Instructor: Alina Vereshchaka

Final Project

Multiple deadlines, please see below

The goal of the final project is to explore various methods and/or applications in artificial intelligence. You will be expected to prepare a proposal, make a checkpoint and final submissions, and present your work at the end of the course. Your project must be related to AI and involve AI algorithms. You are welcome to discuss the topic of your final project by private Piazza post or during the OHs. If you are not sure about a topic, we encourage you to speak with us.

Possible directions

Below is a list of possible directions for your final project, you need to choose one.

1. **Informed Search Algorithms**
   Use uninformed and informed search methods to solve two different problems setup. You can use your A1 code as a basis, but you must apply the methods to new problems with different characteristics.

2. **Reinforcement Learning – Multiagent RL**
   Build and solve multi-agent tasks. You can use your A2 code as a basis, but you must expand it to multi-agent settings.

3. **Reinforcement Learning – Gymnasium**
   Apply a tabular method to solve any of the Gymmasium environments. E.g. Classic Control or Toy Text

4. **Machine Learning – Classification Problem**
   Select a dataset, preprocess, analyze and visualize the data. Apply logistic regression to classify the data. Interpret the results. You can consider MNIST, Penguins or other dataset for your project.

5. **Machine Learning – Real Value Prediction**
   Select a dataset, preprocess, analyze and visualize the data. Apply a linear regression to make house price prediction. Interpret the results. You can select any dataset of your choice.

6. **Machine Learning – Recommender System**
   Select a dataset, preprocess, analyze and visualize the data. Apply collaborative filtering and linear regression to make a prediction about a person's movie preference. Interpret the results.

7. **Your Own Project**
   You are welcome to propose your own topic, please make sure to discuss it with the course instructors.

Assignment Steps

1. Register your team (Oct 18)

You may work individually or in a team of up to 3 people. The evaluation will be the same for a team of any size. You can work with the same team member(s) that you worked with during Assignment 1 or Assignment 2.

Register your team at UBlearns > Groups. In case you joined the wrong group, make a private post on piazza.

2. Submit a proposal (Oct 31)

- The project proposal should be a one-two pages extended abstract motivating and outlining the project you plan to complete.
- Your proposal should have the following structure:
    1. Topic
    2. Objective. Explain the objective of the project -- what you are trying to solve.
    3. Technical Outline. What environment or dataset and algorithm you are planning to use.
- Submit as a pdf to UBLearns > Assignments
- Name your file as UBIT_TEAMMATE1_TEAMMATE2_final_proposal.pdf
  e.g., avereshc_atharvap_final_proposal.pdf

3. Submit a checkpoint (Nov 16)

- Complete an initial part of your project and obtain initial results. Include a draft version of your presentation slides.
- Submit to UBLearns > Assignments.
- Your Jupyter notebook should be saved with the results. If you are submitting python scripts, after extracting the ZIP file and executing command python main.py in the first level directory, all the generated results and plots you used in your presentation should appear printed out in a clear manner.
- Submit all assignment files in a ZIP file named:
  UBIT_TEAMMATE1_TEAMMATE2 _final_checkpoint.zip, e.g.
  avereshc_atharvap_final_ checkpoint.zip

4. Submit the final version (Nov 30)

- Fully complete your project and submit to UBLearns > Assignments
- If you submit multiple files, all assignment files should be packed in a ZIP file named: UBIT TEAMMATE1_TEAMMATE2 _final_project.zip (e.g. avereshc_atharvap_final_project.zip).
- Your Jupyter notebook should be saved with the results. If you are submitting python scripts, after extracting the ZIP file and executing command python main.py in the first level directory, all the generated results and plots you used in your presentaton should appear printed out in a clear manner.
- Include all the references that have been used to complete the project.
- If you are working in a team of two people, we expect equal contribution for the assignment. Provide a contribution summary by each team member in the form of a table at the end of your presentation:

Team Member	Assignment Part	Contribution (%)

We expect equal contributions to the assignment from both team members for the code and presentation parts.

5. Present your work (Dec 1 – Dec 6)

Present your work during the Presentation Days. Registration slots will be available later. The whole team should present the work.

Note: your presentation should represent the work you have submitted.

Presentation details

- Length: 10 mins + follow-up questions
- Presentation Templates: UB branded ppt templates

Suggested presentation structure:

- ❖ Project Title / Team's Name / Course / Date [1 slide]
- ❖ Project Description [1 slide]
- ❖ Background [max 2 slides]
- ❖ Implementation [max 2 pages]
- ❖ Results (Graphs & Any Visuals) [max 4 slides]
- ❖ Key Observations / Summary [1 slide]
- ❖ Thank you Page [1 slide]

Academic Integrity

This project can be done in a team of up to three people.

The standing policy of the Department is that all students involved in any academic integrity violation (e.g. plagiarism in any way, shape, or form) will receive an F grade for the course. The catalog describes plagiarism as “Copying or receiving material from any source and submitting that material as one’s own, without acknowledging and citing the particular debts to the source, or in any other manner representing the work of another as one’s own.”. Refer to the Office of Academic Integrity for more details.

Late Days Policy

You can use up to 7 late days throughout the course that can be applied to any assignment related due dates. You do not have to inform the instructor, as the late submission will be tracked directly in UBlearns.

If you work in teams, the late days used will be subtracted from both partners. In other words, you have 4 late days and your partner has 3 late days left. If you submit one day after the due date, you will have 3 days and your partner will have 2 late days left.

Important Dates

October 31, Tue – Submit a proposal

November 16, Thu – Checkpoint is Due

November 30, Thu – Final Submission is Due

December 1-6 – Final Project Presentations

Q&A

Q) Can we use an existing AI project as base code?

Yes, you can that as a base code. But we expect you to make improvements and modifications on top of that and clearly mention all the improvement made. Submitting an already existing code without a proper citation can be subject to Academic Integrity. Submitting an already existing code with a proper citation won't be evaluated, as there is not your team contribution to the project.

Q) My teammate does not work, and I do everything alone, can you change my team?

We suggest you find a suitable teammate at the beginning who is passionate and willing to put in the work for the project. Make sure to submit a detailed contribution summary, this will help to make necessary adjustments.

Q) Is it compulsory to use UB template for presentation?

No, but we provide you so you can have a base PPT ready. You are free to make your own PPT from scratch.

Q) Is the final report needed?

As long as you include your final project details as part of your presentation, there is no need to prepare a separate report.

If you want to include more details about your project, you are welcome to add a report. There is no strict guidelines on the report structure, you can follow any open form

Q) Are we allowed to use sklearn libraries for the ML-based final project?

Yes, for the final project for this course, you're welcome to use sklearn library. If you're working on an ML-related project, you can also devote some time by doing data analysis on the dataset, provide some statistics and generate visualizations.

Q) Can you please provide more details on what is needed for the final project presentation.

The presentation length should be around 10-12 mins. In your presentation, you can talk about the problem that you are solving, mention what methods you've applied to solve it (e.g. Search Algorithms) and share the results. It is always good to provide different forms of visualizations to make your presentation more clear. You can follow the presentation structure suggest and you can go slightly above the slides limits, if needed.

Here is also a recommendations on the Final Project presentation by Ian M. Mitchell

Q) Could I use a convolutional neural network instead of the suggested logistic regression for classifying the MNIST dataset with Keras/Tensorflow or PyTorch?

Yes you can explore deep learning framework and use them for your final project.

Q) For the second topic, what is meant by "you have to expand it to multi-agent settings." What does this mean, exactly?

Like in Assignment 2 we have one agent trying to reach a goal state, similarly for the final project we want multiple agents to achieve a goal state. You can modify your A2 environment and extend it to two agents and solve it using Q-learning and SARSA algorithms.

Q) Do we need to submit the presentation slide also?

For the Final Project, there will be additional link to upload a final version of the presentation. More details will be shared prior to the presentation days

Q) What's the grading percentage for presentation?

Our grading rubrics will be finalized during the grading period. A team may skip a presentation, and obtain a slight reduction in the grade, however we suggest to present the work. There will be an option to present online over zoom.

Q) When we submitting the draft of our PowerPoint, What type of file should we download? PDF or PPTX?

Both PPT and PDF are accepted.

Q) For the implementation part of the slides, do I just put the code of the algorithm into the slides and explain the code during the presentation?

If you wish to highlight your implementation, e.g you have introduced some optimization or efficiency to the code, you can include a short snippet of the code directly on the slide and talk about it during the presentation. It is not typically to go over your code implementation during the presentation in details.

Q) If we modified something in our topic, do we need to submit a new proposal in checkpoint?

We understand that students may slightly modify the direction of their final project while working on the checkpoint. You are welcome to make slight adjustments. There is no need to resubmit the proposal using the Proposal submission link, but you can include an update proposal as part of your Checkpoint submission, along with your other project-related files.