CSci 8002: Intro. to Research in Computer Science - II

Ravi Janardan
janardan@cs.umn.edu
www.cs.umn.edu/~janardan
6-217 Keller Hall
Outline

• Feedback on Lit. Review
• Formulating research questions + in-class activity
• Being a successful grad student
Feedback
Broad Classification of Lit. Review Topics

- 6 – Robotics
- 4 – Computer vision
- 3 – Networks
- 2 – Architecture
- 2 – Machine learning
- 2 – Software Engg.
- 2 – HCI
- 2 – Text analysis/summarization
- 1 – Recommender Systems
- 1 – Spatial data
- 1 – Big data/data science
- 1 – Sparse matrices
- 1 – Distributed data analytics
Evaluation criteria
(based on guidelines)

• Is it a comprehensive survey with appropriate scope?
• Has it been written in own words and is it a summary + synthesis + critique or a laundry list?
• Is it well-organized (logical, smooth flow)?
• How good is the exposition (clear, understandable, typo-free, (reasonably good) grammar)?
• How is the quality of the sources cited and are the citations complete?
• Is there evidence of serious thought and effort?
• Have format guidelines been followed?
Approach to Grading

• Made three passes
  – Quick read for context
  – Detailed read for comprehension + comments
  – Quick re-read, after reading all reviews, for consistency

• Focused more on overall structure, organization, and flow of review than on technical content (not an expert)

Have a reasonable (high-level) understanding of your respective topics (with a few exceptions)
Performance

• Most reviews were good to very good. Some were excellent! A few reviews were fair. Scores: 14-20 (max=20). Grading was generous.

• Some issues noted:
  – Laundry list of past work rather than S+S+C.
  – Absence of sections (monolithic reviews)
  – Lack of a Conclusion/Discussion section
  – Use of jargon (terms/acronyms left undefined)
  – Typos and incorrect grammar. (Spell-check + have someone review for grammar.)
  – Incomplete references (missing page #s, conf./journal name, ...). Use BibTex, RefWorks, EndNote, Mendeley, ...
  – Beginning sentences with a ref. (“[1] proposed a method for ...”)
  – A few reviews had a preliminary/last-minute feel

• Specific comments written on individual reviews. Please heed these and the guidelines for remaining milestones. (Grading will tighten!)
Research Questions
(revisited)
Formulating research questions

• Characteristics of good research questions
  – Must excite you (and keep you awake at night 😊)
  – Must be interesting and compelling to your larger research community
  – Must have long-term research potential (not “one-off”)
  – Answers must yield a significant new contribution to the field and spur further research
  – Not something incremental or a “repackaging” of existing ideas/techniques
  – Other?
Types of research questions/activities

• Discipline/area-dependent and can involve multiple disciplines. Could involve
  – Solving a major open problem (new algorithm, new theorem, proving/disproving a conjecture, ...)
  – Generalizing/unifying an existing body of work
  – Experimental study to establish/verify a hypothesis (or published claim)
  – Building a software system to demonstrate a proof of concept, simulate some process, analyze large datasets, verify a protocol, etc.
  – Working on (an abstraction of) a truly real-world problem (e.g., from industry)
  – Exploring a brand new, as-yet-untouched topic (risky but can be rewarding)
  – Other?
“Practical” considerations

• Choose questions where the learning curve is moderate, where you think you have promising initial approaches, and where you can leverage existing skills/bring unique skills to the table
  – E.g., linear algebra -> data mining
    graph theory -> networks (social, biological, communication, ...)

• Start small and scale up

• Seek collaborators/domain experts (esp. for cross-disciplinary work). Good resource for interesting problems, reality check, real-world data, validation of work, etc.
Guidelines for formulating research questions

• 2-3 research questions based on your readings for lit. review
  – Must be substantial and meaningful
  – Must have downstream research potential
  – Must be (largely) of your own creation (rather than taken directly from a paper)

• For each question, write a paragraph stating
  – What the question is
  – Why it is important
  – What is known about it (prior related work; can cross-ref. lit. review)
  – What the implications of answering the question might be
  – Outline any plausible initial approaches (optional)

• Provide a concluding paragraph on how questions might relate to each other (if appropriate)

• If needed, talk to me or (better still) to your advisor

• Read and follow detailed guidelines posted. Questions are due Feb. 23
In-class activity

State
• Your research question (in context)
• Why it is important
• What is known
• What might be the implications of answering the question

~3–4 minutes
Wrap-up

• Questions/discussion?
• Next class
  – Guest lecture (Prof. Interrante).
  – Paper posted on class web page
  – Read and come prepared to participate
• Schedule change
  – March 2 & March 9 lecture topics swapped