CS 598KN
Advanced Multimedia Systems
Lecture 1 - Introduction

Klara Nahrstedt
Fall 2018
Overview

- Course information (personnel, policy, schedule, misc.)
- What is happening in Multimedia domain?
- Review of Human Visual System and Digital Imaging
- Summary
Instructor

Klara Nahrstedt

- PhD 1995 from Department of Computer and Information Science, University of Pennsylvania

- Research:
  - Multimedia networking (routing, QoS management, pricing),
  - Multimedia distributed systems (overlay multicast, peer-to-peer systems, service composition, resource management),
  - Mobile computing – smart phones protocols – P2P, video streaming over mobile phones, group management, …
  - Multimedia operating systems (soft-real-time scheduling, caching),
  - Multimedia applications (video 360, multi-view 3D tele-immersive systems, multi-camera systems, collaborative environments, mobile multimedia, P2P IPTV)
  - Multimedia and critical infrastructure security (watermarking, real-time security)
  - Cloud computing/Edge Computing/IoT
Course Logistics

Office Assistant:

- Alice Needham (aeneedha@illinois.edu)

Teaching Assistant: No TA

- Any questions you have, please, email instructor klara@illinois.edu with subject line “CS598KN”
- Postdoctoral fellow Dr. Jousup Park (jounsup@illinois.edu) will present/proctor/evaluate the class presentations when I am on travel

Class Time:

- Tuesday and Thursday 2:00-3:15pm

Class Place:

- 1131 Siebel Center
Course Logistics

- **Instructor Office Hours:**
  - Tuesday and Thursday 3:15-4pm
  - 3104 Siebel Center
  - Phone: 217-244-6624

- **Class Website – Reading List:**
  - [https://courses.engr.illinois.edu/cs598kn/fa2018/](https://courses.engr.illinois.edu/cs598kn/fa2018/)

- **Discussion, Announcements, and Postings:**
  - [https://piazza.com/illinois/fall2018/cs598kn/home](https://piazza.com/illinois/fall2018/cs598kn/home)

- **Grading Center:**
  - [https://compass2g.illinois.edu/](https://compass2g.illinois.edu/)
Required Readings for CS 598kn

- Papers in Reading List (posted on class website)
  - https://courses.engr.illinois.edu/cs598kn/fa2018/ReadingList/ReadingList-cs598KN-Fall2018.htm

- Lectures and Discussion in class
  - Papers in class plus optional papers

- Auxiliary Text:
  - *Multimedia Systems*, Ralf Steinmetz, Klara Nahrstedt, Springer Verlag, 2004
Course Prerequisites

- It is helpful if you have taken at least one of these classes in your undergrad studies
  - CS 425 (distributed systems undergrad) and/or
  - CS 438 (networking systems undergrad)
Goal of the Course

- Expand breath of knowledge in the area of multimedia systems through
  - Learn new multimedia-specific system and networking concepts
  - Learn new mathematical and design tools to model and design complex systems that run multimedia

- Learn scientific tools for your MS/PhD theses
  - Learn how to critique scientific papers
  - Learn how to prepare and present a scientific work as lecture
  - Learn how to present related work
  - Learn how to prepare project proposal
  - Learn how to prepare project presentation and final project report
Class Format

- Class will consist of partially
  - lecturing by instructor and
  - lecturing by students based on reading list
  - paper discussions

- Students responsibility
  - Attend lectures
  - Read papers!!
  - Work on reviews, evaluation, midterm exam, project, lectures
  - Look for new material and post on piazza when you find interesting papers, tools, other material to share
Workload (1)
The course will have four major tasks to do:

- **Lecturing**
  - Student chooses and presents during the semester 2 papers from the reading list, but sends 4 papers selected to instructor (if the first two papers are not available, the following papers on the list will be considered in the order)
  - Email your list of papers to klara@Illinois.edu, subject line: “CS598KN – Paper selection”
  - Paper assignment will be on a first-come-first-serve policy
  - Student presents the papers in class
  - Instructor evaluates the lectures
Workload (2)

Paper Reviews and Evaluation of Reviews

- **Peer-reviewed**
  - Everybody prepares review of paper that he/she presents
  - Presenter posts the review and presentation on the piazza board for everybody to see.
  - Review and presentation will be evaluated by instructor
Workload (3)

- Take-Home Midterm Exam (One Week)
  - Questions will be asked from Lectured material and papers presented prior to exam
  - Problems will include material covered in papers and lectures to answer the midterm questions
Workload (4)

- **Final project** will include three parts:
- 1. project proposal
- 2. project presentation in class
- 3. project paper
Lecturing

- Each student needs to present two papers during the semester
  - Each student submits her/his choice of papers
    - Provide primary (first 2) and secondary choices (other 2 papers) for each lecture
    - See class website for reading list and papers to be presented by students
    - Selection of papers will be based on First Come First Serve
      - IF THERE IS STILL OVERLAP, I WILL REASSIGN PAPERS
    - Submit the choices of papers by email to klara@illinois.edu
    - Assignments will be posted on the class website in the Reading List

- Deadline of paper choices: Saturday, September 1
Lecture Format (1)

- Every paper presentation should be **25 minutes maximum** to leave at least 5-10 minute for discussion

- You should plan 1-2 minutes per slide, so having around 15-20 slides
  - Use simple strong contrast colors
  - Do not make the slide too busy

- **Post your slides on piazza before lecture**
  - Piazza -> cs598kn -> resources ->Lecture notes
Lecture Format (2)

- Your presentation should include
  - Motivation of the problem (why are we looking at this issue? What is the environment where the problem resides?)
  - Problem Description (What is the problem and what are the challenges of the problem?)
  - Background (How did other people solve this problem and why isn’t this enough?)
  - Novel approach (solution described in the paper)
  - Validation of approach
  - Conclusion with Pros and Cons of Paper
Paper Reviews

- Each student reviews papers that he/she presents from the class reading list
  - Use the review format as specified in this lecture
  - Post the review on piazza under reviews_comments folder

- Deadline for each Review is day before the paper is presented (11:59pm)

- Instructor evaluates the presentation/review
Peer Reviews Format

- Review should include:
  - Title, authors, venue of the published paper
  - Short overview of the paper (what is the main idea of the paper) – few sentences
  - 3-5 pros items – positive sides of the paper – why was the paper accepted
  - 3-5 cons items – negative sides of the paper – what are still missing pieces of the work;
  - Comments on how would you improve the paper?

- Note: review should be $\frac{1}{2}$-1 page long; write full sentences and be clear (don’t just put keywords)
Evaluation of Reviews

- Summary of the paper (concise description of the idea)
- The pros and cons items if they are valid
- Improvement suggestions to the paper
- What the reviewer has done well and what could be improved
Take-Home Midterm Exam

- Midterm exam will be
  - Posted on October 23 (Tuesday 8am)
  - Due on October 30 (Tuesday 8 am)

- Use lectures, web material and papers to find answers

- Submit midterm-exam solutions in pdf format to klara@illinois.edu, subject line: “CS598kn – Midterm”
Final Project (1)

- Each student must work on a **class project** in multimedia system/network area
  - Consider continuation of your research projects if it has multimedia context
  - Consider exploring new topic towards your research
  - Come and see instructor during office hours if you need suggestions for class project
  - You can work **alone** or in **group of 2 students**

- **Deadlines of Project Phases:**
  - Project Proposal: **October 9, 2018 (in class)**
  - Project Feedback: meet with instructor during **October 15--19, 2018** (office hours or by appointment via Alice)
  - Project Presentation: Thursday/Tuesday, **December 6 and 11, 2018**
  - Project Final Report: Wednesday, **December 19, 11:59pm, 2018**
Final Project (2)

- The project should have research flavor (so no survey for final project)

- You are encouraged to
  - develop new algorithm/protocol and/or application and/or
  - improve existing algorithm/protocol/applications and
  - validate via comparative simulation or real implementation
  - run QoE experiments on Video 360
  - evaluate/measure existing multimedia system/tool
  - conduct analytics on existing multimedia data
  - .....
Project Proposal Format (1)

Format:

- ACM format, single column, font 11 Arial (or Times New Roman), pdf
- Specify name, title, class number
- Length: 2-3 pages;

Proposal: Introduction

- Motivation and description of problem
  - explain why it is a problem
  - How did others solve the problem?
  - How do you plan to solve the problem?
  - What is broader impact of your solution?
Project Proposal Format (2)

Proposal: Possible Approaches you consider to take
- Picture of framework/architecture you want to explore
- Algorithm you want to explore and compare/improve
- Experiment(s) you want to conduct

Proposal: Action Plan
- By when you want to do what?

Proposal: References
- Papers you want to read and use in your research (at least 3 references must be included – read related work before you propose a project)
Project Presentation and Report Formats

- **Presentation format** should be similar to the lecture format
  - Talk about your problem, challenges, solution and validation.
  - Conclude with lessons learned

- **Report format** should be written like a scientific conference/workshop paper in ACM format (available on web)
  - Read and review papers carefully
Facilities and Equipment

- Engineering workstations-linux machines
- Use laptop cameras or mobile phones cameras or just images/videos on Internet
- Software: gstreamer and ffmpeg – multimedia capturing/display software is installed on engineering workstations-linux machines
  - More software can be installed based on project demands – email for help to engrit-help@illinois.edu (and klara@illinois.edu)
  - Any problems with engineering workstations/multimedia software – email for help to engrit-help@illinois.edu (and klara@illinois.edu)
Grading

- Take-Home Midterm Exam: 22 %
- 2 Papers Presentation: 24% (each paper presentation 12 %)
- 2 Reviews: 4% (each review 2%)
- Final Project: 50%
  - Project Proposal (10%)
  - Project Presentation (15%)
  - Project Final Report (25%)
Grading policy

- Gradebook system:
  - https://compass2g.illinois.edu/

- Late policy
  - No Late Policy, but 3 Bonus Days for Reviews posting!!!

- It is your responsibility!
  - Check announcements in lectures, piazza, or class website

- Projects can be done alone or in group of 2
Re-grading policy

- Students have 1 week (after the grade is released into the compass 2g gradebook) to request for re-grading.
- Re-grading requests need to be in writing to the instructor.
- After the re-grading period, no re-grading request will be granted.