

National University of Singapore
School of Computing

Semester 1, AY2023-24

CS4246/CS5446

AI Planning and Decision Making

Project Guidelines

Important dates

Project team registration:	22 Sep 2023 at 6:00 pm
Project proposal submission:	2 Oct 2023 at 6:00 pm
Project presentation:	Week of 13 Nov 2023
Project report submission:	(soft) 17 Nov 2023 at 11:59 pm (hard) 24 Nov 2023 at 11:59 pm

Project team

You will work on the module project in **4-person teams**. Each team member, however, will be responsible for the success or failure of the entire team. Ensure that you contribute your fair share throughout the project.

Your team may consist of members in different tutorial groups, but the team members should belong to the same cohort, i.e., you cannot have a team with students from both CS4246 and CS5446.

Please register your team using [this form](#) by **22 Sep 2023, 6:00 pm**. We will assign the team numbers after the registration exercise. Team number assignment is an administrative detail. Once you have identified the team, please proceed to work on the proposal submission.

Project topic

The project is an important and interesting part of this module. The project aims to allow you to examine a specific aspect of AI Planning and Decision Making in more depth. As such, the project topic should be related to one or more planning and decision making topics covered CS4246/CS5446.

Project types

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

1. A **survey** project on a particular theme. Read several related papers (no specific limit on the number of papers; you need to cover enough ground to develop a well-formulated survey), absorb and understand the papers, and write a coherent survey of the topic. In a survey, it is often useful to group related ideas together, compare and contrast methods and try to look for interesting observations that may only come from collecting all the related results together. If time allows, replicate one or more of the applications in the papers to give you hands-on experience on the topic.
2. An **exposition** project on an application. Choose an application in a theme, e.g., the Dota 2 video game, the AlphaFold drug discovery program, the Perseverance Mars Rover, and study it in depth. Explain the AI planning and decision making methods deployed, how things work, the challenges involved, the novelty and significance of the application, and a small demonstration of its capabilities, if possible.
3. An **application project**. Define a planning problem in one of the themes (such as AI planning and decision making for social good, AI planning and decision making in strategic and serious games, etc.), and apply/extend one of the existing AI planners (deterministic, HTN, or probabilistic) or decision systems (RL, Multi-agent systems) to demonstrate how AI planning and decision making can be applied to solve the problem.
4. A **competition** entry (e.g., [International planning competition](#)) to solve a special planning or decision making task in a common domain. You are encouraged, but do not have to actually enter the competition, but you can demonstrate how you can apply or extend a planning or decision making controller with the access to a common simulation environment and a set of tools to solve a challenge problem.
5. A methodological or theoretical **research** project. Develop a new algorithm or propose new AI planning or decision making technique with useful properties. Examples: Integrating hierarchical and probabilistic planning. Integrating learning and decision making. Improving online planning and learning. Multi-agent strategy learning. Knowledge transfer in RL. *If you choose this type of projects, talk to me about PhD/MComp thesis 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. There is no specific format for the proposal. You 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. Roughly, explain the division of work. 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 as per your initial plan.

If you choose to do a survey for the project, please include the initial set of papers you plan to read and summarize. Do note that each person reading only one paper doesn't constitute a survey.

Submission

Submit the proposal via the Canvas assignment opened for this purpose. **CLEARLY** list ALL your team members' names, student numbers (Axxxxxxx), NUSnet id (Exxxxxxx), and Tutorial groups (used for scheduling presentations). There is no particular format for the proposal.

This proposal submission is to allow the teaching team to give you feedback on the feasibility and scope of your Project.

Project presentation

The oral presentation will allow you to explain your project accomplishments to the class. Each presentation should be **15 minutes** long, with additional 5 minutes for questions and answers.

Project report

Your report should be **at most EIGHT(8)** pages following the **NeurIPS style**, self sufficient, including all discussions, figures, tables, and references; the actual images of the probabilistic graphics models or screenshots or planning graphs, etc., can be included in an appendix (which is not counted towards the page length limit, and not graded). Your writing should be concise and specific, and should meet the standard of an academic technical report.

Submission

Submit the project report via the Canvas assignment opened for this purpose. **CLEARLY** list ALL your team members' names, student numbers (Axxxxxxx), NUSnet id (Exxxxxxx)

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 and attribution

As mentioned earlier, you will work on the module project in **4-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 partners understand the entire work; questions may be directed to each of you individually during the presentation to check your individual understanding.
- ensure that you cite all sources of information consulted during the project (papers, blogs, video tutorials, etc.,).
- NOT cut-and-paste nor just rephrase from any printed or online descriptions or documentations!

If you seek help from fellow classmates (outside of your team) or generative AI tools be sure to provide appropriate attribution.

Grading

- **Project report:** your report will be graded according to its organization, degree of difficulty, level of achievement, soundness, innovativeness, and clarity of writing.
- **Presentation:** your presentation will be graded according to its organization, clarity, and the ability to answer questions

Resources

Please refer to [this page on Canvas](#) for some relevant resources.

Queries?

Please use the discussion forums on Canvas to ask questions and seek clarifications.