Calgary
Department of Electrical and Computer Engineering
Schulich School of Engineering
ENEL 697 Digital Image Processing
Winter 2010 Session — Test No. 2 — 12 April 2010

Instructions:

1. This is a closed-book, closed-notes test.
2. Calculators and other electronic devices are not permitted.
3. Answer all five questions.
4. Total marks = 20.
5. Time permitted = 90 minutes.

Question 1: Explain the split-and-merge method for image segmentation with a step-by-step algorithm. (4 marks)

Question 2: Give a step-by-step algorithm to implement histogram equalization as applicable to a digital image.
Explain the effects, applications, advantages, and disadvantages of the method. (4 marks)

Question 3: Starting from the underlying model based on diffusion in continuous (x, y) coordinates, explain the derivation of the subtracting Laplacian operator.
Give the 3×3 mask to implement the subtracting Laplacian operator to process a digital image.
Explain the effects, applications, advantages, and disadvantages of the method. (4 marks)

Question 4: Using mathematical expressions and equations as required, explain the process of edge linking. (4 marks)

Question 5: Write the mathematical expression for one of the forms of the Wiener filter.
Explain how the filter may be implemented in practice. (4 marks)

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