Research Methods in Human-Centered Computing (CAP 5108)

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Grading

• Project (50 points)
  – Project pitch on Jan 17 (10 points, group)
  – Project update on Feb 9 (5 points, group)
  – Final movie (10 points)
  – Four page write-up (25 points, where 5 points are by peer grading)
  – Best project by class vote (Extra Credit 5 points)

• Mid-term exam (20 points)

• Ethics training (10 pts)

• Class Participation (20 points)
  – Answer a question asked by a fellow student in class (2 points)

• Extra credit options: Best project (5 pts), study participation (2pts per study, upto 10 pts maximum)
Expectations

• Individual vs group assignments
  – Plagiarism is very bad
  – “Discussed with XYZ”
• Pick a team you can work with
• There will be no make up assignments. In case of absence, you will have the option to apply your project writeup points to that assignment.
• Late policy: -1 point for every day past deadline. This really only applies for the assignments that need to be turned in.
• I am a stickler for formatting. There will be points taken out for not sticking to the correct format ( font, page limit, time limit ).
• You get out of school what you put into it!
Communication

• You are expected to attend class. Canvas and email lists are an aid — expect that important announcements will be made in class because I like to take your feedback into account while changing dates etc.

• I have a poor memory for logistics — when in doubt, refer to class syllabus or webpage. If there is confusion, bring it up in class so that we can address it for all students together.

• I repeat — the above point is important. If you ask me the due date for an assignment over email, I will not reply because I know that I will get it wrong : )
Long history of experimental research

• Pavlov’s Conditioning Experiment (http://clipsforclass.com/learning)
• Do Video Games Teach People to be Violent (http://www.macmillanhighered.com/catalog/static/worth/vtkpreview/VTK_Psychology/clip25.html)
Research – Definition #1

• Research is…

Careful or diligent search

• Examples
  – Searching one’s garden for weeds
  – Searching a computer to find all files modified on a certain date
Research – Definition #2

• Research is…

Collecting information about a particular subject

• Examples
  – Survey voters to collect information on political opinions in advance of an election
  – Observe people using computers and collect information, such as the number of times they
    • Consulted the manual
    • Clicked the wrong button
    • Retried an operation
    • Uttered an expletive
Research – Definition #3

• Research is…

Investigation or experimentation aimed at the discovery and interpretation of facts, the revision of accepted theories or laws in light of new facts.

• Example
  – Design and implement code to compare two object recognition methods
  – Design and conduct a user study to test whether a new interaction technique improves on an existing interaction technique
Experimentation

• A central activity in HCC research
• Increasingly, many areas of computer science are relying on empirical validation (e.g., Evaluation sections in papers)
• In the HCC context, an experiment is sometimes called a *user study* or a *human-subjects experiment*
• Increasingly valued by companies e.g. A/B Testing by Google is a free course on Udacity
• Formal, standardized methodology preferred
  – Brings consistency to a body of work
  – Facilitates reviews and comparisons between different user studies
Points to ponder

Problem definitions in research are different from homework problems,
– open-ended, require you to fill in the details,
– need to be proactive with looking for resources in the library or on Wikipedia or Google
– this is not just true of academic research, but any real-life endeavor — so it’s well worth the pain to get this experience ahead of entering the work force.
Let’s look at some other characteristics of research that are not encompassed in the definitions…
Research Must Be Published

• Publication is the final step

• Also an essential step

• *Publish or perish!* – Edict for researchers in all fields, and particularly in academia

• Until it is published, research cannot achieve its critical goal:
  – Extend, refine, or revise the existing body of knowledge in the field
Peer Review

• Research submitted for publication is reviewed by peers – other researchers doing similar research

• Only research meeting a high standard of scrutiny is accepted for publication
  – Are the results novel and useful?
  – Does the evidence support the conclusions?
  – Does the methodology meet the expected standards for the field?

• Accepted research is published and archived

• The final step is complete
Research Must Be Reproducible

- Research that cannot be replicated is useless
- A high standard or reproducibility is essential
- The research write-up must be sufficiently detailed to allow a skilled researcher to replicate the research if he/she desired
- The easiest way to ensure reproducibility is to follow a standardized methodology
- Many great advances in science pertain to methodology (e.g., Louis Pasteur’s detailed disclosure of the methodology used in his research in microbiology)
- The most cited research paper is a “method paper”¹ (see Google Scholar for the latest citation count)

Research Methods

• Observational method
• Experimental method
• Correlational method
Observational Method

• Example methods:
  – Interviews, field investigations, contextual inquiries, case studies, field studies, focus groups, think aloud protocols, story telling, walkthroughs, cultural probes, etc.

• Focus on qualitative assessments (cf. quantitative)

• Relevance vs. precision
  – High in relevance (behaviors studied in a natural setting)
  – Low in precision (lacks control available in a laboratory)

• Goal: discover and explain reasons underlying human behaviour (why or how, as opposed to what, where, or when)
Experimental Method

• Aka scientific method
• Controlled experiments conducted in lab setting
• Relevance vs. precision
  – Low in relevance (artificial environment)
  – High in precision (extraneous behaviors easy to control)
• At least two variables:
  – Manipulated variable (aka independent variable)
  – Response variable (aka dependent variable)
• Cause-and-effect conclusions possible (changes in the manipulated variable caused changes in the response variable)
Correlational Method

• Look for relationships between variables
  – Example: are user’s privacy settings while social networking related to their age, gender, level of education, employment status, income, etc.

• Non-experimental
  – Interviews, on-line surveys, questionnaires, etc.

• Balance between relevance and precision (some quantification, observations not in lab)
• Cause-and-effect conclusions not possible