Homework #1: Reading, Finding, and Connecting with Research

Due September 3, 5:00pm

The goal of this first assignment is to start laying the foundation of Computer Science research. We will do this by starting to consciously think about how to **read** scientific papers, how to **find** relevant papers, and how to **connect** them back to topics you come across in non-research settings.

1 Readings

Read the following (short) articles. There are links to them on the Schedule page:

- "How to Read a Paper", S. Keshav, in *ACM SIGCOMM Computer Communication Review*, Vol. 37 No. 3, July 2007.
- "Google's Hybrid Approach to Research", A. Spector, P. Norvig, S. Petrov, In *Communications of the ACM*, Vol. 55 No. 7, July 2012.
- "Is Computer Science Science?", P.J. Denning, In *Communications of the ACM*, Vol. 48 No. 4, April 2005.

Writing Task #1: Research Impact. For future (more research-oriented) papers, you will need to write a synopsis and insight into the work, but for this first assignment, instead please comment briefly (on the order of one to two paragraphs) on the following:

> The Google article uses the word "impact" often—in fact, this is a phrase that gets thrown around quite a bit in many communities, including among researchers. What do you think "research impact" is? What impact can/does Computer Science research have on computer users? on industry? on society? What impact might research have that traditional "engineering" might not, and vice versa?

2 Relating research to your classes

One of the goals of this course is to help prepare you to see research questions in all walks of life, so let's get started with something you experience on a daily basis: classes! The classes you take cover topics that have their roots in research—in fact, many are still active areas of research.

Pick a class you have taken (or are currently taking) in Computer Science (or a non-CS class that had a CS-related topic). Pick a topic covered in that class (e.g., an algorithm, approach, study, etc.) and find a research paper on that topic.

Finding a paper on a topic. There are many ways to perform a literature review, and we'll discuss how to go about doing that in a future class. But to get things started, there are a couple things you can turn to. What I tend to turn to first is Google Scholar (https://scholar.google.com). This lets you search for specific topics, authors, and references in academic publications. It also provides multiple links to most papers, allowing you to find freely accessible copies of most papers. Also, many Wikipedia articles on Computer Science topics contain references to some of the seminal papers: *Do recall that the Wikipedia article is not the citable source, but some of its references can be.*

Writing Task #2: Finding related research. Once you have found one of the research papers that introduced some of the concepts from a class you have taken or are taking, read it, summarize the contributions of the paper, including (on the order of one to two paragraphs):

- What is the topic/class you chose; what are the name and authors of the paper, and where was the paper originally published?
- What was known / what was the state of the art before the paper?
- What was the problem stated in the paper (and did this differ from how the problem was formulated in your class?)
- What did the paper add to the body of knowledge?

It's ok to keep this at a high level for now—we will focus on how to review and critically analyze papers later—the goal of this assignment is to get a sense of the fact that most of what you learn in class is a culmination of CS research projects. But certainly demonstrate you did more than just read the abstract!

For example, if you chose algorithms, and you covered shortest path algorithms, you might pick Dijkstra's "A Note on Two Problems in Connexion with Graphs" which introduced "Dijkstra's algorithm" for finding shortest paths. But you need not be bound to such early papers; feel free to pick something more recent (online ads, recent attacks, genome sequencing, natural language processing, etc.).

Expanding on class material. Make it a habit to look up papers on the topics you cover in your classes, and the follow-up work, as well! This can be a great way to supplement your knowledge of the material, and to discover what new results build off of what you cover in class. (To see which papers explicitly reference a paper you have found on Google Scholar, click on the "Cited by..." link for that paper.)

3 Submitting

Submit through the class HotCRP site: https://hotcrp.cs.umd.edu/396h/ as *reviews* to "Homework 1". (Do not create a "new submission".) These are due by 5pm the day before the next class, to give us time to read through all of them and discuss them during class.