Artificial Intelligence Course Project Spring 2024

Project stages in a nutshell:

1. Proposal
   a. Problem selection and data acquisition
   b. Writing proposal

2. Implementation
   a. Code
   b. Report

3. Presentation and defense
   a. 5-minute presentation
   b. Technical questions

The project stages are described in detail below:

1- Proposal

a. Problem selection and data acquisition:

You will research potential application areas for artificial intelligence (AI) (e.g., healthcare, finance, environmental sciences). Next, you will define a specific problem within your chosen context (e.g., predicting stock price trends, analyzing medical image data). Based on the chosen problem, you will identify appropriate dataset(s) for analysis.

Deliverable: A specific problem and its corresponding dataset. Approval is required for both the problem and the chosen dataset.

b. Writing proposal:

You will explore the approved dataset, understand its properties, and identify possible challenges.

Considering the problem type (classification, regression, etc.) and data characteristics, you will choose suitable model(s), It is recommended to choose a neural network architecture (e.g., LSTM for text analysis, CNN for image recognition).

Deliverable: A concise proposal, consisting of 2-3 paragraphs, outlining the chosen context, problem definition, model selection, and potential applications. The proposal should be submitted in PDF format.

Deadline: 1403/03/08 Tuesday 22:00

Note that in the proposal stage:

*At the end of this stage, each student must have a distinct subject, such as "Using LSTM for predicting XAU/IRR pair in Iran".

*It is indeed necessary for each student to work on distinct datasets and subjects, with minimal intersections between their projects.

*You must iteratively seek your instructor approval. For this purpose, both teaching assistants can be approached for guidance and approval.

2- Implementation

After the approval of the proposal, you can proceed with conducting your project.

a. Code:

You will implement the chosen model from scratch. Prior to implementing the model, it may be necessary to preprocess the data. The emphasis will be on developing clean, well-commented code with the proper use of markdown cells in a notebook.

Additionally, you may need to evaluate the performance of the model using relevant metrics such as accuracy, precision, etc. on a held-out test set.

Deliverable: A functional notebook that includes clear comments explaining each code block effectively.

b. Report:

You will compile a concise and well-structured report, which should be 10-15 pages in length, excluding references, table of contents, and other ancillary sections.

The report should adhere to academic standards and include all the necessary information required for a comprehensive analysis. While being succinct, the report should still provide a high-quality work that effectively presents the findings and conclusions.

The report should include the following sections:

1. Abstract: Briefly summarizing the project's context, problem, methodology, and key findings.
2. Introduction: Providing background information and problem definition.
3. Methodology: Describing the data, models, and other technical procedures used in the research.
4. Results: Presenting your findings.
5. Discussion: Interpreting results, addressing limitations, and suggesting future improvements.
6. Conclusion: Summarizing key findings and project contributions.
7. References: Listing all cited sources.

A template for the report will be sent to the students.

Deliverable: A academic paper-like report will be provided in a PDF file format.

Deadline: 1403/04/05 Tuesday 22:00 (for both report and code)

3- Presentation and defense

a. 5-min presentation:

you will deliver a 5-minute presentation on your project, including problem, context, methodology, and key results. (Ensure your presentation stays within the 5-minute time limit)

Focus will be on clear communication and understanding of the concepts.

b. Technical questions:

After your presentation, there will be an additional 3 minutes allocated for posing technical questions derived from the implemented code.

Deadline: Online class on 1403/04/12 Tuesday

Grading

1. Proposal (5%) – Meets deadline, clarity, and creativity.
2. Code Implementation (30%) - Functionality, clean code, and documentation.
3. Report (40%) - Structure, content, clarity, and adherence to page limit.
4. Presentation and defense (25%) – Communication, and ability to answer technical questions, adherence to time limit.

A summary is presented in Table 1.

Table 1- Grade weights for every stage

Stage	**Weights**
Proposal	5%
Code Implementation	30%
Report	40%
Presentation and defense	25%

* Technical questions are used to evaluate whether the project is your original work. Poor answers to technical questions and a bad presentation can lead to a partial or complete loss of grade.

proposed planning

The proposed planning is presented in Table 2.

Table 2- proposed planning

Stage	**Week**
Problem selection and data acquisition	1-2
Model(s) selection and Writing proposal	1
Code Implementation	2
Writing Report	1
Preparing Presentation	1
Summation	**6-7**

FAQs:

1. Where to find datasets?

   UCI, Data.gov, Kaggle, Wolfram, Physionet, Paperwithcode , etc. You might have a dataset of your own, or you want to simulate one.

2. How to find problems?

   Paperwithcodes, different books including your reference books, ask LLMs like ChatGPT, you can also read review papers.

3. Does everyone have to present and answer the technical questions?

   Yes, absence will result in a grade of zero.

4. What happens if two students have come up with the same problem and dataset?

   The first student to claim a problem or dataset typically gets it. The second student would then need to choose something else.