Advanced Research Topics in Networked Systems:
How to Read/Review A Paper?

Qiao Xiang, Congming Gao, and Lu Tang

https://sngroup.org.cn/courses/ans-xmuf23/index.shtml

9/26/2023

Outline

- *Administrative trivia's*
- How to read papers?
- How to review a paper?

Recap: Workload

- **Attendance** (10%)
- **2 written assignments (5%+5%)**
  - WA1: mock PC (review + discussion) (2 weeks)
    - To be posted this week
  - WA2: distributed algorithms (2 weeks)
- **2 lab assignments (15%+15%)**
  - LA1: P4 tutorial (3 weeks)
    - bmv2 as a baseline, real switch for bonus
  - LA2: experiment (3 weeks)
    - a systematic experiment study including methodology, dataset, figures and results analysis
    - the specifics of the experiment is decided by your advisor

Recap: Workload

❑ 2 class projects (20%+30%)
- P1: reproducing via LLM (4 weeks)
  - reproduce one paper by prompt engineering ChatGPT
  - which paper to reproduce is decided by your advisor
- P2: research paper (1-3 students per team, going through the whole 16-week semester)
  - the complete process of producing a 6 to 12-page research paper including proposal, design, implementation, experiment and writing
  - team formation and topic are decided by your advisor
  - checkpoints to be posted this week

How to Succeed in this Class?

❑ Engage in lectures
  ○ Questions are highly encouraged
❑ Push the instructors and your advisor
❑ Read references / online materials
❑ Apply the principles / techniques you learned in lectures to assignments and the project
❑ Do not procrastinate assignments and the project
  ❑ For lab assignments and projects, follow the timeline of checkpoints to avoid the deadline panic

Outline

- ❑ Administrative trivia's
- ➢ *How to read papers?*
  - ➢ *How to read a system paper?*

How to Read A System Paper?

- ❑ S. Keshav, "How to Read a Paper", ACM SIGCOMM CCR, 2007
- ❑ Rebecca Isaacs, "How to read a (systems) paper", SOSP 2019 Diversity Workshop
  - ❑ Slides 8-15 is heavily based on Rebecca's presentation

The 3-Pass Approach

- Read in 3 passes, gradually diving deeper
  - Pass 1: the general idea (a "bird's-eye view")
  - Pass 2: content without details
  - Pass 3: the details, thoughtfully
- Leaving some time between passes can help to absorb ideas
- Depending on the purpose, 1 or 2 passes may be enough

The First Pass

❑ Should take 10-15 mins

❑ Read the title, abstract, intro and conclusion.

  ○ Sometimes the conclusion may be informative (factual vs aspirational)

  ○ Authors are also important!

❑ Look at the section headings, note how the material is organized

What to Know after the First Pass

The five Cs (one more than diamonds)
- **Category**: type of paper (system, measurement study, etc)
- **Context**: related work
- **Correctness**: valid assumptions?
- **Contributions**
- **Clarity**: well written?

The Second Pass

❑ Read the paper! Expect this to take at least 1-2 hours.

❑ Look carefully at the diagrams, tables and graphs.

  ❑ A good overview section usually can give you most information you need to understand the paper

❑ Check the references

  o Look at venues and years published

  o Have you read any of them? Are there some you haven't read but seem interesting

After the Second Pass

❏ You should be able to describe what the paper is about to someone else who hasn't read it.

❏ This is a skill that improves with practice. Try it out on your friends, colleagues
   ○ Advisors, too!

The Third Pass

❑ Read again, in great detail, to "virtually re-implement" the paper (1-5 hours)

  o Identify and challenge assumptions

  o Think about how you would approach the problem, evaluate the solution, present the material, etc.

    o Try to think how you would approach the problem as at the first/second pass

  o Look for what the authors have not said or evaluated

❑ The third pass takes the most time.

After the Third Pass

- ❑ You will have a pretty good idea of whether you think this is good work and a good paper, and you will be able to articulate why.

- ❑ You may have a few ideas for future work yourself!

Rebacca's Tips

- ❑ Don't read in order. Jump around however you like.
- ❑ If the terminology is new, take one term at a time and try to work out its definition in isolation.
- ❑ Allow hours or days between passes.
- ❑ Watch a video of the conference presentation.
- ❑ Find somebody else's write-up of the paper.

Discussion: Other Lessons / Experiences?

- ❑ Pay special attention
- ❑ Spend time on a running example
- ❑ Sometimes, skip the evaluation
- ❑ Contact the authors for clarifications

Outline

- ❑ Administrative trivia's
- ❑ How to read papers?
  - ○ How to read a system paper?
  - ➢ *From one paper to one area*

After Reading One Paper, What Next?

- ❑ Re-read introduction and related work
- ❑ "Cyberstalk" the authors
- ❑ "Cited by" from Google Scholar
- ❑ Survey can be helpful, sometimes

Outline

- ❑ Administrative trivia's
- ➢ *How to read papers?*
    - ○ How to read a system paper?
    - ○ From one paper to one area
        - ➢ *How to read an experience paper?*

Experience Papers Are Different

- Could give you a bigger picture on how a company runs their systems
- A lot of engineering efforts are hidden
- See how much efforts they spent on the research problems you are working on
- Future work / open questions can be valuable
- Talks at different venues could shed light on different perspectives

Outline

- ❑ Administrative trivia's
- ➤ *How to read papers?*
  - o How to read a system paper?
  - o From one paper to one area
  - o How to read an experience paper?
  - ➤ *How to read a paper on X?*

X = Anything but Your Field (e.g., TCS, AI, PL, Robotics, Control, etc.)

❑ Why do we read papers on X?
- o Topic related
- o Tool related
- o Open your eyes

- o ...

❑ Is it hard? Or Fun?

Tips on Read Papers on X

❑ Identify problem formulation first

❑ See if related to your own research

❑ Don't jump into details just yet

   o Understand the assumption/usefulness first

❑ Talk to friends/faculties working on X

   o Don't be afraid/shy, drop an email, or simply knock at the door

   o They may not know the paper you find, but could give you other pointers

Outline

- ❑ Administrative trivia's
- ❑ How to read papers?
  - ○ How to read a system paper?
  - ○ From one paper to one area
  - ○ How to read an experience paper?
  - ○ How to read a paper on X?
- ➢ *How to review a paper?*