Final Project

Final Project

- **Groups Size:** 2-4 people; exceptions of size 1 require permission.
- **Submission:**
  - max 5-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
- More examples — see **short papers published at** ACL/EMNLP/NAACL conferences
  https://aclanthology.org/events/acl-2025/#2025acl-short
- **Prize:** We will give out 1-3 best project awards. 🏆

Why course project?

- What we want you to gain from the open-ended course project:
  - Hands-on experience
  - In-depth understanding of a specific problem / algorithm / dataset / library etc
  - Exploration and creativity in pursuing your own ideas and interests
  - Teamwork skills
  - (Optional) opportunity to do research
  - Have fun!

Credit: GT CS 7643, Danfei Xu

Finding Research Topics

- 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.”

Credit: Stanford CS224n, Chris Manning

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

Credit: Stanford CS224n, Chris Manning

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.

Credit: Stanford CS224n, Chris Manning

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 quantitive 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 quantitive analyses

Credit: Stanford CS224n, Chris Manning

Finding Data

- Some people collect their own data for a project — **we like that!**
  - 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.

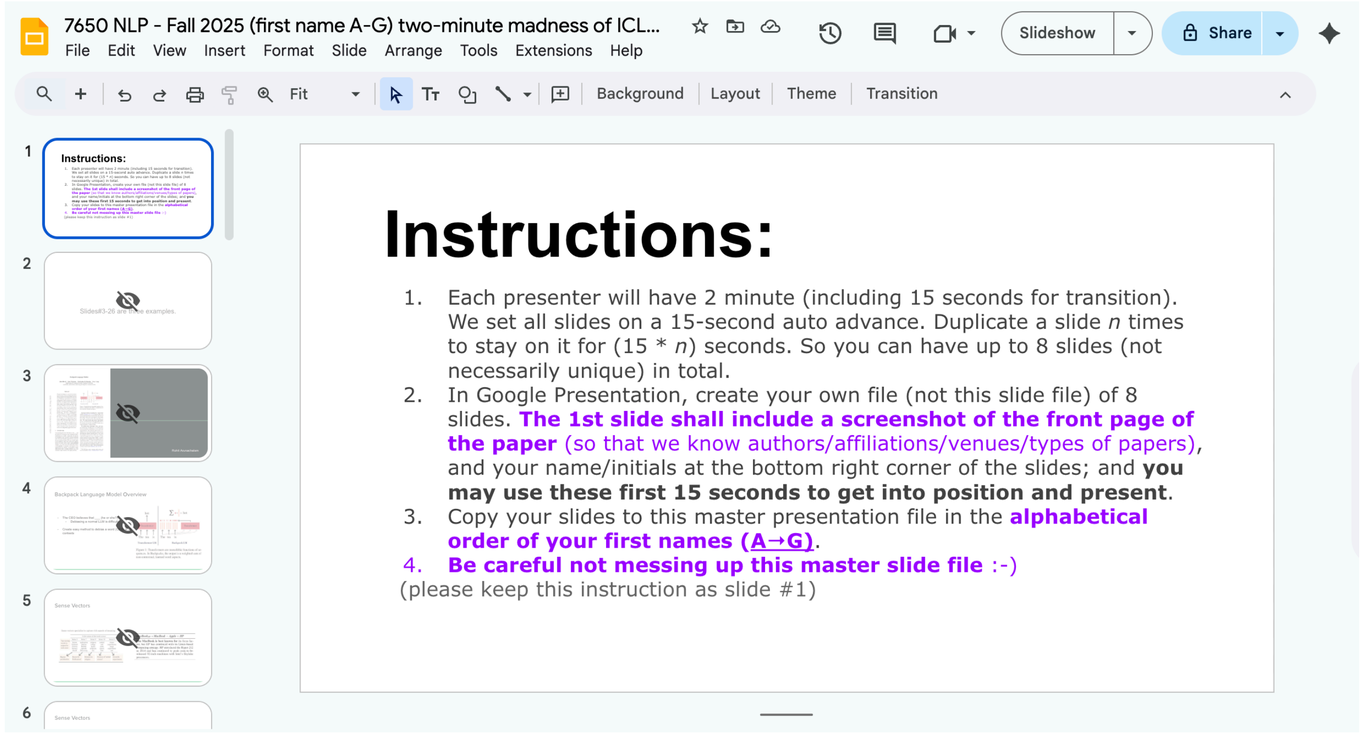
Credit: Stanford CS224n, Chris Manning

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, …

2-min madness

- **In-class presentation of a recent research paper (2%)**
  - read recent publications (ACL/NAACL/EMNLP/ICLR/ICML/NeurIPS)
  - pick one and give a 2-minute oral presentation
    (detailed instructions on the submission will be released later)



Why 2-min madness?

- This will serve multiple purposes:
  - get started to think about what to do for the final course project
  - get to see a wide range coverage of topics on the latest NLP research
  - practice oral presentation skills
  - get to know other students in the class!

Some example research directions

- Multilingual text-to-SQL
- Reasoning
- Domain-specific evaluation
- Memorization
- Dialects & stylistics
- Computational journalism
- etc.

Project Proposal

- **Project proposal of two pages total (2%)**
- 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 tasks(s)?
  - What data?
  - What methods?
  - What baseline?
  - How will you evaluate your results?

- Use **LaTeX template** from ACL Rolling Review (ARR)
  - 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 plant 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

Final Project Writeup/Presentation

- Up to **5-page writeup** due at final exam time (no late submission!)
- Use **LaTeX template** from ARR
- 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 ($X \in [2, 5]$)

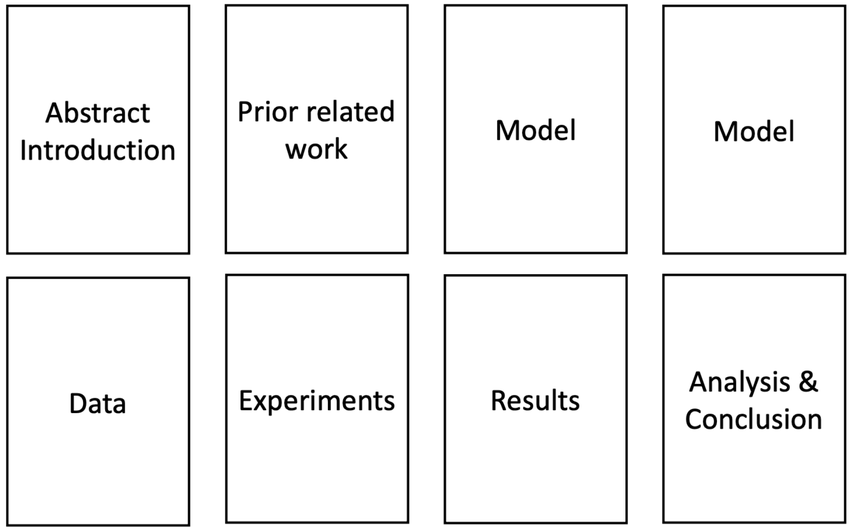


Image Credit: Stanford CS224n

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. <u>Not</u> a sum of aspect-based scores.**

Final Project

- Rule of thumb — how much effort was put into the project?

  - Everyone comes with different backgrounds. We expect students will do different types of projects, some are more technical than others.
  - We most likely can tell how much effort you put into a project by looking at your project final report and presentation.
  - Creativity is also highly valued, and can take many forms:
    - What's new compared to existing work?
    - Will someone who reads your report learn something useful?

Final Project

- **Shared project** with other classes is not allowed

- **External collaborators** (e.g. non CS7650 students, research advisor) are allowed, as long as the **total group size <=4**
  - a written statement/permission from the collaborators (and instructor of the other class if non CS7650 student)

- **Required information to include in the project proposal/report**
  - clearly describe in the report which parts of the projects are your work
  - clearly state what each group member's contribution
  - if an image adapted or copied from other's work, it needs to be clearly marked ("figure from XXXX"), not just as a regular citation.

Have fun with your project!