COMP 4102: Computer Vision

Winter, 2020

Instructor: Rosa Azami

Office Hours: ....

Office: HP

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Class Hours: T/Th 10:05 - 11:25 am

Class Room: Minto Centre 5050

Teaching Assistant: TBD

Course Description

This course introduces the fundamental principles and techniques of computer vision. Topics include: digital image formation and processing, detection and analysis of visual features, camera models and calibration, structure from motion, stereo, segmentation, object detection, recognition and applications.

Prerequisites/Corequisites

Basic linear algebra and calculus, programming in C/C++ or Python.

Resources

- Course notes are available on cuLearn.

- Computer Vision: Algorithms and Applications by Richard Szeliski, Springer, 2011. (available on MacOdrum online library)

Software

You will need to use OpenCV. You can download the latest version from here: https://opencv.org/releases/

Topics Covered

The course will cover the following topics, although some material may be omitted due to time constraints:

1. Introduction

2. Image formation

3. Image filtering

4. Feature detection

5. Camera

6. Stereo and multi-view geometry and reconstruction

7. Structure from motion

8. Reconstruction and 3D shape

9. Object detection and face recognition

Learning Outcomes

At the end of this course, students will be able to:

- Explain the basic terms, concepts and applications of computer vision, including reference to at least one real-world system.

- Apply basic mathematical techniques to solve problems in computer vision.

- Develop software to solve problems in computer vision.

Evaluation

Grading scheme:

- **30%** Assignments (approximately every three weeks)

- **20%** Midterm: around February

- **30%** Final exam

- **20%** Course project: due at the end of classes

Late assignments policy

Assignment deadlines are strict. The following scheme is applied to late submissions (which includes assignments and the final course project):

- 3 hours late: no penalty

- 3 to 12 hours late: -10%

- 12 to 24 hours late: -20%

- More than one day late: assignment receives a grade of zero

CS Undergraduate Academic Advisor

The undergraduate advisor for the School of Computer Science is available in Room 5302C HP, by telephone at 520-2600, ext. 4364 or by email at undergraduate advisor@scs.carleton.ca. The advisor can assist with information about prerequisites and preclusions, course substitutions/equivalencies, understanding your academic audit and the remaining requirements for graduation. The undergraduate advisor will also refer students to appropriate resources such as the Science Student Success Centre, Learning Support Services and the Writing Tutorial Services.

Centre for Student Academic Support (CSAS)

The Centre for Student Academic Support (CSAS) is a centralized collection of learning support services designed to help students achieve their goals and improve their learning both inside and outside the classroom. CSAS offers academic assistance with course content, academic writing and skills development. Visit CSAS on the 4th floor of MacOdrum Library or online at: https://carleton.ca/csas/.

University Policies

Student Academic Integrity Policy

Every student should be familiar with the Carleton University student academic integrity policy. A student found in violation of academic integrity standards may be awarded penalties which range from a reprimand to receiving a grade of F in the course or even being expelled from the program or University. Some examples of offences are: plagiarism and unauthorized co-operation or collaboration. Information on this policy may be found in the Undergraduate Calendar.

Plagiarism

As defined by Senate, "plagiarism is presenting, whether intentional or not, the ideas, expression of ideas or work of others as one's own". Such reported offences will be reviewed by the office of the Dean of Science.

Unauthorized Co-operation or Collaboration

Senate policy states that "to ensure fairness and equity in assessment of term work, students shall not co-operate or collaborate in the completion of an academic assignment, in whole or in part, when the instructor has indicated that the assignment is to be completed on an individual basis". Please refer to the course outline statement or the instructor concerning this issue.

Requests for Academic Accommodation

You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows:

Pregnancy obligation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

Religious obligation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

Academic Accommodations for Students with Disabilities

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. https://carleton.ca/pmc/

Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and is survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: https://carleton.ca/sexual-violence-support/

Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf

For more information on academic accommodation, please contact the departmental administrator or visit: students.carleton.ca/course-outline