WRITING EXCELLENT PROPOSALS

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What is a Thesis Proposal

• A thesis proposal is a document that describes the research you would like to accomplish as part of your advanced degree.

• Through a thesis proposal you demonstrate that you can make a contribution to science. Your thesis must show that you:
  – Know the state of the art (in your area of interest)
  – Understand the state of the art
  – Have identified a “hole” in the state of the art
  – Have a plausible idea for how to fill that hole

• About 25 pages
Steps to Writing an Excellent Proposal

• Ideally your advisor will advise you on the steps outlined in the following slides

• Proposal format will be something like the following:
  – Intro – Layman’s description
    • Discuss problem at high level
    • Summarize your potential scientific contributions
  – Previous related work
  – Research plan
    • Technical description (with preliminary results)
      – Problems to be solved (with potential solution approaches)
      – Experiments to be run (with details of set-up and how data will be gathered
    • Schedule/plan of research activities
  – References
Read Literature

• Familiarize yourself with the relevant literature
  – From the Abstracts: get an idea of how to describe the important parts of a problem succinctly and at a high level
  – From the Introductions: get an idea of how to motivate and justify a problem
  – From the Previous Work sections:
    • Get an idea of how to clearly compare and contrast a problem to the relevant literature.
    • Read the citations as you read the paper to see who is associate with what previous work.
    • Notice whose work is cited in multiple papers. That work may be foundational for your problem too.
Read Literature (cont)

• Familiarize yourself with the relevant literature (cont)
  – Read the most relevant papers in their entirety
    • Understand subtle differences AND similarities among existing results
    • Understand the subtle differences AND similarities between your preliminary results and the existing results
  – To understand the differences and similarities, you may have to implement some of the other methods

• Read the literature critically
  – Were assumptions and models reasonable?
  – Were algorithms true to the assumptions?
  – Are there better approaches?
Before Outlining

• Answer these five questions with one sentence each:
  – What is the problem?
  – Why is it important to solve?
  – Which parts of the problem will you solve?
  – How might those problems be attacked?
  – How will you determine if you’ve solved the problem?

• Read other people’s proposals and reviewers’ comments
Write an Outline

Now that you know the literature and have identified the problem you want to solve...

• Write a high-level outline (one page)
  – More than:
    • Introduction (includes some motivation)
    • Previous work (includes some motivation)
    • Proposed research (includes proposed approach)

• Discuss it with your advisor
• Modify high-level outline as needed
• Write a detailed outline (three pages)
• Discuss it with your advisor
Write a Draft

• Write the formal technical part of your proposal first
  – This will help you see the similarities and differences between your proposed research and existing results

• Write the previous work section next
  – There’s no point in citing a paper if it is not informative to the proposed research
    • Do NOT simply write a description of each relevant paper
    • Cluster previous work into groups based on qualitative features of their technical approaches
    • For each paper described, add a phrase or sentence saying how it is similar and different from the proposed work
    • This can be done for each previous paper discussed or for each group of papers discussed
Previous Work Section

• DON’T write like this: In [1], A was done. In [2], B was done. .... In [n], X was done.
  – This style of writing only proves you found the citations and maybe read the papers. It does not impress the reader.
  – Detailed sentences detailing the similarities and differences let the reader know you really know your sh*t

• DON’T SAY, “to the best of my knowledge...”
  – How can this phrase help you?
  – Reader might do a 10-minute search and find an example. Then you look really lame for not searching harder yourself.
Introduction

• Paragraph 1: Motivation. Broad description of problem area. Why is problem important. What is impact if solved.

• Paragraph 2: Narrow down problem area and describe your problem at high level. Why specifically is your problem important.

• Paragraph 3: Most important paragraph. Elevator pitch. “In this project, we plan to ....” Bulleted list of major contributions

• Paragraph 4: High-level comparison to state of the art

• Paragraph 5: Summarize contributions as very high level. How will your results change the world!
Finalize

• Write the introduction (and abstract) last
• Take a few days off
• Read through the whole proposal in one sitting
  – Eliminate redundancies and inconsistencies
  – Fix grammar and spelling errors
  – Double-check papers cited to make sure you have properly characterized them
• Take a few days off
• Have a friend read it playing Devil’s Advocate
• Make adjustments