

How to read and comment on a paper?

- 1. How to read a paper?**
- 2. How to comment on a paper?**
- 3. What are the bad practices you should avoid**
- 4. Your feedback?**

Why read a paper?

- To know what's going on: 10 group+10 conference
 - title, authors, abstract
 - Track a few leading groups/researchers in your area, typically less than 10 is enough
 - Only a few conferences: SIGCOMM, MOBICOM, SOSP/OSDI, MOBISYS, SENSYS, NSDI, MOBIHOC, ...
- Papers in your broad research area
 - introduction, motivation, solution description, summary, conclusions
 - sometimes reading more details useful, but not always
- Papers that are directly relevant to your work
 - read entire paper carefully, and several times

What to take notes

- **Authors and research group**
 - Need to know where to look for a paper on particular topic
- **Theme of the solution**
 - Should be able to go back to the paper if you need more info
- **Approach to performance evaluation**
- **Note any shortcomings**

Keys to good reading

- **Be critical!!!**
 - It is easy to say nice words about a work, it is harder to identify limitations/flaws
 - No flaw/limitation, no innovation
 - How?
 - Check assumptions, problem settings
 - Check how fast the solution works, how long the solution can sustain, ...
- **Summarizing at different levels shows your depth of understanding**
 - 30seconds (single most important point), 5 minutes (all important points), 45 minutes (to the major details)
 - Whether you can explain the paper in 30 seconds to your parents/friends-not-in-CS
 - What is the punch line of the paper?

You must be confident!!

- **#1 rule in networking area: If you cannot understand a paper via reading, then it is NOT a GOOD paper**
 - **--> Best papers are easy to read**
- **If the paper is not readable, author has not given writing sufficient thought**
- **Your response: If I cannot understand the paper, it is the author's fault**
- **Badly written papers typically do not get read**

Most papers have a nice structure!!!

- Abstract (1/8~1/4 page)
- Introduction section (1 page)
- Background section (0.5~0.75 page)
- Design section (3.5 page)
- Implementation section (1 page)
- Evaluation section (3.5 page)
- Discussion section (0.75 page)
- Related work section (0.5~0.75 page)
- Conclusion section (0.25~0.5 page)

hint

- Understand how the authors write the paper helps you to read!!

What you have in mind before reading your paper?

- Does it solve an important problem?
- What is the novelty?
 - formulating a new problem?
 - proposing new solutions?
 - presenting new evaluation methods/techniques?
 - The work is not incremental!
- Relevance of the work
 - It is working on a hot problem in a hot area
 - The work is the first one in this area, and can stimulate a lot of follow-up work even though the solution is still rough
- After you read it, you learn something you did not know before

Introduction section

A few key questions to answer

- The problem statement: what exact problem it is solving?
- The importance of the problem: why it is worth the effort to solve it
- Challenges for the problem: there are many problems to solve, why is this one difficult to solve?
- Current solutions: what are the limitations of current solutions and motivate the proposed one?
- New idea & technique of the solution: why is the solution different?
- Performance summary: how good is the solution based on the experimental/analytical evaluation?
- Main contributions of the paper (optional): simple recap and main points for the reader to carry home
- Structure of the paper: what each of the remaining sections in the paper talks about

Background section

- Provide brief intro. To people not working in the area
 - State from the standpoint of the problem, NOT general tutorial about the area
 - No copy from the literature
- Models used
- Assumptions made
 - Every paper makes assumptions, it is fine
 - Try to explain why the assumptions are not strong, give cases why the assumptions are realistic in practice
 - Spell out the issues not addressed in the paper, which are out of the scope of the work
 - No one expects a paper to solve all the problems

Design Section

- Provide a brief overview of the solution at the beginning
- For each component of the solution, clearly elaborate
 - What the issues/challenges to address?
 - How the solution component works?
 - Why choose such a solution approach?
 - There are many ways to address the same issue, why this one? Provides cons and pros for this one
- Novelty, novelty, novelty!
 - Explain why the solution is different, not necessarily better
 - Tell readers why it is different from the related work in brief terms when describing each component of the solution

Implementation section

- What are the challenges for the implementation of the design, if any exists?
- How does it address each challenge in the implementation?
- What are the software/hardware platforms for the implementation?
- Complexity of the implementation?
 - E.g., lines of code
 - Does it work with other existing software/hardware platforms?
 - If not, is it easy to export it to these platforms?

Evaluation Section

- To show quantitatively how good the solution is
- Describe the testing scenarios
 - What devices used, the supporting environment, etc.
- Describe the analytical results
 - Spell out the assumptions and conditions for the analysis
- explain figures, tables, bar charts, etc.
 - Tell the readers the % improvement, the gains etc. Do not expect the readers to get such numbers by themselves from the figures, etc.
- Share the insights why the solution provides better results
- For those results worse than the existing solutions, explain why they are so
 - It is okay to share negative results, as long as they are explained why; provide some justification if possible
- In the end, provide a short summary of the performance results
 - The main items for the readers to take home

Discussion Section

- This section basically serves as the storage room for the work
- If there are messy issues, state here
 - Not in the design section, which may distract the readers from your main idea
- If there are straightforward extensions of the solution, state here
- If there are unaddressed, but important issues, discuss here
 - They are basically the loopholes of the work, argue them here
- If there are suggestions/improvements to the current solutions, state here
 - These are items that authors do not have time to evaluate and test out

Related work section

- Main point to make: the work is significantly different from all the existing solutions!
 - Not necessarily better
 - It is not incremental, which extends the existing ones a little bit
- Novelty of the problem: one of the following
 - formulated a NEW problem in this paper!
 - identified NEW issues to an existing problem
- Novelty of the solution
 - The idea explored in this paper is completely different from all others in the literature
 - used new techniques borrowed from other areas or fields
 - No one has done so, I'm the first one
- Novelty of the evaluation
 - used new analysis/experimental methods that no one has used before
- Stay at the level as high as possible: the contribution is major, not minor improvements (no need to comment on the detailed level)
 - Do not discuss the novelty of each component of the solution, only the main idea of the solution
 - Component novelty is described in the design section already, not here

Conclusion section

- Brief recap of the problem solved, and the solution proposed in this paper
- Articulate the importance of the solution
 - Is it applicable to other areas or problems?
 - Does it explore new design principles/philosophies that offer new ways to solve many other problems?
- Share insights gained and lessons learned
 - What are the new positive insights gained?
 - E.g., certain ideas really work
 - What are the negative lessons learned?
 - E.g., complex solutions give only marginal improvement
 - E.g., certain ideas proposed in the literature do not work at all in the tested scenarios
- Ongoing/future work (optional)
 - One or two sentences are enough
 - Not too much, otherwise, the paper sounds work-in-progress that reviewers can reject easily!

Alternative structure

- Sometimes, the related work section can appear as the 2nd section right after the introduction section
 - When to use it? The work builds significantly on the existing ones
 - merge the background with the related work in a single section
 - Provide the tutorial to your design section
 - Downside of this layout: this may make the paper sound incremental, and the novelty is limited

How to comment on a paper?

- #1: Be critical!!
 - If you cannot understand, you can blame the authors!!!
 - Every paper has flaws!!
 - Many flaws, limitations, ...
- #2: use your own words to comment!!
 - Do NOT copy words from the paper!
- Avoid “I’ll learn something and praise the paper!”

How to comment?

At least 4 items of

- 3 strong points: 3 most important things stated by the paper
 - Could be combination of motivations, observations, interesting designs, or clever implementations (1) from the author's perspective at the time; (2) your perspective with the benefit of hindsight
- One weakness: what is the single most glaring deficiency?
 - Design flaws, poorly designed experiments, narrow-scoped main idea, weak applicability, ...

How to comment?

- One key assumption/observation that led to the research
 - What were the key observations?
 - Where did the observation/assumption come from?
 - Personal experience, or work environment, ...
- One key risk/obstacle
 - What are they to prevent the research from successful?
 - Were the authors aware of them? Are these obstacles eventually overcome?