

Digital Image Processing Qualifying Test

May 2008, based on Gonzalez & Woods, 2nd edition

Use both equations and words to answer the questions. Make sure you define all variables used in equations, including their units.

1. Spatial domain filtering

Describe several different types of linear and non-linear spatial filtering methods.

Under what conditions would each be useful? Include advantages and disadvantages they have.

2. Frequency domain filtering

- Give an equation for the 2-dimensional Fourier transform used for image processing.
- Give the inverse transform.
- How does frequency domain filtering work? (I.e., what are the steps in filtering an image in the frequency domain?)
- Describe several different types of frequency domain filters.
- How do you decide to use a spatial domain or a frequency domain filter for digital image processing?

3. Image restoration

Give a mathematical model for a noisy and degraded image and explain each term.

4. Segmentation

- Explain edge detection using the first order derivative method.
- Explain edge detection using the second order derivative method.

