How to AI (Almost) Anything (MAS.S60) Project Midterm

The midterm assignment is separated into two major parts: a midterm presentation and a midterm report. **Please be sure to read the instructions for the midterm report BEFORE reading the midterm instructions.**

Midterm Report - Deadline: Tuesday April 1st, 2025 at 9pm ET

Midterm Presentations - In class on Thursday April 3rd, 2025

Midterm Report Instructions

This midterm report assignment is designed to help the instructors assess progress with the course project and give more detailed suggestions on the next steps. This midterm report should start following a more conventional layout for research papers with an abstract, introduction, related work, proposed method, experiments, results, discussion, and conclusion. Since this is only a midterm report, we do not expect all experiments to be completed, but the midterm should include at least one experiment for one of the research ideas. You should have started exploring one of your research ideas and analyzing its results. This will give you intuitions on what the next steps should be.

Formatting and page limits

Please format your proposal report using the NeurIPS format (link). The midterm report should be a maximum of 6 pages + unlimited extra pages for references. You can optionally include an appendix document with extra details about your project.

Github repository

It is required to create a Github repository for your project. All team members should be added to this project. We suggest to commit your code as often as possible (it is a good practice in general). In the proposal report, please include the link to this Github repository. This Github repository will be used to supplement the report.

Equal contributions between teammates

It is important that all team members participate equally in the project. The Github repository may be used to help assess the relative work performed by each member of the team. If any team member has concerns about the participation level of other members, they should contact the instructor and/or TA as promptly as possible.

Assignment report outline

- **Abstract (1 paragraph):** In a few sentences, you should motivate your problem, explain the specific technical challenge you are solving, describe the main ideas of your approach, and summarize the main findings.

- **Introduction (about 1/2 page to 3/4 page):** First, describe and motivate your research problem. Explain why this problem is important for the research community and, if possible, the society in general. Second, define the specific research challenge(s) that have not been addressed in prior work. Third, explain your proposed idea(s) and how it will help solve (or better understand) the specific research challenges. This third paragraph often starts with "In this paper,…". If possible, have an overview figure illustrating the specific research challenges and how you propose to solve them.
- **Related work (about 2/3 of a page):** The goal of this section is twofold: (1) present an overview of the work happening in your research area, and (2) highlight how your approach differs from prior work. Instead of simply listing all the prior work, try to group them by category or research problem. This will allow you to have a more structured related work section and will make it easier for the reader to place your work in the right context. This section should include about 10-12 citations of prior work. Usually, in the last paragraph of this section, you will have a paragraph stating how your work differs from the prior work (e.g., "To our knowledge, this paper is the first to…"). Be sure to integrate the feedback you received for your proposal submission.
- **Problem statement (1/4 of a page):** formalize mathematically your research problem. This should include the mathematical definition of the variables involved in your problem (e.g., input variable x and labels y). You should also include an objective function describing your main objective, if applicable. This section can be relatively short (e.g. 2 paragraphs or 1 long paragraph). While this section may be relatively short, you should be consistent with your notation later in the paper.
- **Proposed approach (about 1-1.5 pages):** Describe the details of the new research idea that was explored as part of your initial work for the course project. For this midterm, we expect each team to have run experiments for one of your research ideas. Present the details of this research idea. Try to formalize the idea and proposed model as well as possible, with mathematical formalism as often as possible (e.g, define the loss function of your proposed model). Follow the same notation as the problem statement, whenever possible. If possible, describe how the model is optimized and how inference is performed, or how analysis is done.
- **Experimental methodology (1/2 page):** Describe the dataset you are using for this project. Describe the input modalities and annotations available in this dataset. Describe your experimental methodology for evaluating the multimodal baseline model(s). This should include the way you split your dataset for training, validation, and testing. It should also include any details about the hyper-parameters and the evaluation metrics. If the space is too short, you can move some of the implementation details in the appendix, but the main design decision should be explained in the main paper. Grading will be only done using the main part of the paper. Appendix supplementary material is optional for grading.
- **Results and discussion (about 1.5-2 pages):** Present your experimental results in tables and figures. This section should include more than re-running experiments from pre-existing baseline models. The goal of the course project is to explore new research directions. You should include a detailed discussion of your results, including an analysis of failure cases whenever possible. Discussion and error analysis are important parts of the report.
- **Next steps and new research ideas (about 1-1.5 pages):** Following your initial experiments, describe what are the next steps that you are planning for the final report. Include details about other research ideas you may want to explore. For this course project, it is not required to

explore many research ideas, but each research idea should be explored in depth. So it is important to plan your next steps to go deeper into this topic. If possible, also include some figures to illustrate the next research ideas.

Midterm Presentation Instructions

The proposal will also include an oral presentation with accompanying slides. The presentations should be self-contained so that attendees can understand the research problem and the main novelty of your course project.

- The time limit for each project presentation is 5 minutes. As guidance, this is about 5-6 slides. **All team members are expected to participate in both the conception of the slides and the oral presentation itself.**
- Grading will be based on 5 criteria:
    - Good motivation for the problem and existing literature
    - Good experimentation of existing methods and studying their limitations.
    - Good motivation for the proposed ideas and how they address gaps in existing work
    - Good initial experiments with proposed ideas and plan for the remaining experiments
    - Presentations skills (clear explanations, and nonverbal presentation skills)
    - Quality of the slides (images, videos and do not include too much text)

Suggestions for the presentation:

- With 1-2 slides, motivate and illustrate the impact of your research problem, the landscape of existing work and its limitations, and your key contributions. This can be brief since you have already presented something similar in the proposal.
- With 2 slides, present the datasets and baseline models you have processed, their results, and 2-3 key errors (with examples) you have found and hope to address.
- With 2 slides, present your main proposed ideas, their initial implementation and results, a high-level intuition about the novelty of your approach, and how they address the key limitations of existing work.
- With 1 slide, explain the plan for the rest of the semester, including planned experiments, metrics, comparisons, user studies etc.
- If you have time, you can include some key questions where you would like feedback from the instructors and students.