

EECS 207
Spring 2021

Lecture 1
Introduction

Today

- Introductions
- Course specifics
- Overview

Reading Assignments

- By Thurs. Jan. 21:
 - Chap. 1: Introduction
 - Chap. 2: Digital Image Fundamentals
 - Chap. 4: Filtering in the Frequency Domain
 - Section 4.1: Background
 - Section 4.2: Preliminary Concepts
 - Section 4.3: Sampling and the Fourier Transform of Sampled Functions
 - Section 4.4: The Discrete Fourier Transform of One Variable
- By Tues. Feb. 2:
 - Section 4.5: Extensions to Functions of Two Variables.
 - Section 4.6: Some Properties of the 2-D DFT and IDFT

Introductions

- Program (MS or PhD)
- Year (1st, 2nd, ...)
- Taken:
 - Image processing course?
 - Computer vision course?
 - Signal processing course?
- Advisor
- Research/project

Course Specifics

- Course website
 - <http://faculty.ucmerced.edu/snewsam/EECS207>
- Schedule
- Preparation
- Matlab/Python

Overview

- Q: How does JPEG compression work?

Overview

- Filtering in the frequency domain (chap. 4):
 - Continuous and discrete Fourier transform in one dimension.
 - Extension to two dimensions.
 - Filtering in the frequency domain:
 - Smoothing, sharpening.
 - Fast Fourier transform.

Overview

- Image restoration and reconstruction (chap. 5):
 - Noise reduction.
 - Image reconstruction from projections.

Overview

- Wavelets and multiresolution processing (chap. 6):
 - Multiresolution expansions.
 - Wavelet transforms in one dimension.
 - Extension to two dimensions.

Overview

- Image compression (chap. 8):
 - Fundamentals:
 - Redundancy, information theory basics, image fidelity.
 - Basic compression methods.
 - Digital image watermarking.

Overview

- Image representation (tentative):
 - Texture:
 - Gray-level co-occurrence matrices.
 - Gabor filters.
 - Markov random fields.

Overview

- Content-based image retrieval (tentative)
- Audio analysis