



E9 246 Jan 3:1

Advanced Image Processing

Instructor

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Department: EE

Course Time: 10:00 - 11:30 am, Tues, Thurs

Lecture venue: EE 218

Detailed Course Page:

Announcements

Brief description of the course

The objective of this advanced course is to provide a sense of the state of the art image processing techniques in various real world scenarios such as smartphone camera pipelines, image search on the internet, surveillance, and so on. The course can be taken by second semester masters or doctoral students who have had prior experience in image processing either through a course or projects.

Prerequisites

Digital Image processing

Syllabus

Image Features - Harris corner detector, Scale Invariant Feature Transform (SIFT), Speeded Up Robust Features (SURF), edge detection, Hough Transform

Image Enhancement - Noise models, image denoising using linear filters, order statistics based filters and wavelet shrinkage methods, image sharpening, image super-resolution

Image Segmentation - Graph-based techniques, Active Contours, Active Shape Models, Active Appearance Models

Image Compression - Entropy coding, lossless JPEG, perceptually lossless coding, quantization, JPEG, JPEG2000

Image Quality - Natural scene statistics, quality assessment based on structural and statistical approaches, blind quality assessment

Statistical tools - Kalman Filter, Hidden Markov Models

High Dynamic Range (HDR) Imaging - Multi-exposure fusion for static and dynamic scenes, low light image enhancement, retinex methods, dark channel prior, defogging

Object representation and recognition

Course outcomes

Students are expected to have an understanding of and implement various advanced image processing algorithms and analyze their performance on datasets to make improvements. This is achieved through a series of hands on assignments and projects.

Grading policy

25% for Assignments

10% for Midterm Project

15% for Midterm Exam

50% for Final Exam and Final Project

Assignments

Resources