Class 3: Technical Reading & Writing

• Reading technical papers
• Writing technical papers
• Paper review process
Why do we read papers?

• **Generally**: To learn from prior work
  – Learn about relevant discoveries/results
  – Identify useful methods, tools for our own work

• **In this class**: To develop our research skills
  – Gain exposure to CS research
  – Improve our technical reading and writing
Types of Papers

Theoretical:
- Proves theorems
- Presents new algorithm

Implementation:
- Presents new software tool

Experimental:
- Implementation, experiments, case studies

Survey/Review:
- Reviews results of other papers

Essay:
- Non-technical
Typical CS paper organization

Title and Authors
Abstract
Introduction
Related work
Methods
Results
Discussion?
Conclusions
References

Each (sub-)field has its own typical structure. Review other papers to discover norms.
Publication venues

Conferences (often referred to by initials)
- Typically shorter (4-8 pages)
- Reviewed by 3-5 peers, discussed by PC
- 4-8 months from submission to publication

Journals
- Longer extended version of conference paper
- Meticulously reviewed by 2-3 peers
- Longer lead time for publication, typically with multiple revisions
- 1-2 years from submission to publication

arXiv / techreport
- Published immediately, no peer review
- Popular in fast-moving fields like machine learning

In CS, conferences typically more useful/important than journals
What Makes a Good Paper?

• Clear and **concise** abstract
• **Relevant** and **important** related work
• Problem/Methods **clearly** stated
  Assumptions stated and realistic
• **Important** and **clear** results
  Appropriate description of impact / contribution
  Comparison with existing methods
  Advances state of the art (SotA)
Reading a paper (1st pass)

Is it a “good” paper (previous slide)

The 5 ‘C’s [Keshav]

1. Category
2. Context
3. Correctness
4. Contributions
5. Clarity

Decide: Worth it to read?
The 2\textsuperscript{nd} (deep) read

Now, having \textcolor{red}{carefully} read

- Can you \textcolor{blue}{summarize} the objective?
- Do you \textcolor{blue}{understand} the results?
- Are the results \textcolor{blue}{meaningful} for/to the problem?
- Can you think of any faults?
- Can you think of any extensions?
So where do we find these papers?

• Google! Both scholar and regular search
• A literature review is a graph search
  1. Find a paper of interest (POI)
  2. Review the POI’s references
  3. Review the papers that cite the POI
  4. Review what else the authors have written
  5. Review the relevant conference proceedings
Writing: Write the paper you would want to read!

• Everything we discussed about “good” papers applies to your writing
• Good writing practices from your other classes still apply; correct grammar, etc.
• Writing isn’t the last step, write as you go
• Great papers have great figures
• CLARITY is paramount
Best practices

• Active voice if possible (OK to write “we”)
• Avoid imprecise words or usage, e.g.
  – What does “substantially” mean?
  – Only use “significant” in statistical context
• Watch for “content free/lite” sentences
• Watch for unsupported assertions; demonstrate or cite
• Watch for “weasel words”, esp. lazy words like “very”, “extremely”, etc.

http://matt.might.net/articles/shell-scripts-for-passive-voice-weasel-words-duplicates/
Writing: The mechanics

• Use a citation management system, e.g. Mendeley, Zotero, etc.

• LaTeX, Word, etc. will depend on venue/team
  – LaTeX common in CS, physics, math, etc.
  – Word more common in life sciences

*In this class we will be using LaTeX*
Typical conference submission process

1. **Initial submission**
   - Draft the paper using conference style guide. Submit blinded PDF.

2. **Reviews**
   - 3-5 peers review your paper

3. **Rebuttal**
   - You may have opportunity to briefly rebut the reviews

4. **Decision**
   - Program committee (PC) meets to select papers

5. **Revisions**
   - If accepted, submit “camera ready” final draft with revisions based on reviews
Paper reviews

Our same reading process, only with 3rd, 4th reads, etc.

The review itself often contains:

• A brief summary of the main contributions
• Major and minor comments to the author
• Note to the editor/PC (not seen by authors)
• Score or other accept/don’t accept notation
Discussion

• Discuss 3 sample papers and their reviews
  – Linderman et al.
    Towards Program Optimization through Automated Analysis of Numerical Precision [CGO 2010]
  – Anonymous
    A Quantitative Evaluation of Multi-Model Estimation Algorithms [BMVC 2011 submission]
  – Kopf et al.
    Image-Based Rendering in the Gradient Domain [SIGGRAPH 2013]