Research Methods
in computer science

Spring 2017

Lecture 1

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Class Introduction

Introduction

    Name

    Research Group/Advisor

    Year(s) at UH

    Undergrad institution/country/city

Why do a PhD?

Some possible reasons

Like research

Want to get a research/faculty job

Learn how to read and write

Leadership in technology

Acquire analytical and technical skills

Objective

Learn how research is done
in computer science

Improve research
productivity

PhD Skills?

What skills do we need to do a PhD?

- – To become a good researcher
- – To become an effective and productive technologist

Topics Covered

Papers: Read, write, evaluate

Presentations: create, perform, evaluate

Other topics

- Research thinking
- Graphs and visualization
- Tools
- Statistics and data analysis
- Experiment design

Guest Lectures

Other faculty and experts in research, writing, presentation will come to the class to share their ideas.

Important to understand different views and emphasis. They may be your co-advisor, peers, or thesis committee member.

Who Should Take this Course?

Ph.D. Students in early career

MS Thesis students

Administrative Information

3 credits

Can use this course in place of 6110

File a petition requesting substitution

Meet Mondays/Wednesdays at M111

Office hours Mondays 230-330pm

http://www2.cs.uh.edu/~gnawali/courses/cosc6321-s17/

Grading

Pass/Fail

To Pass

    Submit all homeworks

    Each homework graded 0 or 1

    Average grade must be > 0.8

    Participate in activities (conference, etc.)

Topics for today

PhD and Research

What skills do we need to be successful?

The concept of deliberate practice

PhD

Courses?

Research?

Networking and other activities?

Research

Research comprises "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of humans, culture and society, and the use of this stock of knowledge to devise new applications." It is used to establish or confirm facts, reaffirm the results of previous work, solve new or existing problems, support theorems, or develop new theories.

https://en.wikipedia.org/wiki/Research

Some research is theoretical and involves developing and analyzing new algorithms and techniques and some is more applied and involves experiments, design, implementation, and testing. In every case, research is an enterprise of intellectual exploration that seeks to advance our field.

http://conquer.cra.org/students/what-is-research-in-computer-science

Skills

What skills do we need to do research?

How to create knowledge?

(Practical) How to produce output such as: paper/presentations/software?

Deliberate Practice

Observe

Find good papers and presentations

Study the content and style

Identify Skills

Compare with your habits/skills/outputs

Details (not high level like "writing")

Practice

Drills to challenge and improve

Iterate with feedback

Assignment 1

Please describe two topics of interest in Computer Science, one in your area of research and one outside your area of research. Each paragraph has three components:

- Title reflecting the topic, not just area of research. You can take a look at how paper titles are constructed to get an idea on how to write the titles for your paragraphs.

- Clear and short explanation of the topic, understandable to a broader CS audience.

- A short description of the reason you find the topic interesting. The reason could be related to the impact you want to create, inspiration from the past, what you enjoy doing or thinking about, or other reasons you find the topic interesting.