

Final Project

Final Project

- ▶ **Groups Size:** 2-4 people; exceptions of size 1 or >4 will require permission.
- ▶ **Submission:**
 - ▶ 4-page report + final oral presentation
(detailed instructions on the submission will be released later)
- ▶ **Example project reports — see Stanford CS224's past projects**
<https://web.stanford.edu/class/cs224n/project.html>
- ▶ **Prize:** We will give out 1-3 best project awards. 🏆

Final Project

- ▶ **Shared project** with other classes is allowed
 - ▶ project is expected to be accordingly bigger/better
 - ▶ clearly declare at the beginning of your report that you are sharing project (with which class; email and get permission from both courses' instructors)
- ▶ **External collaborators** (e.g. non CS4650 students, undergraduate research advisor, graduate students) are also allowed
 - ▶ clearly describe in the report which parts of the projects are your work
 - ▶ clearly state what each group member's contribution

Project Proposal

- ▶ Two pages total
- ▶ Title & team members
- ▶ 1-page summary of a relevant (key) research paper for your topic
 - ▶ Bibliographical information,
 - ▶ Background (motivation, related work, why this work is important),
 - ▶ Contributions (what's new this paper added to the ongoing research conversation — new algorithms, new experimental results and analysis, new meta-analysis of old papers, new datasets, or otherwise?)
 - ▶ Limitations and discussion (every paper has limitations and flaws)
 - ▶ Why this paper? What is the wider research context?

Project Proposal

- ▶ 1-page summary of what you plan to and how you can innovate?
 - ▶ Main goal and motivation of your project — why it is cool? why it is useful?
 - ▶ What NLP task(s)?
 - ▶ What data?
 - ▶ What methods?
 - ▶ What baseline?
 - ▶ How will you evaluate your results?
- ▶ Use **LaTeX template** from ICLR
- ▶ Include references - clear attribution to other's work
- ▶ It is okay that you change project idea or direction later.

Why Project Proposal?

► From Chris Manning —

Skill: How to think critically about a research paper

- What were the main novel contributions or points?
- Is what makes it work something general and reusable or a special case?
- Are there flaws or neat details in what they did?
- How does it fit with other papers on similar topics?
- Does it provoke good questions on further or different things to try?

How to do a good job on your project plan

- You need to have an overall sensible idea (!)
- But most project plans that are lacking are lacking in nuts-and-bolts ways:
 - Do you have appropriate data or a realistic plan to be able to collect it in a short period of time
 - Do you have a realistic way to evaluate your work
 - Do you have appropriate baselines or proposed ablation studies for comparisons

Why Project Proposal?

- ▶ From Jason Eisner —

<https://www.cs.jhu.edu/~jason/advice/how-to-read-a-paper.html>

<https://www.cs.jhu.edu/~jason/advice/write-the-paper-first.html>

Finding Research Topics

- ▶ Two basic starting points, for all of science:
 - ▶ **Nails** — start with a (domain) problem of interest and try to find good/better ways to address it than are currently known/used
 - ▶ **Hammers** — start with a technical method/approach of interest, and work out good ways to extend or improve it or new ways to apply it

Typical Project Types

- ▶ This is not an exhaustive list —
- ▶ 1) Application: find an application/task of interest and explore how to approach/solve it effectively, often with an existing model
 - ▶ Could be task in the wild or some existing dataset or shared task (e.g., SemEval or various leaderboards, etc.)
 - ▶ Or dialogue system, QA system, ...
- ▶ 2) Analysis: Analyze the behavior of models or existing datasets
 - ▶ how the model represents knowledge or what kinds of phenomena it can handle or errors that it makes.
 - ▶ what linguistic phenomena or other errors exist in the dataset, how they affect model performance.

Typical Project Types

- ▶ This is not an exhaustive list —
- ▶ 3) Dataset/Benchmark: create a new dataset, conduct some analysis
 - ▶ for a novel topic/task, or for an existing task but better way to create higher quality dataset
 - ▶ may involve some manual annotation
 - ▶ conduct some quantitative and linguistic analyses
- ▶ 4) Methodology: Come up with a new or variant of models/algorithms and explore its empirical success
- ▶ 5) Survey: An insightful and comprehensive summary of new emerging research topics, ideally with some quantitative analyses

Place to start?

- ▶ Look at ACL Anthology for NLP papers:
 - ▶ <https://aclanthology.org/>
- ▶ Also look at the online proceedings of major ML/Web conferences
 - ▶ ICLR (<https://openreview.net/group?id=ICLR.cc/2025/Conference>), NeurIPS , ICML
 - ▶ SIGIR, Web Conference, ICWSM (<https://www.icwsm.org/2021/>)
- ▶ Look at online preprint servers, especially:
 - ▶ <https://arxiv.org/>
- ▶ Look for an interesting problem in the world!
 - ▶ Psycholinguistics, computational social science, journalism, ...

Finding a Topic

- ▶ Turing award winner and Stanford CS emeritus professor Ed Feigenbaum says to follow the advice of his advisor, AI pioneer, and Turing and Nobel prize winner Herb Simon:

“If you see a research area where many people are working, go somewhere else.”

- ▶ But where to go? Wayne Gretzky:

“I skate to where the puck is going, not where it has been.”

(Slides 51-55: <https://web.stanford.edu/class/cs224n/slides/cs224n-2022-lecture08-final-project.pdf>)

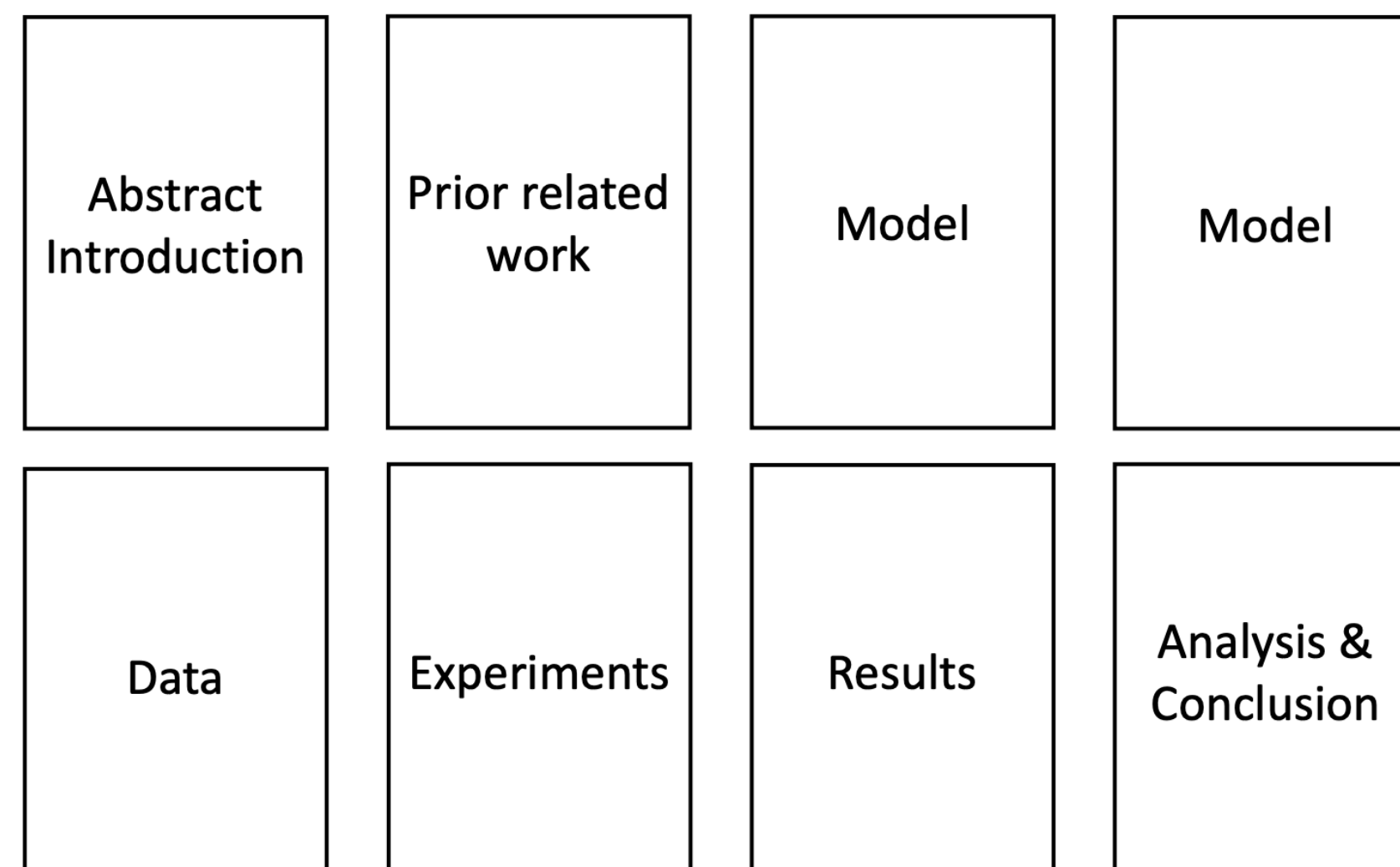
Credit: Stanford CS224n, Chris Manning

Finding Data

- ▶ Some people collect their own data for a project — **we like that!**
 - ▶ You may have a project that uses “unsupervised” data
 - ▶ You can annotate a good amount of data
 - ▶ You can find a website that effectively provides annotations, such as likes, starts, rating, responses, etc.
 - ▶ Look at research papers to see what data they use, how they get it
- ▶ Many others make use of existing datasets built by other researchers
 - ▶ Datasets used in other papers
 - ▶ Shared task at WMT, SemEval, etc.

Final Project Writeup/Presentation

- ▶ Up to **4-page writeup** due the day before final exam date (no late submission!)
- ▶ Use **LaTeX template** from ICLR
- ▶ Include references - clear attribution to other's work
- ▶ Statement of each group members' contribution (inc external collaborators)
- ▶ Writeup quality is important to your grade!
- ▶ X-minute **oral presentation at the final exam time** ($X \in [2, 5]$)



Final Project

- ▶ Grading rubrics

- ▶ Clarity (1-5): For the reasonably well-prepared reader, is it clear what was done and why? Is the report well-written and well structured?
- ▶ Originality / Innovativeness (1-5): How original is the approach? Does this project break new ground in topic, methodology, or content? How exciting and innovative is the work that it describes?
- ▶ Soundness / Correctness (1-5): First, is the technical approach sound and well-chosen? Second, can one trust the claims of the report – are they supported by proper experiments, proofs, or other argumentation?
- ▶ Meaningful Comparison (1-5): Does the author make clear where the problems and methods sit with respect to existing literature? Are any experimental results meaningfully compared with the best prior approaches?
- ▶ Substance (1-5): Does this project have enough substance, or would it benefit from more ideas or results? Note that this question mainly concerns the amount of work; its quality is evaluated in other categories.
- ▶ **Overall (1-5) - Overall quality/novelty/significance of the work. Not a sum of aspect-based scores.**

Some example research directions

- ▶ Multi-document summarization / Plain-language summary
- ▶ Multilingual text-to-SQL
- ▶ Reasoning, Math, ...
- ▶ AI for Law
- ▶ AI for Healthcare
- ▶ AI for Science (e.g., material science)
- ▶ etc.

Have fun with your project!