CPSC 9500
(New) PhD Student Seminar

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Great Ideas
Discussion

- Provide one example of a great technical idea from your research area.
- Explain why you think this idea is great.
How to measure “impact”

• In some ways, impact or contribution is subjective.

• As time passes, it is easier to see.
  • Sometimes we can predict these trends (“time travel”)

• To judge, must know the context, and what existed before.

• Occasionally, we look to the leaders of the field to declare impact.
  • ...but sometimes they are the defenders of the old ideas.
The Problem and the Solution Both Matter

• Can take many forms:
  • solves a small problem, much better than before…
  • solves a major problem, slightly better…

• The size of the problem is at least as important as the goodness of the solution.
Research Patterns
Knowledge

• Much of the knowledge critical for research is not written down coherently anywhere

  • What the open questions are

  • What the important questions are

  • What the different alternative solutions to a question are, and were historically

  • What the different alternatives for posing the question are, and are being considered now
General Approach to Research

1. Find a problem
2. Understand the problem
3. Somehow make a plan for a solution, carry it out
4. Review the solution
Finding a Problem

- Hop on a trend
- Find a nail that fits your hammer
- Revisit old problems (with new perspective)
- Making life easier
  - Pain points
  - Wish lists
- “*-ations”
  - Generalization
  - Specialization
  - Automation
- Teach
Planning a Solution

• Consider related problems
• Make analogies
• Change the problem to one you can solve
• Just start, with anything
• Consider nature
• Work backwards / divide-and-conquer
• Think in speech or pictures
• Let your subconscious work
• Teach
Heilmeier’s Catechism

• A set of questions credited to Heilmeier that anyone proposing a research project or product development effort should be able to answer.

  • What are you trying to do? Articulate your objectives using absolutely no jargon.
  • How is it done today, and what are the limits of current practice?
  • What's new in your approach and why do you think it will be successful?
  • Who cares?
  • If you're successful, what difference will it make?
  • What are the risks and the payoffs?
  • How much will it cost?
  • How long will it take?
  • What are the midterm and final "exams" to check for success?