CSC 595 - Research Skills

Why do a PhD?

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Today’s lecture

- Gaining an understanding of a PhD in many ways
- Useful if:
  - You’re starting a PhD now
  - You’re doing a Master’s and may consider a PhD in the future

Exercise

- What is your ideal job?

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- Does it require doing a PhD?

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- What is your ideal job?

- Does it require doing a PhD?

- If not, would you be better able to get the job (or perform better in the job) if you did a PhD?

What does a PhD unlock?

- Recognized as an expert
  - Note: with PhD comes great responsibility - people may put a lot of trust in your advice
- Unlocks some jobs: postdoc*, professor, research scientist, research managers (usually), the attractive industrial researcher positions (the ones where you have some autonomy)
- Invitations to more senior roles (area chair for conferences), more credibility for organizing workshops
- If staying in academia, you'll have lifelong friends in a community of experts

* dream job…

What is the lifestyle of someone who has a PhD?

this is for academia

- Think for a living
- Love what you do
  - Choose what you work on
  - When you work on it
  - Who you work on it with
- Travel
- Opportunity for long-term impact, including shaping future researchers
- Being immersed in a community with fresh ideas (young people)
- Access to experts from many areas (university setting)
- Flexibility to change directions, be rewarded for learning new things
- Job stability
- Comfortable lifestyle (not rich, but comfortable)

What do you gain from the process of doing a PhD?

- Deep expertise
- Payoffs:
  - the knowledge itself
  - you may get invited to events involving other experts with similar expertise
  - opportunity to be at the forefront of developments in this area (should you choose to stick with it)
  - poised to push for a paradigm shift (a revolution) should you be choose to do so (requires strong reputation in community)

What do you gain from the process of doing a PhD?

- Great breadth of knowledge
- Payoffs:
  - Higher ability to generate new ideas
  - Higher ability to reach out to experts in other areas
  - Higher ability to understand experts from other areas when they reach out to you
  - Bonus: it’s cool to know more stuff!

What do you gain from the process of doing a PhD?

- Ability to work with high level of independence
- Payoffs:
  - You decide what you work on
  - You can come up with problems and pitch them to other people, which implies…
  - …you can be the lead in a research collaboration
  - You can start a movement (careful here… recall “great responsibility”)

What do you gain from the process of doing a PhD?

- Many other skills
  - Teaching skills
  - Learning what your limits are and dealing with high-pressure situations (deadlines)
  - Critical thinking (from discussions/arguments with friends, advisor, reviewers, etc.)
  - Presentation skills (from giving external talks, internal seminars, etc.)

What does a PhD require?

- High amount of intrinsic motivation and high drive
- Intelligence? A reasonable amount, but you have enough if you got into a program so don't worry! **Motivation/passion/drive** are what truly need to be high
- High emotional strength, ability to deal with isolation from independent work
- Be absolutely certain you want to do a PhD
- Make sure what you do in your PhD is for you (not your advisor, not anyone else)
    - If you find yourself asking your advisor "is this what you wanted", etc., ask yourself if you are doing the project for your advisor or if you are doing it for yourself

What is the path of a PhD?

- When I started my PhD, the average length for computer science PhD (without Master's) was 6.1 years. Recent stats seem to be similar. Beware suggestions that you can do a PhD in 4 years. Expect at least 5 years, even if you already have a Master's.

- Initially, more courses*… but not too many simultaneously; research is main priority

- Satisfy the breadth requirement

- PhD proposal - a major endeavor, with at least one completed (and ideally published) work

- PhD defense - sometimes very soon after proposal; depends on maturity of proposal

- Get a job - Pro-tip: don't schedule PhD defense until next job is lined up. This requires a patient advisor…

* How about extra courses (beyond requirements)? Careful here… if they may be influential for your research, it's ok to take a few extra courses.

(for Master's thesis students): What is the path of a Master's?

- Initially, more courses… but always balance with research (main priority)
- Start research the very first semester. Research takes time.
- If one project finishes in a year, second year can be a higher risk (higher reward) project, and now two options for the Master's thesis
- Do grades matter? Yes, if you plan to pursue a PhD, or if you wish to get fellowships. For "great research" track, target only getting A's (so, not too many courses at once)

Evaluation after PhD

- No one cares what grades you got during your PhD
- It is rare that anyone will read your thesis.
    - Possibly, no one on your **committee** read your thesis! (even though they're supposed to read it)

Evaluation after PhD

- So, how are you evaluated? For faculty jobs:
  - How many good papers (at top venues) you have
  - Your prominence in the field (standing), including what awards you've received
  - Above all else, how strong your letters of recommendation are.
  - Far down the road: for faculty job interviews, job talk and meetings with faculty are really important

Evaluation after PhD

- So, how are you evaluated? For industrial researcher jobs:
  - Similar to faculty jobs, but industry may have more specific and (aside from the very top positions) more applied interests
  - Letters of recommendation may play less of a role

Academia vs Industry

- Pros of academia:
  - Freedom!
    - Choose what you do
    - Who you work with, including how many people
    - Flexible hours
  - Long-term job stability
  - Long-term impact
  - Opportunity for deep exploration
  - Respect

Academia vs Industry

- Pros of industry:
  - Money!
  - More structure
  - Clearer directions and problems
  - More short-term stability (routine)
  - Focus on end-to-end solutions
  - More direct impact
  - More time to attack problems
  - More teamwork

What a PhD is not

- A way to get rich
  - low pay during PhD, and time spent in PhD means less time getting salary increases in industry
  - industry pays way more than academia (expect a factor of 3 or 4 for machine learning jobs)
- Something to do because you don’t like anything else
  - Must like the process of getting a PhD, and need very high amount of intrinsic motivation
- A way to get a specific job
  - Should also like the process of getting a PhD
- A way to take more classes (glorified undergraduate degree)? No
  - Misses the point of PhD, and advisor won’t be happy if this is your reason!
- A way to be a professional TA…

Have checkpoints to think about the long-term

- When in a PhD program:
  - Occasionally check if a PhD is right for you. Long time commitment and lost opportunities if it isn't for you
  - Consider how you can progress so that you have what you need by the time you finish:
    - Personal development (skills to improve)
    - Network (people who will write strong letter)
    - Papers (consider rate of progress, flexibility of advisor to keep funding you until ready to graduate). But be optimistic here. Progress often accelerates near the end
- Doing a PhD can have immense reward and be a very fulfilling, fun, and happy experience