M1522.001000 Computer Vision

Time: Monday/Wednesday 3:30∼4:45 PM
Location: Building 302 Room 208
Lecturer: Gunhee Kim (gunhee@snu.ac.kr)
Office Hour: Wednesday 11:00∼12:30 PM (only by appointment)
TA: Fatemeh Pesaran and Dayoon Ko (ta.cv@vision.snu.ac.kr)

Grade

1. Quiz every week (20%), five homework assignments (50%), and final term project (30%). No midterm and final exam.
2. Final grads will be assigned based on the earned scores. A: 4-50%, B: 3-40%, C or below: 20% (subject to change according to the University's rule).

Course description

Today, much of everyday-life information is represented visually and processed digitally. Digital imaging is ubiquitous, with applications including photography, television, movies, tomography, printing, robot perception, surveillance, and many more. This is an undergraduate-level introductory course to the fundamentals of computer vision and digital image processing. We expect to cover topics including light and color, image formation, image pyramid, filtering, warping, mosaics, alignment and tracking, stereo vision, and machine learning based face and object recognition.

Policy

1. (Quota Exceeding Course Registration) We will accept all requests, so simply apply via mysnu. Do not email us.
2. This course will be done in a way of **flipped learning**. All lectures are delivered as recorded videos for the whole semester. Please come to class room every **Wednesday** to take the quiz.
3. Assignments will be posted via ETL.
4. If you have any homework questions, please use the board of ETL.
5. Students are allowed to discuss with others about the problems, but must hand in their own answers.
6. We do **NOT** learn **deep learning**.
7. Every student is allowed **3** total homework **late days** without penalty for the entire semester.
   (a) The deadline of homework is at the beginning of class on the due date.
   (b) After the deadline, any delay less than 24 hours will accrue to the use of 1 late day.
   (c) After using up all late days, your credits will be half every 1 day.

Notes

1. This course is based on 15-385 Computer Vision that the instructor TA'ed in CMU. We are extremely grateful to the researchers who allow us to use or modify their slides for this course: Srinivasa Narasimhan.
2. Please do also acknowledge the original sources where appropriate.

Project

Information

1. The objective is to apply the techniques learned in this course to your own research or real-world problems. Projects should be done in teams of 3–4 students.
2. All write-ups should be written in CVPR style. In order to earn full scores, projects should submit 3 deliverables in **English**.
   (a) Team-up. Due: 10/4
   (b) Proposal (20%) Due: 10/25
   (c) Presentation (30%) Date: 12/13
   (d) Final report (50%) Due: 12/17

Proposal

1. Proposals should be approximately **1–2 pages** long, and should include the following information: Project title, list of group members, overview of project idea, a short survey of relevant papers, and description of potential data sets for experiments.

Final Report

1. Final reports should be approximately **4–8 pages** long, and should include the following information: introduction (problem definition and motivation), background and related work, methods, experiments, and conclusion (discussion and future work).

Presentation

1. All project teams will present their work at the end of the semester. Due to COVID-19 pandemic, each team needs to record their presentation in about 8–10 minutes and submit to TA before the deadline. (This plan is subject to change). All members of each team must participate in the presentation. Live demonstrations will earn bonus points.

Course Outline

The weekly coverage may change as it depends on the progress of the class.

Date	Lecture	Homework
9/4	Introduction to Computer Vision	
9/6	Image Processing	
9/11	Frequency Domain Analysis	
9/13	Image Sampling and Pyramid	
9/18	Edge Detection	HW1 Out
9/20	Hough Transform	
9/25	Active Contours	
9/27	Appearance	
10/2	Photometric Stereo	HW1 Due
10/4	Camera I	HW2 Out
10/9	Hangul day (**No class**)	
10/11	Camera II	
10/16	Calibration	
10/18	Feature I - Color and texture	HW2 Due
10/23	Feature II - Keypoint Detection and Description	HW3 Out
10/25	Image Alignment	
10/30	Image Mosaic	
11/1	Stereo I - Epipolar Geometry	
11/6	Stereo II - Depth Estimation	HW3 Due
11/8	Optical Flow	HW4 Out
11/13	Lucas-Kanade Tracking	
11/15	Grouping and Clustering	
11/20	Segmentation I - Mean Shift, Watershed	
11/22	Segmentation II - Graph-based methods	HW4 Due
11/27	Image Categorization	HW5 Out
11/29	Classification I - KNN and Naive Bayes	
12/4	Classification II - SVM	
12/6	Object Detection	
12/13	Project Presentation	HW5 Due
12/17	Project Report	