How To Recognize a Great Idea

To do ...

- Why and how to read
Outline

- Why reading
- Deciding what to read
- Suggestions on how to read
Need for efficient reading

- Why reading papers?
  - Review for a conference or a class
  - Literature survey of a new field
  - To keep up to date

- Too many papers!
  - SIGCOMM ~40, IMC ~42, ICDCS ~87, NSDI ~40, CoNEXT ~32, …
  - Per year over 200
  - Hundreds of hours per year at it!
How and what to read

- A critical but rarely taught skill
- Not like reading fiction!
  - **Not** from start to end, but in passes
  - Not all at the same level, skip some/much
- A variant of the three-pass approach*
  - Get a bird’s-eye view
  - Read as the audience
  - Read as an author

* S. Keshav, How to read a paper, CCR, 37(3), 2007
Deciding what to read

- **Goal:** To keep up to date
  - **Approach:** Scan papers in latest conference

- **Goal:** To get up to speed on a subfield
  - **Approach:** Transitive closure of related work of papers in top conference

- **Goal:** To increase your expertise
  - **Approach:** Deep diving on key papers
Goal: To grasp main idea of a collection of papers; keep informed about problems and recent solutions

Top-down method
- Skim table of content: papers clustered into “sessions” which typically identify main areas
- Consider authors and prioritize by area of interest and reputability of authors
  - As everything else, gets easier with time
How to read

- First pass – a few minutes
  - Title, abstract and introduction
  - Sections and subsection headings
  - Conclusions
  - Glance over references

- You should be able to answer
  - Category – measurement, analysis, …
  - Context
  - Correctness – *Valid assumptions*?
  - Contributions
  - Clarity
How to read

- If you are interested in the paper but it’s not your specialty or
- If you are exploring a new field ...

Second pass ~1hr
  - Read with care, but gloss over details
  - Look at figures, diagrams
  - Mark relevant unread references for further reading

At the end, you can summarize the main points, with supporting evidence to another person
Goal: To get up to speed on a subfield

Start by creating the seed
- Recent papers from top conference, do a first pass
- Survey paper if one exists
- Seminal paper if different from above

Else, perform transitive closure of cited work
- Read related work sections of above papers
- Focus on shared citations and repeated author names
Deep diving

- Goal: To understand some problem area in greater depth, on the path to be an expert
- Find the seminal paper in the field
- Read carefully, including evaluation
- Third pass ~1-5hr (depends on experience)
  - Try to virtually re-implement the paper
  - Identify and challenge every assumption
  - Think of how you would have presented the ideas
  - Comparing your virtual version with the actual paper provides a deeper insight
Questions to answer as you read

- Comprehension questions
  - You are reading to understand what the paper says

- Evaluation questions
  - But you have to be critical of the claims

- Synthesis
  - To generate research agendas
Invariant comprehension questions

- What is the problem?
  - Motivation? What is the niche?

- What are the claimed contributions?
  - What’s new? Question, methodology, algorithm, research area …
Invariant comprehension questions

- How do the authors substantiate the claims?
  - Methodology, argument, experimentation … what makes it scientific instead of mere opinions?

- What are the conclusions?
  - What have you learned? Are the results generalizable? What are the open problems? …

- Where? Abstract
Invariant evaluation questions

- Is the research problem significant?
- What is the “intellectual nugget”?
  - Every paper should have a key intellectual contribution
  - This key idea will also give your brain a way to “index” the paper
Invariant evaluation questions

- What are the main contributions?
  - New finding? Method? Perspective?
  - Are the contributions significant?

- Are the claims valid?
  - Have they cut corners? Error in proof? Problematic experimental setup? Are the claims modest enough?
  - Are the result likely to be affected by the method?
Keeping notes

- One sentence summaries are infinitely better than nothing at all
- Primitive approach – single file of notes
- Better – database with bibtex
  - There are some existing tools for bib management
    - Zotero, Papers, Mendeley, EndNote, …
  - Will also help you more quickly construct related work sections for papers