

# CS224n: Project Proposal Instructions

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Each team (both default and custom) hands in **one** project proposal, which is worth 8% of your grade. This document specifies what information you should include in your proposal – it applies to both default and custom projects.

Before you start writing your project proposal, make sure that you have watched the *Practical Tips for Final Projects* lecture and read through the corresponding lecture notes. The notes contain guidelines that will help you understand our expectations for projects, and enable you to write a better project proposal. If you're doing the default final project, you should also ensure you have read through the the default final project handout (posted on the website).

We provide an example proposal template for your convenience:

<https://www.overleaf.com/read/ccpkcdcsrzr>

## 1 Key information to include

Your PDF proposal should have the following information at the top:

- **Title:** The title of your project (you can change this later).
- **Team member names:** List the names and @stanford.edu email addresses of all of your team members.
- **(Optional) External Collaborators:** If you have any collaborators who are not CS224n students, list them.
- **Custom or Default Project:** Indicate which you are doing.
- **(Custom project only) Mentor:** Note that we don't expect you to already have a mentor – you will be assigned one after we receive your proposal. Depending on your situation, write either (a) 'X has already agreed to be our mentor', (b) 'We would like to request X as our mentor', or (c) 'We have no particular mentor'. If you are doing one of the projects proposed by Stanford AI Lab members, write their name in case (a).
- **(Optional) Sharing Project:** If you are sharing this project between CS224n and another class, indicate it here.

## 2 Research paper summary (max 2 pages)

**Paper selection:** The first section of your proposal is a summary of a research paper that is relevant to your project. For example, if you are reimplementing a complex model, you should choose the paper that presents that model. If you are applying a particular method to a new task, you could choose the paper that presents the method. If you are developing a new variant of a particular model, you could choose the paper that presents the original model. There are other possible cases – use your judgment to choose what seems like the most relevant paper. If you are doing the default project, the papers linked in the default project handout are a great place to start.

**Paper eligibility:** Any research paper is fine, though you want to make sure it is a high-quality paper. For this, we encourage looking for papers that have been published in a peer-reviewed venue (i.e. conference or journal). However, due to the fast pace of Deep Learning and NLP research, there are many important and high quality papers that are not (or not yet) published at a peer-reviewed venue – for example, they may be very recent papers that have not yet been submitted for review. If you choose a paper that has not been published at a peer-reviewed venue, be wary that it might be unfinished or preliminary work.

**The summary:** Write a summary of the paper that a fellow CS224n student could understand. For most teams this will probably involve some key mathematical equations, but you don't have to exhaustively mathematically describe everything. You may include a diagram if you think it's important, but it shouldn't take up more than 1/3 of a page. In your 2-page (but not longer than 2-page) summary, prioritize conveying the most important information and ideas of the paper. In particular, when evaluating your summary, we will explicitly look for discussion of each of the following aspects:

**Bibliographical info.** Title, authors, publication venue (or preprint server, like arXiv), publication year, and URL. Put this information at the top of your summary.

**Background.** Set the scene for the paper, looking to the introduction section, as well as the related work or background sections, if they exist. What motivations and problems do the authors cite when explaining why they think this work is important? What problems are they attempting to solve, or what knowledge are they hoping to discover?

**Summary of contributions.** Each paper is published because it adds something to the ongoing research conversation. It teaches us something we didn't know before, or provides us with a tool we didn't have, etc. Summarize what contributions this paper makes, whether they be in new algorithms, new experimental results and analysis, new meta-analysis of old papers, new datasets, or otherwise.

**Limitations and discussion.** Every research paper has limitations and flaws.

Using the discussion and conclusion sections if they exist, critically identify interesting experiments, methodology, or methods that might have made this paper stronger. For example, did the authors only evaluate on English, or only on Wikipedia text, and claim that their results generalize to all of language? Did the authors not characterize the errors their model makes compared to previous models? Discuss how these limitations contextualize the findings of the paper – do you still find the paper convincing?

**Why this paper?** There are infinite<sup>1</sup> papers you could read, and you chose to read this one. Maybe it came up first on Google Scholar, or a TA suggested it... regardless, discuss your motivation for choosing this paper or the topic that the paper it addressed. What interested you about the topic? Having read it in depth, do you feel like you’ve gained from it what you were hoping? (“No” is an okay answer here.)

**Wider research context.** Each research paper is a focused contribution, targeting a very specific problem setting. However, each paper also fits into the broader story of NLP research – designing systems that process human languages. In this course, we cover some fundamental concepts: how to represent language, what structure language has, why language is hard for computers to model, what problems tend to occur when applying deep learning methods to language. Connect the paper to these broad topics. Does the paper help us build better representations of language? If it helps us solve a particular task (like automatic translation or question answering,) do the methods have any promise for being more broadly applicable to other tasks (e.g., a new type of regularization in LSTMs applied in language modeling might be applicable to other NLP tasks!) It may be useful to do a cursory read of one or more of the papers cited in the paper you’re reviewing, and cite them.

**Do not go over two pages for this summary.** Use your judgment to determine what information from the paper is important while making sure to devote a bit of space to each of the sections above. In particular, if you’re doing the default project, you do not need to spend time explaining things that are already covered in the default project handout (e.g. don’t spend time explaining what SQuAD is, or what the F1 and EM metrics are).

### 3 Project description (1-2 pages)

In this section, you will describe what you plan to do for your project. It’s fine if your project eventually evolves into something different – that’s a natural part of research. But your proposal should lay out a sensible initial plan. This section should answer the following questions (it’s a good idea to structure your project description in this way, but you can structure differently if you like):

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<sup>1</sup>Citation needed

1. *Describe the main goal(s) of your project.* If possible, try to phrase this in terms of a scientific question you are trying to answer – e.g., your goal may be to investigate whether a particular model or technique performs well at a certain task, or whether you can improve a particular model by adding some new variant, or (for theoretical/analytical projects), you might have some particular hypothesis that you seek to confirm or disprove. Otherwise, your goal may be simply to successfully implement a complex neural model, and show that it performs well on a given task. Briefly motivate why you chose this goal – why do you think it is important, interesting, challenging and/or likely to succeed? If you have any secondary or stretch goals (i.e. things you will do if you have time), please also describe them. In this section, you should also make it clear how your project relates to your chosen paper.
2. *What NLP task(s) will you address?* This could be the same task as addressed by your chosen paper, but it doesn't have to be. Describe the task clearly (i.e. give an example of an input and an output, if applicable) – though if you already did this in the paper summary, there's no need to repeat.
3. *What data will you use?* Specify the dataset(s) you will use (including its size), and describe any preprocessing you plan to do. If you plan to collect your own data, describe how you will do that and how long you expect it to take.
4. *What neural method(s) are you planning to use?* Describe the models and/or techniques you plan to use. If it's already described in the paper summary, no need to repeat. If you plan to explore a variant to a published method, focus on describing how your method will be different. Make it clear which parts you plan to implement yourself, and which parts you will download from elsewhere. If there is any part of your planned method that is original, make it clear.
5. *What baseline(s) will you use?* Describe what methods you will use as baselines. Make it clear if these will be implemented by you, downloaded from elsewhere, or if you will just compare with previously published scores.
6. *How will you evaluate your results?* Specify at least one well-defined, numerical, automatic evaluation metric you will use for quantitative evaluation. What existing scores will you be comparing against for this metric? For example, if you're reimplementing or extending a method, state what score(s) the original method achieved; if you're applying an existing method to a new task, mention the state-of-the-art performance on the new task, and say something about how you expect your method to perform compared to other approaches. If you have any particular ideas about the qualitative evaluation you will do, you can describe that too.

7. *What are the ethical challenges and possible societal risks of your project, and what are mitigation strategies?* Please provide a 1 paragraph description of A) the ethical challenges and possible negative societal risks regarding your project, identifying at least 2 valid ethical concerns or potential societal risks, and B) some practical, specific strategies to mitigate those risks (you are not required to implement these mitigation strategies). Try to be a little specific and intentional in describing ethical concerns (e.g. more depth than ‘there will be issues with user data privacy’), and especially around issues specific to your project. Writing clear limitations and identifying potential risks is something that we’re encouraging as part of a broader trend in the research community to include such statements as part of published research. This includes Stanford’s Ethics and Society Review (ESR) and the EMNLP Impact Statement, which are great resources for getting started. This section will be graded primarily for effort and intentionality, and feedback may be provided.

Default final project teams will probably write shorter project descriptions than custom project teams. In particular, items (2), (3) and (6) are likely to be very short. As before, there is no need to explain things that are already covered in the default project handout.

## 4 Submission instructions

Submit your PDF proposal on Gradescope, and *make sure to tag all of your team members* – only tagged team members will receive credit. Additionally, when you tag the different ‘questions’ in your PDF, make sure to use the default project tags or the custom project tags, but not both.

## 5 What to expect

In grading the research summaries, we will be looking for well-considered analysis, and will be critically grading on quality of the summary, not based on completion.

We will grade your project proposals and provide brief feedback – for custom project teams, the grader will be the mentor. If there’s a problem with your proposed project (e.g. it’s not feasible in the given time), we may require you to submit a revised proposal – otherwise, your project is approved. All teams will be allocated GCP credits (based on the team listing in the proposal).

If you want to discuss your proposal before submitting it, you can go to the Office Hours of a knowledgeable staff member (look at the Office Hours webpage to see staff members’ areas of expertise).