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?