CS 598KN
Advanced Multimedia Systems
Lecture 1 - Introduction

Klara Nahrstedt
Fall 2020
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 (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
  - Video 360 systems
Course Logistics

- **Office Assistant:**
  - Candice Steidinger (steidin2@illinois.edu)
  - If you need to meet with me outside of office hours, please ask Candice for an appointment. She has access to my calendar and will help you very fast.

- **Teaching Assistant:** Hongpeng Guo (hg5@illinois.edu)
  - Any questions you have, please, email TA (hg5@illinois.edu) or instructor klara@illinois.edu with subject line “CS598KN”

- **Class Time:** Tuesday and Thursday 2:00-3:15pm

- **Class Place:** virtual zoom

- **Zoom link is available on piazza**
Course Logistics

**Instructor Office Hours:**
- Tuesday and Thursday 3:15-4:15pm
- Use the same zoom link as for the class
- Phone: 217-244-6624

**Class Website – Reading List:**
- [https://courses.engr.illinois.edu/cs598kn/fa2020/](https://courses.engr.illinois.edu/cs598kn/fa2020/)

**Discussion, Announcements, and Postings:**
- [https://piazza.com/illinois/fall2020/cs598kn/home](https://piazza.com/illinois/fall2020/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/fa2020/ReadingList/ReadingList-cs598KN-Fall2020.htm](https://courses.engr.illinois.edu/cs598kn/fa2020/ReadingList/ReadingList-cs598KN-Fall2020.htm)

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

- Auxiliary Text for background reading:
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 breadth 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 (review)
  - Learn how to ask questions and prepare answers
    - (More and more conferences ask for rebuttals to reviewers’ questions)
  - 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, TA, guest lecturer and
  - lecturing by students based on reading list
  - paper discussions

- Students responsibility
  - Attend lectures
  - Read papers!!
  - Work on presentations, questions, 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 (1a)

Lecturing and Q&A

- Student presents 1 paper presentation (Paper #1)
- Student prepares for 2nd paper (Paper #2) questions prior to the class, and answers the questions after the class based on discussion of the paper
- TA will setup a google doc with papers and students can select one paper for presentation and one different paper for Q&A.
Workload (1b)

- Instructions about the **google doc** and selection will be placed on piazza.
  - Note: only one student can present a paper, so if we run out of papers, we will convert some of the lectures by guest lecturer/instructor into paper session.

- Paper assignment will be on a **first-come-first-serve policy**
  - Student presents the papers synchronously in zoom-class
  - Instructor evaluates the lectures, and questions/answers
Workload (2)

- **Paper Reviews** and Evaluation of Reviews
  - Each student selects three papers for review which are
    - different from Paper #1 (presentation)
    - different from Paper #2 (Q&A)
    - different weeks (3 reviews should be from papers over 3 weeks – one paper per week to review).
  - Send your selected three papers to the TA.
  - Review information will be then posted on piazza.
    - Reviews will be evaluated by the TA
Workload (3)

- Take-Home Midterm Exam
  - 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 **Paper #1** and prepare questions and answers for **Paper #2**
  - Each student selects choice of papers in google doc
    - Details about google doc will be posted on piazza
    - Selection of papers will be based on First Come First Serve
    - Assignments will be posted on the class website in the **Reading List**

- The **google doc** will be open after the first lecture and it expires on **September 4, 2020**.
Lecture Format for Paper #1

- Paper #1 presentation should be **20 minutes maximum** to leave at least 10 minutes 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
Q/A of Paper #2

For **Paper #2** to prepare questions and answers:

- read the paper carefully
- post questions on piazza prior to lecture
- ask questions in class
- post answers to questions after lecture including class discussion

Instructor will evaluate the quality of Q/A
Format of Q&A on Piazza

- Specify title and authors of the Paper
- Phrase a question (Question #1) in the context of the paper that might not be clearly discussed in the paper
- Phrase a question (Question #2) that might lead to future work for the paper
Paper Reviews

- Each student sends list of 3 papers (different from the 2 papers to present/Q&A and each review is done in different week)
  - Email to TA your three papers
  - Use the review format as specified in this lecture
  - Post the review on piazza under “paper_reviews” folder

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

- TA evaluates reviews
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 ½-1 page long; write full sentences and be clear (don’t just put keywords)

Think like a reviewer and member of a technical conference committee
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 20 (Tuesday 5pm)
  - Due on October 26 (Monday 11:59pm)
- 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 (or setup a meeting via Candice with the instructor)
  - You can work alone, or in group of 2-3 students
    - Depending on the size of the project group, corresponding complexity of the project and clear division ‘who does what’ is required and expected.
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/application 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
Project Deadlines

- **Project Proposal**: October 1, 11:59pm
  - Submit to klara@Illinois.edu
  - Subject: cs598KN: Project proposal

- Meet with Instructor for **Project Proposal feedback**:
  - October 8 and 15 (Thursday): 3:15-6:15pm
  - Sign-up sheet will be provided
    - If you cannot come on October 8/15, October 13 during office hours (3:15-4:15pm) is possible as well or by appointment via Candice
Project Deadlines

- **Project Presentation**: December 1, December 3 and December 8
  - Sign-up sheet will be available
  - Depending on number of project, time slots will be allocated
  - Depending on number of students in the class, number of project in the class, we will inform each group about the allotted presentation time.
Project Deadlines

- **Final Project Report** Deadline: December 16, 11:59pm (Wednesday)

- Depending on the size of the project group
  - 1 person project: min **6 pages** – double column ACM Format paper (with references, pictures, tables)
  - 2 person project: min **8 pages** – double column ACM Format paper (with references, pictures, tables)
  - 3 person project: min **10 pages** – double column ACM Format (with references, pictures, tables)
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
- If you have any further questions regarding the software, please, contact the TA hg5@illinois.edu
  - More software can be installed based on project demands – email for help to engrit-help@illinois.edu (and hg5@illinois.edu)
  - Any problems with engineering workstations/multimedia software – email for help to engrit-help@illinois.edu (and hg5@illinois.edu)
Grading

- Take-Home Midterm Exam: 22%
- Paper #1 Presentation: 12%
- Paper #2 Q&A: 7%
- Paper – Three Reviews: 9% (each review 3%)
- Final Project: 50%
  - Project Proposal (5%)
  - Project Presentation (18%)
  - Project Final Report (27%)
Grading policy

- Gradebook system:
  - [https://compass2g.illinois.edu/](https://compass2g.illinois.edu/)

- Late policy
  - No Late Policy, but 3 Bonus Days for Review and Answer posting!!!
  - Questions must be posted prior to paper presentation! (no late policy)

- It is your responsibility!
  - Check announcements in lectures, piazza, or class website
  - Please, email to TA and/or instructors
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/TA.
- After the re-grading period, no re-grading request will be granted.