

# CS 492

# Reading Papers and Literature Review

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# Agenda

- How to do a literature search
- How to read a paper



# Literature Search

- Two approaches:
  - Survey: “I want to get up to date on a focused research area”
  - Targeted: “I want to know if anyone has written about this idea”



# Getting Up to Date

- Process varies depending on your knowledge
- First, you want to get caught up on basics. There are a few ways:
  - Best option: **take a course**
  - Find a textbook. It will be out of date relative to research cutting edge, but that's OK at first
  - Find course materials online (lectures, talks on youtube, etc.)
  - Talk to a prof for reading material recommendations



# What papers should I read?

- Ask your prof. They'll probably know the best papers to read
- If not, they'll point you to the right place
- If you're lucky, there might be a **survey paper** covering your topic



# Survey Papers

- These are papers that take a broad view of a research area. They usually answer the following questions:
  - What are the applications/motivation for the area?
  - What are the open problems/challenges?
  - What are the significant papers/systems that tackle the challenge?
  - Possibly: insight for common themes, future directions, suggestions for further research
- For example, look in ACM Computing Surveys.
- Follow the citation chain to dive into detail



# Finding *good* papers

- Not all papers are created equal
- A Google search is a good first-order tool, but it doesn't filter on quality
- Conferences/journals have varying standards of rigor/impact
- You want to prefer: peer reviewed conferences, journals with a high impact factor. Ask your prof what they are.
- Start from the top quality places



# Conf./Journal Quality

- Historically, the main indicator has been ***acceptance rate***, i.e., how many papers are accepted vs. how many were submitted
- Typical numbers for reputable places range from 10%-30%
- Not always a good indicator, and it's a flawed metric (it's also changing now)
- Again, ***ask your professor***





# How to get an idea of paper quality?

- Here are some hints (but not strict determiners)
- “Is it published at a reputable venue?”
- “Does it have many citations?”
  - Must be careful with this though, papers in newer fields or more esoteric fields with smaller communities will naturally have small citation counts
- “Does it cite papers from top places?”
- “Is it readable? Does it look sloppy?”



# Tips for targeted search

- Know what you're looking for. Try to narrow down to specific keywords
- Do a quick search on Google (prefer Google Scholar). Filter your findings based on quality. Read those papers and follow the citation chains to *major papers in the area*.
- If you keep seeing one paper that's cited by everyone else working on the problem, you probably want to read it
- Look on CS search engines: ACM digital library, IEEE Xplore



# Reading a Paper

- This is difficult at the beginning!
- You will encounter a lot of language and new concepts you haven't seen before. Be patient
- Give yourself *plenty of time*. At the beginning, it might take you a week to fully understand a paper



# Understand Your Goals

- Why are you reading this paper? Goals dictate reading style
  - Want to get an idea of what several papers are for? Just read the abstracts.
  - Want to understand a system in depth? You'll probably need to read it several times!



# Organize Your Papers

- Use an organization system to keep track of papers, you'll end up reading a lot of them. E.g., ReadCube, Mendeley
- Keep a notebook where you can collect thoughts on the papers you read. Examples:
  - Evernote
  - Apple Notes
  - Hierarchy of markdown notes



# First Pass (in-depth read)

- Read the abstract first
  - Afterwards, you should have a high-level understanding of the problem, why it matters, and the basic shape of the solution/idea
- Read the conclusion
  - What are the major findings? Did it support the abstract?
  - In many cases the conclusion is a reiteration of what was in the abstract
- Get a feel for the structure of the paper
- Take a quick look at the graphs/figures



# Second Pass

- I'll typically do a read of just the intro, then take some time to think about the problem on my own
- Give some time to let it sink in, brainstorm
  - I might just stop here for the day if I'm limited on time, come back to it tomorrow
- Many papers will have a "Background" section. Read that in this pass too. Treat it as a "prerequisites" item.
- Do some preliminary reading on the concepts in this section if you're not at all familiar



# Full Pass

- Now do a *full* read through, from the intro (again) all the way to the conclusion
- Take notes as you go
- Highlight words/concepts you don't understand yet (don't stop though!)
- Even if you feel lost, power on to the end





# Research Pass

- Go back to your highlights and notes
- Prioritize items you didn't understand.
  - If it's just mentioned in a small paragraph, maybe not that important
  - If it's mentioned in every section of the paper, you want to understand
- For each item, go do your own research. Consult textbooks, other papers, etc.
- This will take time!



# Revisit

- Read the paper again after you've done your background research
- It *still* may be fuzzy, and you still may not understand everything. That's OK.
- It's often good enough if you can understand:
  - What the problem is
  - Why it's important
  - The general solution to the problem in the paper, and why it's novel and different



# Don't Get Discouraged

- Paper reading is a *skill* that takes time to develop
- You won't be great at it the first time you try
- Luckily, academic papers all have a pretty similar structure which you'll get used to navigating



# Read a lot!

- Start forming a list based on your literature search, and work your way through it
- Sometimes your professors will get you started with a stack of papers
- Schedule reading time



# What to read?

- Read for depth (will build your expertise):
  - papers in your focused research area
- Read for breadth (will build your creativity):
  - papers adjacent to your research area
  - papers in other CS fields
  - papers outside of CS
- Read for fun (will help your reading skills, **and** writing skills)

