CS 4984 Computer Vision: A First Class

Instructor: Francis Quek


About the Class
Computer vision is about the understanding of digital images and videos. In this class, students will be introduced to the fundamentals of image formation, low-level processing of images, and selected topics on dealing with multiple cameras/video streams and mid-level vision. Students are expected to have a grasp of mathematics and linear algebra for the class.

The class is intended for seniors and graduate students.

Topics
Image Formation and Image Models
- Cameras
- Geometric Camera Models
- Geometric Camera Calibration
- Radiometry --- Measuring Light
- Sources, Shadows and Shading
- Color
Early Vision: Just One Image
- Linear Filters
- Edge Detection
- Texture
Early Vision: Multiple Images (Selected Topics)
- The Geometry of Multiple Views
- Stereopsis
- Affine Structure from Motion
- Projective Structure from Motion
Mid-Level Vision (Selected Topics)
- Segmentation by Clustering
- Segmentation by Fitting a Model
- Segmentation and Fitting using Probabilistic Methods
- Tracking with Linear Dynamic Models

Projects
There will be a series of four to five projects in the class, as well as final project. Projects will be done in teams (size dependent on class size). These projects will determine 60% of the course grade. The final project will be worth 30% of the final grade, and the other projects will be evenly weighted.

Projects will be graded by project reports and a demonstration.

Students select the final project in consultation with the instructor. Projects ideally should be related to the students’ areas of research interest.

Exams
There will be a mid-term and final exam worth 10% and 30% of the course grade respectively, and will cover material covered in the course.

Prerequisites
CS 2604, Math 2214 & 2224