Guillermo Vargas

Final Exam, Digital Image Processing Spring 2016

Part I.

1. *What does it mean for an image to be “digital”? There are two parts to this answer*

*(explain both).*

The reason why an image is said to be digital, is because of the numeric nature of the data contained in what we call an image on the computer. Whereas in the traditional sense of the word and image is a chemical representation of light intensities on a piece of paper, a digital image is a collection, a matrix of data that contains bits, or the smallest possible element of an image, and within them the light intensities are recorded as numbers, usually from 1 to 255

1. *We have seen how MATLAB is a powerful tool for digital image processing.*

*Explain how linear algebra concepts such as vectors, matrices, matrix multiplication,*

*etc. can be applied to images.*

The very nature of a digital image in itself, that of being a collection of ordered points with numeric values within them, leads to the conclusion that to do any sort of mathemcatical operations to these values, linear algebra must be used. For example, matrix multiplication can be applied when doing a convolution. We multiply a matrix

1. *In the context of geometrically transforming an image, explain the concepts of spatial*

*resampling and pixel value (intensity) interpolation.*

1. *What does a gamma-correction do? What does this have to do with a power-law*

*contrast stretch?*

1. *Explain in qualitative and quantitative terms what happens when you do a principal*

*components transformation to a multispectral image. How is this useful?*

1. *Explain the morphological operations of erosion and dilation.*
2. *What is aliasing? How can it be avoided?*