What Is (And Isn’t) HCI Research?
Announcements

Readings: the magic of Stanford's library proxy

Project brainstorm 1 due next Friday

Watch your email for discussant assignments being sent out
Why are we here?

This is a good class for you if: you are looking to get engaged in HCI research or theory, or want to deepen your understanding of it.

HCI Research is a graduate-level research seminar course, not your typical HCI project course. It requires mastery of HCI concepts or concepts in adjacent fields.
Research vs. practice

Research introduces a fundamental new idea into the world of human-computer interaction.

This fundamental new idea is called a contribution. Research contributions follow a formula:

The bit: Industry and other researchers all thought one way about a problem

The bit flip: “No, let’s do it this way instead.” The researcher offered a new perspective that nobody had ever considered or made feasible before. They proved out their idea as the better approach.
Research vs. practice

Research contributions in HCI articulate a high-level approach to design, or a social scientific insight. While they are situated in a particular context, ideas are generalizable and can be applied to new situations.

Examples from last class: making bits tangible, sensing exercise activity using accelerometers, embedding interfaces into clothing, projecting interfaces and using a depth sensor to detect interaction
How do I know?

For design and engineering ideas

Ask yourself: is it possible to solve this problem using a set of techniques that is already known?

  If so, it is not research.
  If not, it is more likely to be research.

Ask yourself: has this technique been introduced in other HCI contexts?

  If so, it is not research.
  If not, it is more likely to be research.
How do I know?

For design and engineering ideas

Ask yourself: is the problem one that is known to the HCI community?

  If so, it is not research.
  
  If not, it is more likely to be research.

A good idea may be old news! (Ex: Apple Watch)
Address a new problem with an old solution

Activity recognition (new) solved with off-the-shelf ML (old)

State of the literature

Address an old problem with a new solution

Hard to convince the world

Address a new problem with a new solution

ESP Game

Address an old problem with a new solution
Answer a new question with an old method

Solve a new problem with a new technique

Reasoning about invisible algorithms in news feeds

Hard to convince the world

State of the literature

Answer an old question with a new method

Tie strength and Facebook use
How do I know?

For social science ideas

Ask yourself: is this phenomenon describable or is this question answerable using our existing social scientific knowledge?

If so, it is not research.

If not, it is more likely to be research.

A good idea may be old news! (Ex: People using Wikipedia a lot but rarely contribute content — social loafing and diffusion of responsibility)
Examples
“Location sensing to autoshare shopping habits.”

Could be research if:

- Nobody has ever proposed shopping as a problem
- Your solution generalizes to other problems
  - e.g., sensing location based on smell
  - e.g., public shaming to change behavior

Probably not research if:

- You are applying a solution that we know about already to a problem that we know about already
“A mirror to show me how I’d look if I lost weight”

Could be research if:

Nobody has ever studied how people use technology to envision health outcomes

Your solution generalizes to other problems and has never been demonstrated before (e.g., a model that generates realistic weight loss alterations)

Probably not research if:

You are applying a solution that we know about already to a problem that we know about already

e.g., this is solely a user-centered design project

e.g., you are not contributing a new technique or domain
“Researching the new hot app SnortChat.”

Could be research if:

- SnortChat exemplifies an interesting point in the design space, and we use it to understand that design space.
- Theories suggest that SnortChat should work one way or should not succeed, but it’s the opposite.

Probably not research if:

- You have trouble articulating what broader design choice SnortChat is an example of.
- We have studied applications like SnortChat in the past, and SnortChat works the same way.
- You have to put the word “researching” in the title.
“I’m doing research already!”

Great! You have two options for your final project.

The “Macro” option

Continue on your research path with the faculty member
Write up the overall project as your final project submission

The “Micro” option

Carve out a sub-research problem of the larger project, or a riff on the project, and tackle it end-to-end within the scope of the class

Either way, submit the idea brainstorm with your team. The point of the assignment is to train you to articulate research concepts.
Social Computing

Michael Bernstein
CS 347
Human-computer interaction
Ubiquitous computing
Social computing
Social computing goals

Design systems that create new forms of human interaction

Draw on the technology-mediated nature of the medium to understand human social interaction
Sociotechnical system

Social interactions define the system

Technical infrastructure defines the system

The two components are interrelated and both responsible
Why we use this term: it captures that the technical elements of the system are not enough to determine its behavior or outcomes.

- Wikis don’t imply Wikipedia as the outcome
- Short text messages don’t imply Twitter as the outcome

“Sociotechnical systems” emphasizes that it’s the interplay of the tech and the people in the system that make it tick.
The intellectual challenge of social computing [Ackerman 2000]

“The social-technical gap is the divide between what we know we must support socially and what we can support technically.”

The social sciences teach us mechanisms that are important for effective social interaction. But we lack designs that facilitate those mechanisms.

Intuitively: we know how to throw parties IRL, but generally not how to engage those same mechanisms online.
Major research questions

Technological mediation lowers some transaction costs to connect with others, and increases other transaction costs. What new forms of social interaction might this produce?

How do we encourage pro-social behaviors, and regulate anti-social behaviors?

Current hot topics include:

- How social media users are influenced by invisible algorithms that change their experience
- How to empower underserved communities to organize and resist
Major research questions

Sociotechnical systems offer a new lens onto traditional social science theory:

How has technology-mediated interaction changed our relationships with each other and with the world?

By observing or manipulating the technology platform, can we learn how people interact with each other?
From Social Science Theory to Social Computing Research
New data, new theories

Social science theory was built around a world where most interactions occurred offline.

Do online interactions allow us to observe social behavior in new ways, allowing us to extend or complement offline theories?

Do online interactions create new forms of social behavior that require new theory?
Predicting Tie Strength

The Strength of Weak Ties [Granovetter, Am. Jour. of Soc. ’73]

Strong ties: a small number of people you know very well

Weak ties: your large number of acquaintances

Theory: your weak ties are bridges to other parts of the network; they can help you find jobs and information

How well can you predict tie strength observationally using social media?
Predicting tie strength

[Gilbert and Karahalios, CHI '09]

Most predictive:

- Days since last communication
- Days since first communication
- Wall words exchanged
- Mean strength of mutual friends

![Diagram showing tie strength metrics and their contributions to Adj. R² = 0.534, MAE = 0.0994.]
Social capital

Collective benefits derived from involvement in social environments

In other words: friends with benefits

Bridging social capital

  Social capital built up with a community or across groups (e.g., Stanford students)

Bonding social capital

  Social capital built up between close friends and family
Social capital in social network sites

Facebook usage increases all types of social capital, especially bridging social capital

[Ellison, Steinfeld and Lampe, JCMC ’07]

Regression predicting bridging capital scale

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<tr>
<td>Facebook (FB) intensity</td>
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Emotional contagion

[Kramer et al., PNAS ’14]

If you see positive or negative status updates via social media, does it put you in a more positive or negative mood?

Method: selectively hide positive or negative status updates, and measure how many positive and negative status updates were posted.
LabInTheWild
Buzzfeed-ifying online studies through narcissism

What is your website aesthetic?
Compare your visual preferences to people around the world. This experiment takes

How good is your implicit memory?
Have you ever had a gut feeling about something? Your implicit memory might have

What is your thinking style?
Find out how your thinking style compares to others. This experiment takes around 5

Quantifying Visual Preferences Around the World
Katharina Reinecke
Krzysztof Z. Gajos

Copyright © 2014 ACM ISBN/14/04...$15.00.
Design innovations
Answer Garden
[Ackerman and Malone, OIS ’90]
The original Stack Overflow, Quora, Piazza
An “organizational memory” system: knowing what we know
Main idea: members leave traces for others to solve their questions
Games with a Purpose

Label every image on the internet using a game

[von Ahn and Dabbish, CHI ’06]
Scientific Collaboration

FoldIt: protein-folding game. Amateur scientists have found protein configurations that eluded scientists for years.
Flash Teams

[Retelny et al., UIST ’14]

Computationally-guided teams of crowd experts supported by lightweight team structures.
Input: high-level script outline
Output: ~15 second animated movie

Our example:
44:40 hours
$2381.32
Data-driven interaction
Collaborative filtering

Learning from one user’s behavior to predict another user’s behavior

GroupLens, aimed at personalizing and filtering usenet [Resnick et al., CSCW ’94]

This paper is one of the highest cited HCI papers of all time! It is the foundation of every modern recommender system (e.g., Netflix, online shopping, …)
Collaborative filtering

General idea: identify rows that behave similarly to the one you’re trying to predict, and identify columns that behave similarly to the one you’re trying to predict.

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Emergent programming practice

[Fast et al., CHI 2014]

```ruby
1 name = "Ethan Fast"
2 lc_name = name.downcase!
3 #=> "ethan fast"
4 # But downcase! has a side-effect.
5 # It changes the value of name.
6 name
7 #=> "ethan fast"
8
9 Warning: Line 3

Codex observes
var0 = var1.downcase
more than 200 times, but
var0 = var1.downcase!
only 1 time.
```
A sample of active topics in social computing
Harassment and moderation

Moderating content or banning substantially decreases negative behaviors in the short term on Twitch. [Seering et al. 2017]

Reddit’s ban of /r/CoonTown and /r/fatpeoplehate due to violations of anti-harassment policy succeeded: accounts either left entirely, or migrated to other subreddits and drastically reduced their hate speech. [Chandrasekharan et al. 2017]
Harassment and moderation

Friends intercept harassing emails before they appear in your inbox [Mahar, Karger and Zhang ’14]

SQUADBOX

Fight back against harassment.

Try it out!

Put a squad of trusted friends, volunteers, or paid moderators
Encouraging collective action online [Salehi et al. 2015]

Powering change on MTurk

We are a community of 485 Turkers and growing...!
Algorithms and sociotechnical systems

Many are unaware of the algorithms mediate their social interactions [Eslami 2015]

To what extent are bots spreading fake news? [Vosoughi, Roy, and Aral 2018]

When people are made aware that algorithms might be creating content in their social systems (e.g., writing AirBnB profiles), people lose trust in any content that they believe to be AI-authored [Jakesch 2019]
Social computing contributions

Using sociotechnical systems as a lens to better understand human social behavior

  e.g., How do we grow friendships? What role do they play as we undergo major life changes?

Creating sociotechnical systems that demonstrate new kinds of social or collective behavior

  e.g., How might the internet come together to write the Great American Novel?
Discussion

Find today’s discussion room at http://hci.st/room