Graduate School Tips

CPS 701: Introduction to Graduate Study
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DUKE
COMPUTER SCIENCE

1

Assignment

Due in 4 weeks, on October 9

- Talk to your advisor or potential advisor or a senior student
  - Get recommendation of a recent and/or important paper in an area/project that interests you
  - Get a sense of the important publication venues in this field
  - Get recommendation on document editing, reference management, and literature search tools
- Read the suggested paper
- Find a few (between 2 and 5) related papers; skim them
- Prepare a BibTeX file of all above papers
- Prepare a short document ($\leq$ 2 pages)
  - Summarize (in your own words) the paper you read
  - Write a few sentences about each related paper

2

Tools of the trade

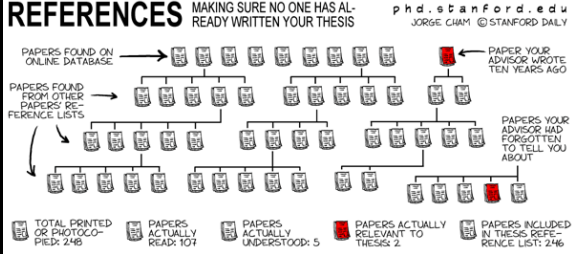|	My current choices
Document editing	LaTeX + Emacs + make Occasionally Word 2010
Reference management	BibTeX + Emacs + make
Presentation software	PowerPoint
Web authoring	Emacs + XML + scripts Wiki + XML + scripts
Graphing	Gnuplot, Matlab
Drawing	Xfig with LaTeX PowerPoint + PDF/EPS export

Again, the "Resources" panel of the course website has many useful pointers

3

On finding related work

http://www.phdcomics.com/comics/archive.php?comicid=286

4

On finding related work (really!)

- Ask your advisor, who can offer good starting points and see not-so-obvious connections
- Follow citations (forward & backward)
- Google (Scholar) + online databases (e.g., ACM DL, DBLP)
  - Need to build up a list of useful keywords
- Rank using citations/venue prestige
- Routinely check top venues
- Share with fellow students (reading groups, journal clubs)
- Talk to people at seminars, conferences, ...
- Talk to those outside your field
  - Start with your fellow grad students!

5

Deciphering academese

http://www.phdcomics.com/comics/archive.php?comicid=405

6

How to read a paper

Above all, question authority

- Identify the problem being solved
- Attack the problem yourself, without looking at solutions
  - At least come up with their "strawman" solution
  - Might even get a better solution!
- Read their solution and compare it with yours
  - Are you convinced which one is better?
- Write a short, poignant summary; record in your bib db
  - Don't just copy their abstract
  - Keep additional notes in your bib db when you revisit the paper or discuss it with others

7

On reading motivation

- Is the problem new?
- Is the problem important?
- Is the problem interesting?
- Is the problem contrived?

- Learn how people make good/bad pitches
  - Some papers overstate/understate their applicability
  - Can you do better?
- Come back after finishing reading: did they solve the same problem motivated earlier?

8

http://www.ludumdare.com/compo/wp-content/uploads/2008/12/no_motivation.jpg

On reading evaluation

- Do the experiments tell you anything new?
  - Many simply confirm the obvious!
    - E.g., # of ops counted analytically vs. measured
  - How do you make it more interesting?
- Is the paper trying to hide something?
  - Unexplained "magic sauce"
    - E.g., how to tune a parameter
  - Choices of workloads and parameter ranges
    - E.g., synthetic datasets, unreal uses of real datasets, or x-axis covering a small range
  - Choices of performance metrics
   - E.g., an index costs 1/10 of the I/Os incurred by a full scan—great?

9

http://www.pjcj.net/yapc/yapc-eu-2007-gluing-a-bank-together/slides/images/investigate.jpg

Other reading tips

- Read related work carefully
  - A glimpse at the bigger picture and pointers to follow to learn more about the problem/area
  - Think beyond their related work discussion
    - Congrats if you uncover non-obvious connections to other areas!
- After you finish reading
  - What is the "take-away" message?
  - Think about future work
    - What assumptions can be relaxed or introduced?
  - Learn to appreciate their contributions
- Don't judge what a paper is about by its abstract
  - Corollary: if you cite it, better read beyond the first page!

10

Importance of planning

http://www.phdcomics.com/comics/archive.php?comicid=360
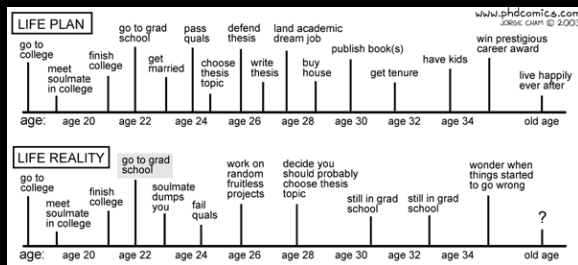
11

A fictional PhD student: Year 1

- Took many courses and aced them, like he always did
- Courses/TA took most of the time, but he was taking care of quals (and without exams!)—so no time was wasted?
- Met with a couple of professors, got papers to read, showed up in group meetings, but didn't have time to "do" much
- Thought he could declare Prof. as advisor at the end of Semester 2, but Prof. wouldn't commit
  - Got placed on departmental probation
  - Cursed the other student whom Prof. did take
- Couldn't take advantage of the RIP initiative
 - So what? Got a well-paid programming job in the summer

12

A fictional PhD student: Year 2

- Thank God Prof. *B* took him!
- Late RIP proposal was rushed and half-baked; committee wanted an extra progress report!
- After the progress milestone, Prof. *B* didn't think the defense would be ready until summer
  - Told by Prof. *B* to "prove himself" in the summer or else he would get no funding next year!
- Spent the summer finishing RIP while watching other 2nd-years getting cool internships at research labs or working on their prelim

13

A fictional PhD student: Year $n \geq 3$

- Had to do more work in Semester 5 to turn RIP results into a submission
- Realized the approaching prelim deadline, but still had no topic
  - Thank God the Grad School extended deadline to Semester 7
- Requested extension again because Prof. *B* didn't think prelim was ready
  - No *Saved by the Bell* in grad school
  - Pass by the end of Year 4 or withdraw

http://www.cartoonstock.com/newscartoons/cartoonists/tzu/lowres/tzun1102l.jpg
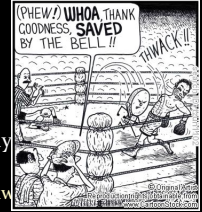
14

Team discussion (20 min.)

- Knowing what went wrong for these fictional characters, how would you plan your own PhD/MS career?

http://pattersonenterprisesltd.com/upload/HomePageBlocks/CareerPlanning_0000l1456450XSmall.jpg

15

Team assignment...

16

A reasonable PhD schedule

Year 1
- Talk to faculty, attend seminars and group meetings this fall
- Declare advisor early in spring
- Form committee and do RIP proposal before summer
- Earn 3 (or least 2) quals credits
- Focus on courses in your area (or related areas) and do projects that impress your potential advisors
- TA in spring

Summer 1
- Whatever you do, stay in touch with your advisor
- You may be offered an RA:
  - RIP initiative makes it easier for advisors to fund you
  - Take it—at this stage it's often better than a higher-paid coding job

17

PhD schedule: Year 2

Year 2
- Full speed ahead with your research
  - Goal: a publishable piece of work for RIP
- Pass the remaining quals
- Focus on courses useful to your research
  - Follow your advisor's advice; no need to meet all course requirements yet
- TA in fall or spring; may even be deferred or waived
- Confirm future funding arrangement with your advisor

Summer 2
- Continue working with your advisor, to get a head start on prelim
- Or, find an internship relevant to your research
  - Use your advisor's connection

18

PhD schedule: Year 3

Year 3
- In fall, decide on your dissertation direction
  - Check with your advisor for classes to take before prelim
- Obtain initial results, and publish more on the way
- Get your committee together by early spring, and write/defend your prelim
  - Part of it is a dissertation proposal: not a contract, but a demonstration that you are "ready," e.g., able to propose a research agenda suitable for PhD
    - Check with your committee for scope and expectation
  - Extensions must be approval by the Graduate School
    - Extensions beyond Year 3.5 are rarely granted

19

PhD schedule: Year $n \geq 4$

Years 4 to $n-1$
- Research, research, research...
- Wrap up course requirement; you can always take/audit more to expand your horizon and stay up-to-date

Year n
- Your last spring will be packed by interviews, writing, and defense
  - Job hunting starts earlier and takes more time than you think
    - For academic jobs, applications start in late fall
- Get bulk of your work done before last fall!

20