EECS 598 and EECS 498 (Fall 2021) – Call For Proposals
Due date: Friday, October 15 at 11:59pm EST

Collaboration within this course. You are free to work on this project in teams of 2-3 (strongly encouraged) or individually. Individual projects can be less ambitious in scope but should **not** be less complete: a half-implemented system does not make a good project outcome. On the other hand, if the team consists of more than three members, please talk to the instructor beforehand: such projects will need to have a more ambitious scope. All team members are expected to contribute equally to the final project, and all members will receive the same grade for it. You are also free to discuss your project with others in the course, though only members on your team should contribute to the actual algorithm/implementation/experimentation involved. Any external resources used must be clearly cited in your final project report.

Collaboration outside this course. You may collaborate with people from outside the course. For example, you may use this final project for another course where you have collaborators from another course, or you may combine this final project with your own research on which you are collaborating with your colleagues. However, your project must still involve concepts from this course! Please talk to the instructor beforehand if you have questions.

1 Overview

The final project is highly research oriented. You have multiple options on how to pursue your final project. In general, your final project will be evaluated based on its level of originality and completion.

- Option 1: Extend an existing technique in prior work. Generally, this is how it works: pick a paper that you find interesting, identify a couple of important limitations of the work, propose a few ways to extend the technique, implement these extensions, and explain how your approaches overcome their limitations. You may want to choose a paper that has an implementation so that you can directly work on their codebase. However, you're also free to re-implement their idea and build your ideas on top. What's important is to identify limitations of existing work, propose your own ideas, design your approach, and implement as well as evaluate your prototype. The originality will be judged based on your proposed extensions.

- Option 2: Apply an idea in one paper to solve a problem in another paper. Compared to the first option, this option may lead to more original research. The key is to first identify a problem A that would benefit from an idea that was previously used to solve a different problem B. Note that A itself may not necessarily be a new problem, but the combination of the approach and problem should be new. What's challenging in this kind of project is to figure out how to apply B's approach in the context of solving A. You will need to justify why it's a good idea to apply B approach to solve problem A, design your own approach to apply B approach for A, implement your idea and evaluate it.

- Option 3: New approach for an existing problem. This option could also lead to highly original research. To conduct this kind of project, you want to fist identify a new idea that has not been explored in the past for an existing problem. It's possible that this idea hasn't been used to solve other problems or it cannot be applied to solve other problems. What's important here is that it's a new idea for the problem that you aim to solve, and that idea doesn't have to be applicable to other problems. You want to justify that your idea is indeed new by comparing it against existing techniques. You will also need to develop your idea into a concrete working approach. You should evaluate your prototype and compare your idea against existing ideas, and hopefully show that it works better than existing approaches.

- Option 4: Propose a new problem, and solve it no matter adapting an existing approach or proposing a new idea. This is likely the most exciting kind of of research projects, which also means it's very challenging. What's really hard is to find a new problem that few people haven't even considered in the past. Once the problem is identified and defined, solving it usually is much easier. Given the problem is fresh, it is also very likely going to lead to a highly original solution.

2 Milestones

There are five important milestones.

- Project proposal.

- Checkpoint 1.

- Checkpoint 2.

- Final project presentation.

- Final project report.

2.1 Project proposal

The goal of writing a proposal is to help you identify a problem that you would like to spend the next two months working on as well as develop further thoughts on how you plan to approach that problem and how you plan to evaluate your approach.

Your proposal should clearly include the following components, at the very least.

- A brief statement of the problem you plan to investigate, typically 1-2 paragraphs.

- An explanation why this problem is interesting, typically half a page.

- A description of your proposed approach, typically one page. Feel free to include more details if any.

- An evaluation plan which describes how you plan to evaluate your approach, typically half a page.

- An outline of how you plan to carry out the proposed work, such as a table of important milestones.

2.2 Two checkpoints

A checkpoint report is nothing but a partial final project report, which serves as a forcing function that helps you think about how you plan to accomplish the work and manage your time. It's important to make steady progress at each checkpoint. Feel free to create an outline of your final project report at an early point and use checkpoints to progressively add more content over time until you finish up the entire project and report. However, keep in mind that as a project evolves, you may also need to adjust your plan as well as the report.

2.3 Final project presentation

Near end of the semester, each team will present their work to the entire class. Depending on the number of teams, each team may have 15-30 minutes. This is not fundamentally different from a paper presentation in terms of how you design your slides and deliver the presentation, though one difference here is that you're presenting your own work rather than someone else's work.

2.4 Final project report

You will summarize your work in a final project report. Make sure you include the following sections in your final report, at least.

- Introduction, typically 1 page, which clearly states what problem you aim to solve, why this problem is interesting, what is your key idea, and what's new in your project.

- Motivating example, typically 1-2 pages, which illustrates how your idea works in more detail on a concrete example. You can also use this example to highlight how your idea differs from existing approaches.

- Your approach, typically 2-4 pages, which clearly explains how your approach works in great details. You should differentiate the key high-level ideas in your approach from the low-level implementation details. That is, you should always first state the key ideas in your approach and try to describe how they work at a high-level, before you dive into any lower-level details. Do not put your code in this section; instead, if you want to describe algorithms, try to summarize them as pseudo code.

- Experimental results, typically 1-2 pages, which demonstrate how well your approach works in practice. If your work is purely theoretical, you may not need this section. Note that you should clearly describe how you set up the experiments before you show any experimental results.

- Related work, typically 1 page, which cites important work that's related to your work. Try to identify at least five related papers. Also make sure to describe how your idea is different from their work.

3   Submissions

Your Task. You have two tasks.

- Task 1: Form your team.

- Task 2: Team members collaboratively write a proposal. Please specify all team members in the proposal.

Canvas. Everyone needs to submit their proposal as a PDF. If you want to include additional files, please put them all into a single .zip file. All members in the same team should submit the same proposal.

References