

Spring 2024

Introduction to Artificial Intelligence

Final Project Proposal

Mar. 26, 2024

Introduction

In the final project, you will work in groups of **three to four students** to apply methods learned in the class to a real-world problem that you are interested in. The topic scope is **Large Language Models**, such as GPT-4, LLAMA 2, etc. Please create some interesting applications with Large Language Models. If you do not have any idea, you can refer to this [link](#). We also provide an example below.

Proposal Requirement (70%, 10% each)

The proposal should include the following items. Note that you should include all of these items in your report.

- **Problem Statement and Task Definition:**

What does your system do (what is its input and output)? What real-world problem does this system try to solve? Make sure that the scope of the project is not too narrow or broad. For example, building a system to predict the exact stock price is unrealistic, whereas predicting the relative changes in stocks is more reasonable.

- **Description of the challenges:**

What are the challenges of this task? Which topics (e.g., search, MDPs, etc.) might be able to address those challenges (at a high level, since we haven't covered any techniques in detail at this point)?

- **Input/Output Behavior with Concrete Examples:**

Concrete examples of both the inputs and outputs (explain what the input and output variables should look like and how they interact with the system). You should collect some preliminary data that you can use in your description of the input and output behavior. Specifically, reference what data you are using. The teacher recommends using the following open-source data (of course you can choose from other sources). Note that you should not use data with ethical issues.

- [Open data platform of Taiwan government](#)
- [Kaggle](#)
- [Papers with code](#)
- [Hugging Face](#)
- [NeurIPS 2023 Datasets and Benchmarks](#)

- [ShuttleSet](#)
- **Related works:**
Search the Internet for similar projects and mention the related research and projects.
- **Methodology:**
How will you approach the problem? Why does this method fit with your problem? Identify the challenges of building the system and the phenomena in the data that you're trying to capture. How should you model the task (e.g., using search, machine learning, logic, etc.)? There will be many ways to do this, but you should pick one or two and determine how the methods address the challenges as well as any pros and cons. What algorithms are appropriate for handling the models that you came up with, and what are the tradeoffs between accuracy and efficiency? Are there any implementation choices specific to your problem?
- **Evaluation Metrics:**
How will you measure the success of your system? Why does this metric work best for this problem? For this, you need to obtain a reasonably sized dataset of example input-output pairs, either from existing sources or collecting one from scratch. A natural evaluation metric is accuracy, but it could be memory or running time.
- **Baselines:**
Before developing your primary approach, you should implement baselines and oracles. These are really important as they give you intuition for how easy or hard the problem you're solving is. Intuitively, baselines give lower bounds on the performance you will obtain. If this gap is too small, then you probably don't have a good task. Importantly, baselines should be relatively easy to implement and can be done before you invest a lot of time in implementing a fancier approach. In this part of the proposal, you should describe what your baselines are (we expect at least 2-3 baselines in your final project presentation). While you do not need to implement it for the proposal, it is recommended that you have started implementing it by this point. Note that baselines can be simple algorithms like a rule-based method or a simple classifier.

Work Plan (30%, 10% each)

Since this is a team project, we need to make sure everyone in the team contributes to the project. However, we understand that it is hard and meaningless for you to pre-assign work to team members. Therefore, instead of a work division table, we require you to provide this information in the proposal:

- **Time schedule:**
 - No need for an exact date, just list all the tasks and sub-goals of your project, then tell us which part will be done first.
- **Discussion:**

- We want to see how your team works together throughout this project, so please open a discussion board/channel (e.g., Hackmd note, Trello board, Notion) and record your discussion throughout the project.
- The record should be the summary of your regular discussion, which might be what's the progress of your work (something has completed, something hasn't completed, next targets), the trade-off between different implementation methods and your final choice, and something the prototype needs to be modified. Notice that this is a **tool** for you to develop your application, please do not only see it as class work.
- In the proposal, just open the discussion board/channel and provide the link in the slide.
- **Repo:**
 - Please open a GitHub/Gitlab repo for your project, you need to upload the source code of the project in the repo and a README to describe your functionality and the steps of reproducibility at the end of the project.
 - Please do version control and show the contribution of each member using Github or Gitlab.
 - In this proposal, just open the repo and provide the link in the slide.

Example

We provide an imaginary example of the first three bullets to show how to approach the final project (you can find there are some impractical things).

- **Problem Statement and Task Definition:**

New students often face challenges in navigating the NYCU's resources, policies, and services during their initial days on campus. Many are unsure whom to ask for help or where to find relevant information, leading to frustration and anxiety. The task at hand is to develop a NYCU_BOT that can address these concerns by providing accurate and timely assistance to new students, thus facilitating a smoother transition into university life.
- **Description of the challenges:**

There are a few challenges with this project. Firstly, NYCU_BOT lacks information about NYCU, so we need to provide that information through Google Search or the NYCU website. Secondly, in order to communicate as smoothly as a human, We plan to use the ChatGPT API as our LLM to answer questions. However, the ChatGPT API introduces challenges such as potential delays in responses and financial considerations. Response time delays may frustrate users accustomed to instant replies, while continuous API usage could strain the project's budget. Lastly, ensuring the seamless integration of NYCU_BOT into various platforms and systems presents

another hurdle. Compatibility issues may arise, requiring thorough testing and adjustments to guarantee smooth functionality across different interfaces.

- **Input/Output Behavior with Concrete Examples:**

Input 1: A new student types, "How do I register for classes?" into the chatbot interface.

Output 1: The chatbot responds with a step-by-step guide on the registration process, including links to relevant forms and deadlines.

Input 2: A student asks, "Where can I find information about dining options?"

Output 2: The chatbot provides a list of dining facilities on NYCU, along with their operating hours and menu options.

Input 3: A Chinese student inquires, "我可以在哪裡找到宿舍申請表格?"

Output 3: The chatbot recognizes the user's language preference (Mandarin Chinese) and responds in the same language, providing instructions on how to access the dormitory application form.

Discussion

TAs had opened a channel **Final Project 討論區** on Microsoft Teams of the course, you can ask questions about the final project in the channel. TAs will answer questions in the channel as soon as possible.

Submission

1. **The deadline for this homework is 4/15 (Mon.) 23:59:00.**
2. The proposal should be **at most 4 pages** excluding references. Both Chinese and English are acceptable.
3. Submit one proposal with the filename of **Proposal_Team{ID}.pdf** (e.g., Proposal_Team05.pdf). Please write 05 if you are Team 5 for example.
4. Late submission leads to a score of (original score)*0.8. For example, if you submit your homework right after the deadline, you will get (original score)*0.8 points.
5. **We only accept one pdf file**, the wrong format or naming format causes -10 points to your score (after considering a late submission penalty).
6. Notice that the proposal will count as part of your final score, please design your project as detailed as possible.
7. **Only 1 team member needs to submit the proposal.**
8. We might select some outstanding proposals and invite you to present during the class and would have a bonus if you present.

9. If there is anything you are not sure about submission, ask in the discussion forum.
10. You can refer [here](#) for some motivations.