CS688/WST665
Web-Scale Image Retrieval and Classification

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(윤성의)

Course URL:
http://sglab.kaist.ac.kr/~sungeui/IR
About the Instructor

- Joined KAIST at 2007

- Main research focus
  - Handling of massive data for various computer graphics and geometric problems
  - Paper and video: [http://sglab.kaist.ac.kr/papers.htm](http://sglab.kaist.ac.kr/papers.htm)
  - YouTube videos: [http://www.youtube.com/user/sglabkaist](http://www.youtube.com/user/sglabkaist)
My Recent Work

Fig. 1. This figure shows an overview of our IRJW framework.
About the Instructor

● Contact info
  ● Email: sungeui@gmail.com
  ● Office: 3432 at CS building
  ● Homepage: http://sglab.kaist.ac.kr/~sungeui
Class Information

- **Class time**
  - 4:00pm ~ 5:15pm on TTh

- **Office hours**
  - Right after the class time
  - You can make arrangements by sending emails

- **TA**
  - 이협우, leehyeopwoo@kaist.ac.kr, Room 2106
About the Course

- We will focus on the following things:
  - Broad understanding on image (and video) retrieval techniques and classification
  - In-depth knowledge on recent methods for web-scale data
  - Design better technologies as your final project
Content-Based Image Retrieval (CBIR)

- Identify similar images given a user-specified image or other types of inputs
Content-Based Image Retrieval (CBIR)

- Identify similar images given a user-specified image or other types of inputs

Input:
- Extract image descriptors (e.g., SIFT)

Web-scale image database

Output:
Applications

- Search
- Image stitching
- Object/ scene/ location recognitions
- Robot motion planning
- Copyright detection
Panorama Stitching

(a) Matier data set (7 images)

(b) Matier final stitch

[Brown, Szeliski, and Winder, 2005]

http://www.cs.ubc.ca/~mbrown/autostitch/autostitch.html
Object Detection

PASCAL challenge
Robot Motion Planning

Autonomous robot vision 1

Autonomous robot
http://www.youtube.com/watch?v=3SQiow-X3ko
Issues for Web-Scale Multimedia Search

- Too many multimedia data and frequent updates
- Accuracy?
- Performance?
- Novel applications?
What if I meant different products of “Apple” computer?
It took a few seconds to get this result on my desktop computer.
Some of Topic Lists

- Feature detectors
- Descriptors
- Quantization
- Nearest neighbor search
- Bag-of-Word
- Visual vocabulary
- Object categorizations
- Generative and discriminative models
- Hashing techniques
- Text-based retrieval systems
- Large-scale retrieval indexing techniques
- Video related techniques
- Various applications
Prerequisites

- Basic knowledge of linear algebra and data structures
  - No prior knowledge on computer graphics and computer vision

- If you are not sure, please consult the instructor at the end of the course
Course Overview

- Half of lectures and other half of student presentations
  - This is a research-oriented course

- What you will do:
  - Choose papers and present them
  - Propose ideas that can improve the state-of-the-art techniques
  - Quiz, mid-term, final-term exams, and
  - Have fun!
Course Overview

- **Grade policy**
  - Quiz, assignment, and exams: 30%
  - Class presentations: 30%
  - Final project: 40%
  - **Class presentation and projects are the most important activities in this class**

- **Instructor and students will evaluate presentations and projects**
  - Instructor: 50% weights
  - Students: 50% weights
Presentations

- Read papers
  - Given a main paper, read two or three related papers
  - Look at pros and cons of each method
  - Think about how we can efficiently more realistic and complex search and classification issues, and think about novel applications
Final Project

- Propose ideas to address problems identified from your presentation papers
  - Show benefits of your ideas and how your ideas can improve the state-of-the-art techniques in a logical manner
  - Implementation of your ideas is not required, but is recommended

- Team project is allowed
  - Role of each student should be very clear
Course Awards

- Best speaker and best project
- A small gift will be given to the best speaker
- A high grade will be given to members of the best project
Programming HWs and Exams

- Two programming assignments
  - Implement basic image search components

- Late policy
  - No score for late submissions
  - Submit your work before the deadline!

- Two exams
  - Mid-term exam covers class materials
  - Final-term exam covers presentation materials of students
Honor Code

- Collaboration encouraged, but *assignments must be your own work*
- Cite any other’s work if you use their code
Question HWs for Every Class

- Come up with one question in the class and submit at the end of the class
  - 1 for typical questions (that were answered in the class)
  - 2 for questions with thoughts or that surprised me

- Write questions at least 4 times
  - Write a question per month
  - Multiple questions in one time will be counted as once

- Common questions are addressed at my draft
  - Some of questions will be discussed in the class

- If you want to know the answer of your question, ask me or TA on person
Homework for Every Week

● Go over recent papers on image search
  ● Those should be high quality and recent ones
  ● Find two papers, and submit your summary before every beginning of the Thur. class
  ● Online submission is possible

● Think about possible team members
● Too late if you think them later..
Class Attendance Rule

● Late two times → count as one absence
● Every two absences → lower your grade (e.g., A- → B+)

● To check attendance, I’ll call your names

● If you are in situations where you should be late, notify earlier
Resource

- My ongoing draft on image search
  - pdf file is available at the webpage

- Reference
  - Computer vision: algorithms and applications
  - Its file is available (http://szeliski.org/Book/)
Other Resources

- Technical papers
  - CVPR, ICCV, ECCV, ACM MM, SIGGRAPH, etc.

- Course homepages
- Google or Google scholar
Schedule

- Please refer the course homepage:
  - http://sglab.kaist.ac.kr/~sungeui/IR
Official Language in Class

- **English**
  - I’ll give lectures in English
  - I may explain again in Korean if materials are unclear to you
  - You are no required to use English, but are recommended

- **To non-native Korean speakers**
  - Many Korean students prefer to use Korean for deeper discussions
  - In these cases, we will use Korean, but I will summarize main points in English
My Wish for You

- Follow up lecture materials and do various class activities/ HWs well
- Lead to your next publication, or
- Lead to your next start-up
Next Time

- Feature detectors
About You

- Name
- Your (non hanmail.net) email address
- What is your major?
- Previous experience on image retrieval and computer vision
- Credit/ audit