UNIVERSITY of GUELPH

COLLEGE of ENGINEERING AND PHYSICAL SCIENCES

SCHOOL OF COMPUTER SCIENCE

CIS*4720 Image Processing and Vision
W23 (3-1) [0.50]
Course Outline

Website:
See *CourseLink*.

Lectures:
MON, WED, FRI, 10:30am to 11:20am, MCKN 121
First lecture Jan 9, last one Apr 10, no lectures Feb 20, 22, 24 and Apr 7

Labs:
FRI, 1:30pm to 2:20pm, MCKN 029
First lab Jan 13, last one Apr 10, no labs Feb 24 and Apr 7

Regular Office Hours:
FRI, 2:30pm to 3:30pm, REYN 0003
First OH Jan 20, last one Apr 10, no OHs Feb 24 and Apr 7

Instructor:
Pascal Matsakis

Teaching Assistants:
Nishith Bharatkumar Gajjar, Yukun Shi

Contact:
1 – cis4720@socs.uoguelph.ca (Yukun Shi)
for questions regarding the course material (i.e., lectures, labs, assignments, project, midterm) as well as for regrade requests and other questions regarding your grades.
2 - pmatsaki@uoguelph.ca (Pascal Matsakis) for all other issues, e.g., course delivery, evaluation method, conflict with the teaching assistant, personal issues, administrative issues.

Description

Synopsis

This course is an introduction to image processing. Emphasis is placed on topics such as image enhancement, segmentation, morphological analysis, texture analysis, visualization and image transformations. Applications of image processing in medicine, forensics, food and security are surveyed.

Prerequisites

CIS*2750, CIS*3110, (CIS*2460 or STAT*2040)

Topics

Image representation, sampling, quantization, bilinear interpolation, connected components, distance measures, arithmetic / logic operations, image enhancement, histogram equalization, gray-level mappings, convolution, spatial filtering, lowpass / highpass filtering, linear / nonlinear filtering, segmentation, point / line / edge detection, basic global thresholding, boundary following, polygonal approximations, texture descriptors, minimum distance classifier...

Learning Outcomes

On successful completion of this course, you will be able to:

- appreciate the role of image processing and computer vision in the real world;
- establish an understanding of the principle concepts and algorithms associated with image processing and computer vision;
- apply image processing and computer vision algorithms to real world problems;
- design and implement image processing and computer vision algorithms, and extend existing algorithms from the literature.

Recommended Text

Gonzalez, R. C., Woods, R. E., *Digital Image Processing,* Pearson, 2018

Evaluation

Grading Components

Assignments (15%)
There will be 3 assignments. They will all have the same weight. Each submission must be in the form of a single *pdf* file uploaded via the *Dropbox* tool in *CourseLink*. The ordering of questions

must be preserved. It is your responsibility to ensure that your answers are easily legible; an answer that is not easily legible may receive a mark of zero. Only in exceptional circumstances will excuses for missed deadlines or requests for extensions be entertained. Any such excuse or request must be presented to the course instructor as soon as possible. The only remedy available for missed assignment is redistribution of its weight to other components (at the discretion of the instructor).

Project (30%)
You will be regularly required to write computer programs, and these programs will have to be demoed all together at the end of the term.

Midterm Examination (25%)
This is a closed-book test on all material covered in the lecture and lab classes. Only in exceptional circumstances will excuses for missed test be entertained. Any such excuse must be presented to the course instructor as soon as possible, with all supporting documentation. The remedies available for missed test are redistribution of its weight to other components, or make-up test (at the discretion of the instructor).

Final Examination (30%)
This is a closed-book test on all material covered in the lecture and lab classes. It will be composed of multiple choice and/or short answer questions.

Regrade Requests

If you feel you deserved a better grade on an assignment or on the midterm exam, you may submit a regrade request. The request must be e-mailed to the teaching assistant and received within seven calendar days of the grade being posted on *CourseLink*. You are therefore encouraged to review the solutions as soon as possible, and to make sure your work has been correctly graded and your grade correctly recorded. The request must be submitted with a clear and sound explanation of why you feel the original grade was unfair. Note that a regrade request may result in your entire work being regraded, and the revised grade may be higher or lower than the original grade.

Deadlines

Assignments

Assignment 1:	Sun Jan 29, 11:59pm
Assignment 2:	Sun Mar 19, 11:59pm
Assignment 3:	Sun Apr 02, 11:59pm

Project
All projects will be demoed between Mar 27 and Apr 20.

Examinations

Midterm examination (Part A):	Wed Mar 1, in class, 10:30am to 11:20am, MCKN 121
Midterm examination (Part B):	Fri Mar 3, online, 50 minutes between 10:30am and 11:59pm
Final examination:	Fri Apr 14, online, 8:30am-10:30am

Other

E-Mail Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students. Use your <uoguelph.ca> account (not any other account) to contact the teaching assistant or instructor. When contacting the instructor, start the subject of your message with the number 4720.

Electronic Devices

Turn off and store away all electronic devices (e.g., laptops, tablets, calculators, mobile phones, cameras, video recorders, audio recorders) before you walk into the classroom. The only exceptions are devices used with a stylus for note-taking. Note-taking must then be the only use of the device. Photos, videos and audio recordings are not permitted during lectures and labs.

Academic Misconduct

You are expected to work on each problem on your own and present your own solution. The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor. Please review the Academic Misconduct Policy detailed in the Undergraduate Calendar:

https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-misconduct/

Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student. When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway. Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability. Use of the SAS Exam Centre requires students to make a booking at least 7 days

in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time. Please see: http://www.uoguelph.ca/sas

Drop Date

The last day to drop CIS*4720 is Apr 10, 2023. The regulations and procedures for dropping courses are available here: https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/dropping-courses/

Resources

The Academic Calendars (https://www.uoguelph.ca/registrar/calendars/) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.