

Research Methods in computer science

Spring 2026

Lecture 8

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Agenda

HW2 group activity

Recap: Research paper structure

CS Experiments

HW4

Recap: Research paper structure

Related Work Regrets

Ideally

- Situate the work in the context of a larger community of scholarship. What's new about this work? What inspired it?
- Provide credit and attribution for methods and ideas that are important to the work, but are not original to the paper.
- Provide concrete support for empirical claims made by the paper.

Reality

- Provide proof that the authors know what they are talking about, because they've clearly read a lot of papers.
- Provide proof that the work "belongs" in your journal or conference, because they cite the bigwigs in your field.
- Provide proof that the authors weren't the first people to make an otherwise unsubstantiated claim.
Provide lists of people who do related things, so they can be used as reviewers.
- Avoid pissing off the reviewers who do related things, since they might be upset if they weren't cited.

Signs of poor related work

Laundry list of summaries

No explicit relation to the proposed work

Lack of organization

Not putting one's work in the context of the field

Other symptoms

- Old papers

- Papers from limited number of sources

The Body of the paper

Depending on the area of work may describe the proposed algorithm, proofs, systems, implementations

This paper argues....

This paper proves...

Evaluation

Description of experiments and metrics

Results of experiments

Implications of those results

More applicable to the applied areas of
computer science.

Experiments

What experiments are useful?

Critical for the main arguments of the paper

What experiments are not useful?

Pointless experiments that generate pointless numbers, graphs, and tables

X improves classification performance

What evidence would you like to see?

X improves classification performance

What evidence would you like to see?

F1/Accuracy/... comparison vs SOTA

Ablation study

CPU usage graph

Throughput vs time

When is an experiment useful?

It gives us information directly about the claim.

Helps us as a researcher.

Helps us as a reviewer.

Types of Experiments

From the “context” perspective

Controlled [Benchmark dataset...]

Uncontrolled [Real Internet...]

There are other perspectives to be covered in future lectures

Experiment Design

Be clear about X and Y

Independent variable

Dependent variable

Which independent variables are interesting?

Claim – Measurement Examples

Claim	Y	X
X is faster	Latency	Input load, ...
X is more scalable	Throughput	Input scale, ...
X is more accurate	Error related metrics	Dataset difficulty, ...
X is more robust	Failures	Noise, failures, ...

Adversarial Experiment Design

What dataset or scenarios will cause the benefits of the system to disappear?

Where does the system fail?

Group Activity

Part 1 - We will pick a research topic. Then we will do experiment design and metric selection. You need to be able to justify your decisions.

Part 2 – Attack the choices as a reviewer, including adversarial experiment design.

Group 1

A new algorithm that translates English text to Spanish.

Group 2

A new wireless networking technology.

Group 3

Impact of doing court proceedings in metaverse.

<https://www.reuters.com/world/americas/colombia-court-moves-metaverse-host-hearing-2023-02-24/>

HW4

Introduction

Your writeup should answer all the questions we discussed in the stated sequence.