Proposal Writing and Presentation

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Outline

• Proposal Writing

• Proposal Presentation

• Team Projects
Sources

- Prof. Marie desJardins’ lecture notes from Spring 2006
- *Writing Technical Articles* (with emphasis on paper in systems and networks), by Henning Schulzrinne
- *On Writing Well" by Zissner.*
- *Writing in Style*
Proposal Format

• 4 Pages
• Letter Size
• Double Column
• Single-Space
• 10 Time New Rome
• With Citations
Propose of the Writing

• Organizing yourself and your thoughts

• You should publish papers along the way to getting your degree
  • definitely true for Ph.D. students;
  • ideally true for M.S. students;

• In CS, you are expected to have publications when you graduate (otherwise you will have difficulty in getting a job)

• A life-time skill as a PhD.
The Writing Process

• Writing should be part of the research process

• It’s really hard to “Do The Work” and “Write It Up”
  • The Work is never done, and It is constantly changing

• Writing on a regular basis
  • to pin down the details
  • to focus your ongoing research

• Keep the advisor aware what you are doing.
Write as You Work!

• Writing about papers you read:
  • makes related-work part of your paper that much easier
  
  • creates a record of your understanding of the paper because you will forget the details
  
  • helps you to organize & synthesize the threads of the related work
  
  • encourages you to analyze & think about previous work and its limitations
How to proceed

• Write something every day, even if scribbles, an outline, a paper summary, or a trivial bit of commentary

• Write soon after you think and fix it later.
  • But organize well. Bad organization is harder to fix later.

• Write (with pen/pencil) on paper first, then type it onto computer
  • For some it works better than others
Technical Paper Structure

0: Abstract
1: Introduction
2: Related work
3: Motivation
4: Main Design (Outline are OK for now)
5: Performance Evaluation
6: Conclusion
Section 0: Abstract

• 150 – 200 Words & 6-10 Sentences

  • **1 STC**: the problem considered in this paper with a specific topic
  
  • **1-2 STC**: why the problem is interesting (a.k.a important)

  • **1-2 STC**: why other SoA did not solve it **politely & objectively**

  • **1-2 STC**: describing main idea

  • **1-2 STC**: the evaluation methodology (show effort)

  • **1 STC**: highlight the key result.
Section 1: Introduction (1/2)

• This section is an expanded version of the Abstract
  • WHAT you are talking about
  • WHY Bother????
  • Why smart people like you did not solve it
  • How: you main idea

• One logical way to organize
  • expand the abstract
  • replace each grouped set of sentences with a paragraph
Section 1: Introduction (2/2)

- You might add 1-2 para. on critiquing related work in general
  - Recommend NOT to talk too much about particular work in this section

- A short para. on key contributions and key performance results from the paper

- If space allows, a short paragraph on the paper organization

- It is YOUR job to sell this paper
  - this Section is critical in setting the reviewer’s mindset
  - you must make them want to read the rest of the paper

- Discussion: Write before or Write after the main body
Section 2: Related Work

- A brief background (perhaps a subsection) of the topic
  - That is needed for someone who knows the area
  - but not this specific topic
- To avoid citing too many references when space-constrained
  - you can cite survey paper(s) that summarize key work on this problem
- Summarize KEY papers related to the PROBLEM
  - the problem you are trying to solve in this paper
  - identify main approaches/weaknesses of these papers
- Finish with a paragraph on WHAT is missing from past work
  - they make unrealistic assumptions? for restricted cases?
  - how your paper is different from all those
Section 3: Motivation

• Expand the motivation para. in intro. to evidences
  • Use data to show why your problem is true or interesting.
  • e.g. data sparsity.

• Use data to show why the assumption you make is true
  • e.g., taxis can cover all road segments

• Use data to show why previous problems do not work
  • under the setting you identified
  • e.g., Tensor Decomposition cannot work in real-time
Section 4: Main Design Section

- Clear presentation (formal if possible)
  - Problem statement; Constraints Considered, Design Goals/Objectives
- Clearly the assumptions
  - Defend your assumptions
- Present all formal notations/definitions and acronyms
- Proposed Mechanism(s)
  - This might be split into several sub-sections
  - Build up your work for easy understanding for the reader
- Use of figures AND examples to illustrate concepts is important
- Complex Algorithmic /flowcharts shall be avoid
- Number Important Theorems, Definitions, Equations
Section 5: Performance Evaluation (1/4)

• Theoretical Analysis
• Empirical (Experimental Analysis)
• Simulation (Discrete Event) or Programming package based Analysis

• Clearly State:
  • Methodologies used
  • System Assumptions used in the evaluation
  • System parameters that are varied
  • Performance metrics that are studied
Section 5: Performance Evaluation (2/4)

• Baselines
  • Naïve design
  • Optimal solution (using exhaustive search)
  • State of art baseline
  • Variations of the scheme you proposed
  • Oracle Design (Assume the God)
Section 5: Performance Evaluation (3/4)

- Do not think that the user can figure out everything just by looking at the graph or table

- If you are using graphs/tables to present results, the explanations of these are really critical
  - 1 STC to describe what this experience is about
  - 1 STC to describe the general trend of results
  - 1 STC highlight abnormalities in a graph (if any)
  - 1 STC to choose one date point to explain the different between difference between your solution and baselines.
  - Be objective in this section – if your algorithm fails for some cases, state so – do not gloss over that fact!
Section 5: Performance Evaluation (4/4)

• When presenting graphs:
  • Are x-axis, y-axis clearly labeled in the figure and explained in text?
  • Are font sizes readable (by middle-aged people in the least!)
  • Are legends legible in the figure – it is easy to visually differentiate the different plots in a graph?
  • Rule of thumb: around 5 plots per graph is good (for line plots)
  • Use bar graphs, line graphs effectively - try different means and see which one conveys results better
  • Do not Microsoft Excel – Use gnuplot, matlab, or other packages

• Summarize the key findings from the performance studies in a paragraph at the end of the Section
Section 6: Conclusion

• This is similar to the abstract – but do not cut-and-paste

• 1-2 Sentences to summarize the Problem & Solution

• 1-2 Sentences about the key contributions

• 3 Sentences about Important Lessons Learned

• Acknowledge the Limitation of the Paper

• Potential Future Work
Section X

• Discussions and Future Work
  • You might try to stay ahead of the reviewers by stating your mechanism’s known weaknesses and where improvements are possible
  • Do not sweep dust under the rug

• Acknowledgments (Be specific, Be honest, and be generous)

• Citations (VERY IMPORTANT)

• Appendix
  • Detailed proofs that are not needed in main section; Detailed tables
  • Conference papers (non-theory) usually do not have app.
Summary: Technical Paper Structure

• Specific Structure Varies, but in CS you should always:
  • Describe the problem
  • Explain why it’s important
  • State how you solved the problem
  • Make explicit claims about your approach
  • Support these claims experimentally and/or analytically
  • Place your approach in the context of current and past related work
  • Give directions for future work

• Applies in smaller scale and with variations to proposals and technical papers
Make reviewer’s miserable life easier

Put yourself in other’s shoes

Do not assume others know what you know!
Clear & Brief (1/4)

• **Summarize**: Begin every section with a summary paragraph about what was in this section
  - Without being repetitive, reiterate at the end of long sections, what was presented.
  - Avoid “Obscure Generalization”: It is good to generalize, but over-generalizing makes it very hard to understand

• **Structure**: At the beginning of long subsections with several sub-parts, it is good to summarize the subsection and the organization
  - Avoid a Lack of hierarchy/structure
  - Highlight important statements clearly
Clear & Brief (2/4)

• Avoid exploring all subtleties and refinements of an idea/concept when first presenting it;

• Start with basics and later on, move to finer aspects

• Be aware of the knowledge level of the reader
  • Get feedback from a student in your lab/group first
  • and then someone outside the lab
  • but in CS or related field
Clear & Brief (3/4)

• Avoid footnotes as much as possible
• Do not write long, winding sentences: Short, Simple Sentences are better.
• Do not make statements that: “It is obvious that ...” when it is not readily obvious to the typical reader
• Avoid cliché’s such as “The rapid growth of the Internet has ..”
• Avoid “Checklist” Phenomenon: Stating a bunch of items somewhere in the paper, but not coherently
Clear & Brief (4/4)

- Avoid “sentences with complex logical structures”
  - Use if-then-else statements with bullet lists, if need be

- Use lists (itemized, enumerated) to the extent needed: if there are at least 3 items, that can make a list

- Avoid “Mixture of mathematical symbols and text:”

- Avoid “long and weird notations and terms”

- Avoid abuse of it and this and that – make clear which entity you are referring to, in a consistent way. (data and information, vehicles & cars, etc)
Clear & Brief (4/4)

• Keep it brief.
• Break it up.
• Don’t be self-important.
• Start your paragraphs with topic sentences.
• Don’t write a detective novel.
• Don’t try to handle too many ideas at once.
• Use key words.
• Signpost with transitional phrases.
• Repeatedly summarize.
• Avoid passive constructions.
• Avoid adverbs.
• Delete double negatives.
• Chop off your first paragraph and rewrite.
• Read it out loud.
• Read it again cold.
• Move back and forth between word processor and paper. *Quoted from Peters pp. 231–233* 

Robert Peters’
Words of Wisdom
Responding to Criticism (1/2)

• “The reader is always (well, at least sometimes) right (or at least kinda).”

• Don’t get defensive and start making excuses:
  • “It’s in there!” [Then why didn’t they notice it?]
  • “I didn’t have room!” [Then maybe you should rethink your priorities.]
  • “It’s not important!” [But this reader thinks it is. So the paper has to explain it, or convince her that it’s not important.]

• But ignore “There’s no future work” comments...
Responding to Criticism (2/2)

• Take reviewers’ comments with equanimity
  • Do not lose heart on a reject decision
  • Do not see “red” on errors/flaws being pointed out – look at reviews objectively and be prepared to revise the paper as deemed best by you and advisor
  • Reviewers do point flaws that do not exist

• Each advisor will have his/her writing style
  • Make sure that you confer with advisor before you write papers for submission elsewhere
Outline

- Proposal Writing
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- Team Projects
Proposal Presentation

• One Student or Two Students Present
• Other Team Members for Questions

• 18-min Presentation
  • Timers for 5 mins and 1 mins
• 2-min Q&A
Presentation Structure

• 20 slides
• Introduction 5
• Related Work 2
• Motivation 3
• Main Design 10
Presentation Style

- More Related Pictures
- Figures and Tables
- 6 by 6 (6 lines and 6 words)
- Process Some Data
- Keep it professional
- No Busy Background, Cute Colors, long Sentences
Outline

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# Teams

<table>
<thead>
<tr>
<th>Team</th>
<th>Members</th>
<th>Member 1</th>
<th>Member 2</th>
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<tbody>
<tr>
<td>1</td>
<td>Suhas Kurup</td>
<td>Ziwen Sun</td>
<td>Shuang Tian</td>
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<tr>
<td>2</td>
<td>Ruilin Liu</td>
<td>Sameera Somisetty</td>
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<td>3</td>
<td>Rajarshi Bhowmik</td>
<td>Andrew Cai</td>
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<td>4</td>
<td>Liu Liu</td>
<td>Nivedh Rajesh</td>
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<td>5</td>
<td>Xiaoyang Xie</td>
<td>Vedika Babu</td>
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<td>6</td>
<td>Zhihan Fang</td>
<td>Abdullah Shareef</td>
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<td>7</td>
<td>Jun Hu</td>
<td>Qi Dong</td>
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<tr>
<td>8</td>
<td>Kai Chen</td>
<td>Yiran Sun</td>
<td>Xinhe Gao</td>
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T1: Electric Vehicle Charging

1. **Members:** Suhas Kurup, Ziwen Sun, and Shuang Tian

2. **Topic:** Electric Vehicle Charging

3. **Importance:** Reducing Driving Waiting Time

4. **SoA & Drawback:** *Model-Driven* Approaches & Unrealistic Assumptions

5. **Key Challenge:** Modeling Demand and Supply based on Trace Data alone

6. **Solution:** *Data-Driven* Approaches based on HMM

7. **Evaluation:** E Taxi Fleet Data
T2: Social based Vehicular Routing

1. **Members:** Ruilin Liu and Sameera Somisetty
2. **Topic:** Group-based Vehicular Routing
3. **Importance:** Reducing Overall Times for A Group of Drivers
4. **SoA & Drawback:** *Individual or System-wide*
5. **Key Challenge:** Solving in Real Time & Infer background Traffic
6. **Solution:** *Convex Optimization and GPU-based Implementation*
7. **Evaluation:** BJ Taxi Data
T3: Correlations of Urban Systems

1. **Members:** Rajarshi Bhowmik & Andrew Cai
2. **Topic:** Dependency and Correlation of Urban Systems
3. **Importance:** Fundamental Understanding for smart cities
4. **SoA & Drawback:** *Individual System based Performance Analyses*
5. **Key Challenge:** Infer correlation based on imperfect data
6. **Solution:** *Event and Anomaly-Driven Modeling*
7. **Evaluation:** NYC Infrastructure Data
T4: Approxi Computing for Smart Cities

1. **Members:** Liu Liu & Nivedh Rajesh
2. **Topic:** Approxi Computing for Real-time Services
3. **Importance:** Real-time Decision for Emergency response, etc.
4. **SoA & Drawback:** Offline Analytics and Slow
5. **Key Challenge:** Heterogeneous Big Urban Data to Process
6. **Solution:** *Try Different Combinations by finding dominating factors*
7. **Evaluation:** Shenzhen City Data
T5: Fleet-Oriented Vehicular Tracking

1. **Members:** Xiaoyang Xie & Vedika Babu
2. **Topic:** Tracking Private Vehicles by Commercial Vehicles
3. **Importance:** Infrastructure-less Urban-Scale Vehicle Tracking
4. **SoA & Drawback:** with GPS or in Small Scale
5. **Key Challenge:** Infer missing locations based on previous contacts with minimum commercial vehicles
6. **Solution:** *HMM-based Multi-Fleet Mobile Tracking*
7. **Evaluation:** Shenzhen City Data
T6: Urban Density Modeling based on Multi-Carrier Cellphone Networks

1. **Members:** Zhihan Fang & Abdullah Shareef
2. **Topic:** Density & Mobility Modeling with cellular networks
3. **Importance:** Many Smart Cities services based on mobility
4. **SoA & Drawback:** Single cellular network & Overfitting
5. **Key Challenge:** How to combine heterogeneous info from multiple cellular networks
6. **Solution:** *Convex Optim. based spatiotemporal alignment*
7. **Evaluation:** Shenzhen Data
T7: City-scale Social Events Detection

1. **Members:** Jun Hu and Qi Dong
2. **Topic:** Enhance city-scale social events detection & descript.
3. **Importance:** Find interesting activities and monitoring the whole city through social media streams.
4. **SoA & Drawback:** Single cellular network & Overfitting
5. **Key Challenge:** accurate online detection and large-scale steaming data from twitter, Instagram, and taxicab trajectory
6. **Solution:** *Online Anomaly Detection with large-scale streaming data, e.g., the entropy-based anomaly streaming methods.*
7. **Evaluation:** NYC data?
T8: Bus Route Planning

1. **Members:** Kai Chen, Yiran Sun, Xinhe Gao
2. **Topic:** Enhance Bus Routing.
3. **Importance:** Reducing waiting time & improve ridership.
4. **SoA & Drawback:** Survey-based Approaches & No Real Data
5. **Key Challenge:** How to model demand before or after the planning by determining the reason of a low ridership?
6. **Solution:** *Round trip-based inference and HMM*
7. **Evaluation:** Shenzhen Bus Data
Summary

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