National University of Singapore
School of Computing

Semester 1, AY202324

CS3263 Foundations of Artificial Intelligence

**Issue:** 4 September 2023

# Project Guidelines

## Important Dates

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| **Project proposal submission:** | **(Monday) 2 October 2023** |
| **Project presentation:** | **Week of 13 November 2023** |
| **Project report submission:** | **(Friday) 17 November 2023** |

## Project Team

You will work on the term project in **3-person teams.** Each team member, however, will be responsible for the success or failure of the entire team. Please choose your team members carefully; make sure you can work well together.

## Project Topic

The term project constitutes an important and interesting part of this module. The project aims to allow you to examine a particular aspect of AI in more depth. We encourage you to choose a project topic from one of the following 2 themes. But if you want to work on a different topic, it should be related to one or more of the AI topics covered in the module. In particular, please highlight the responsible AI considerations.

- AI assistant for X (where X is a domain such as education, finance, well being, elderly care, customer service, etc.)
- AI for good, in areas such as: health, education, sustainability, climate change

You can choose to work on ONE of the following project types:

1. An exposition project on an application or a class of applications. Choose an application for a topic in AI, e.g., AI assistant(s) built on large foundational models such as ChatGPT, Llama, Bard, etc., Mission Planning for Mars Rovers, and study it in depth. Explain the AI methods deployed, how things work, the challenges involved, the novelty and significance of the application, and a small demonstration of its capabilities, if possible.

2. An application project. Define an AI problem in one of the themes, and apply/extend one of the existing AI systems on advanced search, probabilistic modelling, logical inference hybrid knowledge representation, generative models and reasoning or decision systems (decision analysis, MDP, RL) to demonstrate how AI techniques can be applied to solve the problem.

3. A competition entry to solve a special AI task in a common domain. You do not have to actually enter the competition, but you can demonstrate how you can apply or extend an AI controller with access to a common simulation environment and a set of tools to solve a challenging problem. E.g. https://mlcontests.com/

4. For the "brave souls": A methodological or theoretical research project. Develop a new algorithm or propose new AI technique with useful properties. Examples: Integrating Bayesian networks with neural networks. Integrating learning and causal reasoning. Improving decision analysis. Introduce a new representation system by combining knowledge graphs and causal inference. Study and prove properties about advanced search algorithms. *If you choose this type of project, come talk to me about UROP or even PhD research opportunities!

## Project Requirements

The project constitutes **25%** of the total marks for the course. You will be graded on the project report and the presentation only but must submit a project proposal in order to receive a grade for the project.

## Project Proposal

The length of the proposal should be *at most* **ONE(1) single-spaced, SINGLE column page with 1-inch margins**, excluding title page and references.

The proposal should explain clearly what you *plan* to do, not the specifics.* The proposal should give enough background to allow the audience to understand the problem and the approach. You should carefully consider what can reasonably be done within the scope of a course project. Explain the division of work among team members. You should give some deadlines on certain tasks that need to be done and do a risk assessment on the possibility that you may not achieve your aims. Remember that things will almost always turn out harder than you expected, so your plan should include intermediate milestones that can also serve as finishing points if things do not work out.

The proposal will NOT be graded. It is to allow the teaching team to give you feedback on the feasibility and scope of your project.

**Submission**: Submit the proposal through the Canvas channel. CLEARLY list ALL your team members' names, metric numbers, and EMAIL addresses.

## Project Presentation

The oral presentation will allow you to explain your project accomplishments to the class. Each presentation should be **15minutes** in duration, with additional **5 minutes** for questions and answers. *NOTE: *Due to scheduling constraints, please note that you may be asked to record and upload your presentation instead.*

## Project Report

Your report should be *at most* **TEN(10) single-spaced, SINGLE column pages with 1-in margins**, excluding title page, but including all discussions, figures, tables, and references; the

*Feel free to start preliminary discussion on your topic in the discussion forum before the proposal deadline

actual printout(s) of the probabilistic graphics models or screenshots or planning graphs, etc., can be included in an appendix. Your writing should be concise and specific and should meet the standard of an academic technical report. In particular, you are expected to use a Reference Manager (e.g., Endnote, Zotero, Monterey, etc.) to manage the citations, and present the citation entries in Vancouver style.

**Submission**: Submit the report through CANVAS channel by the due date. CLEARLY list ALL your team members' names, metric numbers, and EMAIL addresses.

### Audience

The project proposal, report and presentation should be targeted at a technical audience who are generally knowledgeable in the area but may not be familiar with the particular topic you are working on, e.g., one of the other students taking the class.

### Collaboration

You are to work in **3-person** teams. However, you should

- Explain the division of labour in the proposal and in the final report (it is okay if the actual work division is different from the proposed work)
- Be sure that all team members understand the entire work. The teaching staff will direct questions to each of you individually during the presentation to check your individual understanding.
- Please ensure that you cite all sources of information consulted during the project.
- DO NOT cut-and-paste nor just rephrase from any printed or online descriptions or documentation!
- DO NOT ask ChatGPT to do all your work – if you do work with ChatGPT – please explain which part of the work is yours, and which part is supported by ChatGPT. You will **not** be penalized by working with ChatGPT, but we need to know your honest contributions.

### Grading

Your project report will be graded according to its organization, degree of difficulty, level of achievement, soundness, innovativeness, and clarity of writing. Your presentation will be graded according to its organization, clarity, and your ability to answer questions.

More specific guidelines and evaluation criteria are included in the Appendix of this document

### Best Project Award

The best project in class will be awarded a mystery prize at the end of the term!

### Information Resources

- Some example project ideas on AI assistants are included in the appendix.
- A list of relevant information repositories will be provided here.

## Appendix: Some Example Project Ideas:

[Ref: ChatGPT 4.0]

1. Elderly Companion Chatbot:
- Description: Design an AI chatbot that helps combat loneliness in the elderly. The chatbot should have features to remind users about medication, tell stories, play games, etc.
- Responsible AI Element: Ensure the chatbot does not spread misinformation and maintains user privacy.

2. Personalized Learning Assistant:
- Description: A chatbot that aids in the learning process. Depending on the user's performance, the assistant recommends resources, quizzes, or breaks.
- Responsible AI Element: Adapt to diverse learning styles without bias and ensure recommended content is credible.

3. AI Tour Guide:
- Description: Create an AI agent that provides virtual tours of famous landmarks or museums, tailoring its information to users' interests and prior knowledge.
- Responsible AI Element: Ensure diverse and inclusive information is provided, free of cultural biases.

4. Eco-Friendly Lifestyle Assistant:
- Description: An AI that provides tips, resources, and reminders to help users lead a more eco-friendly lifestyle, from reducing energy consumption to waste management.
- Responsible AI Element: Ensure suggestions are practical, realistic, and scientifically accurate.

5. AI Reading Companion:
- Description: A chatbot that helps enhance the reading experience. As users read a book, the AI can provide summaries, context, or answer questions about the content.
- Responsible AI Element: Ensure that provided information is accurate and doesn't infringe on copyright issues.

6. Interactive Cooking Assistant:
- Description: A voice-activated assistant to help users while cooking. It can read recipes aloud, answer questions about ingredients, and suggest substitutions.
- Responsible AI Element: Ensure dietary and allergy considerations are taken into account, and explanations will be provided when necessary.

**For data sources, try to access public available datasets or APIs.**

## Appendix: Project Evaluation Guidelines

- Problem Understanding and Formulation
    - Motivation and rationale
    - Problem definition
    - Innovativeness
- Knowledge and Technical Depth
    - Relevance and significance
    - Accuracy of knowledge applied
    - Level of achievements
- Methodology and Results
    - Methodology
    - *Literature survey and prior work* (*if applicable)*
    - *Implementation (if applicable)*
    - Analysis and insights
- Effort and Initiative
    - Evidence of effort
    - Evidence of independent and teamwork
    - Contributions of team members clearly stated
- Report
    - Relevance of content
    - Organization
        - 10-page length strictly enforced
    - Writing style
- Presentation
    - Relevance of content
    - Organization
    - Clarity
    - Time management
    - Q&A