CS 5330 Pattern Recognition and Computer Vision

Spring 2025

Instructor Information:

Prof. Bruce A. Maxwell
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Office hours: R 3-4pm ET / noon-1 PT and F 5-6pm ET / 2-3pm PT
Email b.maxwell@northeastern.edu to schedule alternative times

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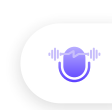Srijan Dokania: dokania.s@northeastern.edu
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Office hours schedule and links ⇗
(https://docs.google.com/spreadsheets/d/1j_TUIQC5Vvo6J5DqzU68aW-
FYIhj3TqqMe9qCOZ6tyk/edit?usp=sharing)

Time/Location:

Time: Wed 5-8:20pm ET / 2-5:20pm PT
Location: Zoom

Course Description

Introduces the fundamentals of extracting information from digital images. Major topics include image formation and acquisition, gray-scale and color image processing, image filters, feature detection, texture, object segmentation, classification, recognition, stereo, optical flow, motion estimation, and object detection and recognition. The course will cover both classical and modern computer vision techniques built on deep networks.

Students will learn by developing small and medium-scale vision systems to solve practical problems such as image filtering, content-based image retrieval, image stitching, augmented reality, and object recognition.

Course Goals

- Students understand the fundamentals of image formation and image acquisition, including camera calibration.

- Students understand and can implement image processing algorithms such as filtering, morphological operations, connected components, and feature detection.
- Students understand and can implement algorithms for segmentation, detection, tracking, and classification of objects.
- Students understand and can implement systems using deep networks to solve computer vision tasks such as object recognition and localization.
- Students work in a group to design and develop a medium-sized image analysis and computer vision application.
- Students present algorithms and results in an organized and competent manner, both written and orally.

Useful Resources

- **Maxwell's lecture notes (https://northeastern.instructure.com/courses/206145/files/3163933 wrap=1)** ↓ **(https://northeastern.instructure.com/courses/206145/files/31639338/download? download_frd=1)**
- Maxwell's weekly topics
- **Computer Vision: Algorithms and Applications, 2nd ed.** ⤷ **(http://szeliski.org/Book/)**, Rick Szeliski
- **OpenCV** ⤷ **(http://opencv.org)**: computer vision SDK.
- **CVOnline** ⤷ **(http://homepages.inf.ed.ac.uk/rbf/CVonline/)**: computer vision resources.
- **Computer Vision Foundation** ⤷ **(http://www.cv-foundation.org)**: computer vision papers and community news.
- **Computer Vision Papers** ⤷ **(http://www.cvpapers.com)**: more CV papers
- **PyTorch deep learning toolkit** ⤷ **(https://pytorch.org)**