

CAP 4453 Section: On-line Robot Vision

Fall 2019

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Course Topics: Processing Edges; Object Detection; Motion Processing; Convolutional Neural Networks; Deep Networks; Review of Current Research Topics

Pre-requisites: COP 3503C and MAC 2312, or C.I.

Textbook: All materials are provided electronically. No Textbook.

Evaluation:

1 in-class test (35%); 5 programming assignments (30%); 1 project (35%).

Based on total score, grades are given as: W, A(>94), A-(>90), B+(>87), B(>83), B-(>80), C+(>77), C(>73), C-(>70), D+(>67), D (>63), D-(>=60), F (<60) and I (rarely)

Course Learning Outcomes:

- Become familiar with algorithms for edge detection, object detection using AdaBoost, motion computation, convolutional neural networks for multi-class recognition.
- Write programs for vision.
- Orally present explanations for a recent vision research paper.
- Become familiar with the process of reading a recent vision research paper.
- Use existing vision libraries to demonstrate vision capabilities.

Course Abstract: The study of mechanical vision is one of the few areas of science which blends one's intuition with formal methods. Vision (whether in humans or machines) is fundamentally a computational process. Visual processes for machines must be able to deliver the kinds of capabilities that humans have: scene recognition, motion processing, navigational abilities, and so forth. This course will begin by examining some of the elementary concepts in machine vision. Subprocesses to be examined include: edge detection, object detection, motion analysis, and convolutional neural networks for machine vision. The student will be exposed to unsolved problems in these topics, the solutions to which have very high technological pay-offs. The workload consists of interesting reading, programming, a test and a report on a recent research publication. This class is suitable for undergraduate students in Computer Science and Engineering disciplines, and anyone else who wishes an introduction to machine vision.