Paper Reviewing & Projects

Advanced Computer Security
CS563/ECE524

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Paper Reading & Reviewing

- Efficient and critical reading of published literature is an essential skill for a researcher
  - Some tips for how to approach it
- How to write reviews

Goals

- Reading a paper has two goals: to *learn* and to *critically evaluate*
- Learn what problem is being solved, what techniques are being used, how effective they are, etc.
- Evaluate whether the problem is important, whether the techniques are novel and correct, whether the results improve on state of the art
- Note: critical != negative

Strategic Reading

- Papers are long, dense
- E.g.: CookieGraph: 15 pages, 13630 words
  - At 50-75 wpm, that’s 3-4 hours just to read!
- Focus your reading to answer questions, achieve goals

Introduction

- Read the introduction in its entirety (more or less)
- Make notes:
  - What is the problem being solved?
  - What are the challenges / gaps in state of the art?
  - What is the technical approach being taken?
  - What are the major results?
- Write a 3-sentence summary

Critical Evaluation: High-Level

- Start *critically* thinking about these questions
  - Is the problem important?
  - Is state of the art correctly described? Are gaps significant?
  - Is the technical approach novel?
  - Are the results significant?
- Identify *sources of information* and *objective metrics* that can help answer these questions
  - Look for them inside paper body

Technical Understanding

- Understand the techniques and methodology of the paper
- Section focus: Background (skim), Technical sections
- Pay attention to:
  - Context
  - Assumptions
  - Unclear points
  - Correctness

Critical Evaluation: Low-Level

- Understand whether the paper achieves what is promised / alluded to in introduction
- Section focus: Evaluation, Related Work
- Pay attention to:
  - Evaluation methodology
  - Rigor
  - Completeness

Takeaways and Next Steps

- Takeaways: What of this paper will you carry with you?
  - Did you learn a new technique? New problem? Make notes!
- Improvements and next steps in this research line:
  - Major deficiency: must be corrected for paper to meets important goals
  - Minor improvement / incremental steps: small changes that would make paper better
  - Future research: moving this work into new contexts

Review Form:

- Paper Summary: 3 sentences (short and long)
- What has paper done well: 2-3 bullet points (short), 1-2 paras (long)
- Improvements and next steps: 2-3 bullet points (short), 2-3 paras (long)
- Takeaways: 2-3 bullet points (short), 1-2 paras (long)
- Overall summary: 1 para (long only)
- Discussion points: 2-3 bullet points (short and long)
- Rating: Paper quality, paper interest

Discussion Points

- Make notes of:
  - Points you don’t understand
  - Points you disagree with
  - Subjective opinions
  - Related questions

Paper Presentation

- ~5 minute summary of the introduction
  - What problem is being solved?
  - What are the challenges / gaps in state of the art?
  - What are the high-level technical approaches
- ~5 minutes on technical content: Techniques, methodology, evaluation
- ~5 minutes on feedback
  - Identify common positive points and places for improvement
- Rest to moderate discussion
  - Take points from reviews + add your own

Blog post

- Summarize paper, class discussions
- Paper summary: more or less a rewrite of the introduction from *your* perspective
  - What problem is being solved, why it's important, what are technical approaches?
- Highlight some technical details: techniques, evaluations
- Discuss improvements / future steps, focusing on major ones
- Highlight more interesting discussion points, including disagreements

Project Proposals

- Proposals due EOD on Feb 24
  - 2 pages
  - Evaluated on completeness
- Research components:
  - What problem is being solved
  - Gaps in state of the art
  - Initial approach
  - Expected results and timeline
  - Potential risks

Components

- SoK components:
  - Topic, and why it was chosen
  - Initial list of 8+ papers
  - What perspective you might add
- Reproduction components
  - Paper and why it was chosen
  - Plan for reproduction: how to get code, data, etc.
  - Extensions planned

Team and Collaboration Plan

- List members on the team
- Include collaboration plan
  - What expertise do members bring?
  - How will work be split up?
- ~1 paragraph
- Recall that larger teams have higher expectations!

Feedback

- Written feedback provided on scope, risks, etc.
  - Team meeting can be scheduled on request
  - Revised proposal may be requested

Literature Review

- Due EOD March 14
- 1-2 pages
- *Comprehensive* set of related papers
  - For reproduction, new papers that have since been published
- A few sentences per paper about the high-level contributions, relationship to other papers and your work
- Any changes to project proposal based on literature review

Check-in

- Due EOD on April 11
- Progress towards deliverables, milestones
- Challenges and setbacks encountered
- Anticipated revisions to goals, timeline

Presentation and Paper

- Presentation: May 8, 20 minutes per group (stick to time!)
  - Highlight problem being solved, technical approach, challenges
  - Explain remaining steps
  - Evaluated on presentation quality
- Paper: Due May 16
  - Conference-style paper reporting on your work
  - Evaluated based on:
    - Depth of work
    - Quality of presentation
    - Rigor

Next week: Papers

- Reviews due 12:30pm day before class!
  - Short reviews only, still working on review system
- Volunteer to present, blog!