EE 416 Introduction to Digital Image Processing

Credits: 3

Categorization of credits: engineering topic

Instructor(s): Todd R. Reed.

Textbook and Other Required Materials:

R.C. Gonzalez, R.E. Woods, and S.L. Eddins. *Digital Image Processing using Matlab (second edition)*, Gatesmark Publishing, 2009.

Designation: Elective

Catalog Description:

Digital Image Representation, Intensity Transformations, Spatial Filtering, Filtering in the Frequency Domain, Image Restoration, Color Spaces and Transformations, The Fast Wavelet Transform, Image Compression. Pre: 315 or consent.

Pre- and Co-requisites: Pre: 315 or consent.

Class/Lab Schedule: 3 hour lecture.

Topics Covered:

- Basic digital image concepts
- Fundamentals of image representation in Matlab
- Intensity Transformations and Spatial Filtering
- Frequency Domain Processing
- Image Restoration
- Color Image Processing
- Wavelets
- Image Compression

Course Objectives and Relationship to Program Objectives:

Students should be able to (i) understand and analyze image processing problems and (ii) design algorithms to solve image processing problems and meet design specifications [1, 2, and 4].

Course Outcomes and Their Relationship to Program Outcomes

The course outcomes are closely related to the topics covered

- Understand the relevant aspects of digital image representation and their practical implications [1].
- Have the ability to design pointwise intensity transformations to meet stated specifications. [1, 2, 4, 6]
- Understand 2-D convolution, the 2-D DFT, and have the abitilty to design systems using these concepts. [1, 2, 4, 6]
- Have a command of basic image restoration techniques [1].
- Understand the role of alternative color spaces, and the design requirements leading to choices of color space [1, 2, 4, 6].
- Appreciate the utility of wavelet decompositions and their role in image processing systems [1].
- Have an understanding of the underlying mechanisms of image compression, and the ability to design systems using standard algorithms to meet design specifications [1, 2, 4, 6].

Contribution of Course to Meeting the Professional Component

Engineering topics: 100%.

Computer Usage:

Matlab is used throughout the course.

Design Credits and Features:

EE416 has 1 design credit. Homework problems require the solution of open-ended design problems (problems for which multiple approaches can be taken to reach the stated objectives).

Person(s) Preparing Syllabus and Date: Todd R. Reed, 10/2/14. Y. Dong, June 14, 2021.