

EE 715-4.0 Digital Image Processing

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Textbook: Rafael C. Gonzalez and Richard E. Woods, *Digital Image processing*, Addison–Wesley, 1992.

References: A. K. Jain, *Fundamentals of Digital Image Processing*, Prentice Hall, Inc. 1989.

Topics

1. Digital image fundamentals: image representation, sampling, quantization, acquisition, image geometry, stereo image, spatial frequency concepts. Reading: Chapter 1, Chapter 2, and Sections 3.3.8, 3.3.9, (2.0 Weeks). **** Computer assignment 1
2. Image enhancement: histogram modification, image smoothing, sharpening, pseudo-coloring, and color system. Reading: Chapter 4 (1.5 Weeks). **** Computer assignment 2
3. Unitary image transforms: Karhunen-Loeve, Cosine, Walsh, and Hadamard transforms. Applications of these transforms in image convolution, correlation, and image data compression. Introduction to Image Compression Standards and Vector Quantization. Reading: Sections 3.3, 3.5, 3.6, and Chapter 6 (3.0 Weeks). The proposal for the final design project is due on the first class of 6th week. **** Computer assignment 3
4. Image analysis and description: feature extraction, edge tracking and linking (Hough transform, etc.), segmentation, region growing, Morphological processing and some image feature descriptors. Sections: Chapter 7 and Chapter 8, (2.5 Weeks). **** Computer assignment 4
5. Other image processing topics: Motion estimation, optical fields, etc. (1 week)

Computer assignments

1. 2–D sampling theory and image spectrum;
2. Image enhancement with histogram modification and frequency selective processing;
3. Image transforms and compression;
4. Image feature extraction and description;
5. Final Design Project

Grading policy

- Final Project and Presentation: 30%
- Computer projects/home work: 70%

Office Hours

Mon.	Wed.
2:50 pm – 3:50 pm	2:50 pm – 3:50 pm

Or by appointment