Group Projects

Deep Learning

Why projects?

- The Course Project presents an excellent opportunity for you to put your classroom learning into practice by addressing a problem that interests you.

Potential projects typically fall into two main categories:

- **Applications**: If you have a specific background or interest in fields such as biology, engineering, or physics, marketing, we encourage you to leverage the DL models learned in this course to tackle problems within your domain of interest. Choose a real-world problem and employ DL models to find solutions.

- **Models**: In this track, you have the option to develop a novel model or create a modified version of existing models. Apply your model to address various DL-related tasks. This track often poses greater challenges but can also lead to noteworthy contributions that are suitable for publication.

Scope of projects

As this is a deep learning class, the project scope extends to any problem that can be solved using DL. Deep learning techniques can be applied to various problem domains, including but not limited to:

- **Computer Vision**: Utilizing deep learning models for tasks such as image classification, object detection, image segmentation, and image generation.

- **Natural Language Processing (NLP)**: Applying deep learning methods to tasks like sentiment analysis, text classification, machine translation, text generation, and language understanding.

- **Graph Learning:** Leveraging deep learning algorithms to analyze and model complex network structures, such as social networks, knowledge graphs, and recommendation systems.

- **Deep Learning Applications:** Exploring diverse applications of deep learning, such as speech recognition, audio processing, time series analysis, reinforcement learning, and generative models.

It's important to note that while these areas are within the scope of the deep learning class, projects should primarily focus on deep learning techniques and applications.

Project Grading

Your project, along with the recorded presentation, constitutes 50% of the total course grade, divided as follows:

- **Project Proposal, Data Selection, and Description: This component carries a weightage of 5%** towards your final grade. It involves submitting a well-structured project proposal, including the selection and description of the data you will be working with.

- **Professional Jupyter Notebook Report: This component accounts for 35%** of your course grade. You are expected to create a professional Jupyter notebook that presents your project work, including data preprocessing, model implementation, evaluation metrics, and any additional analysis or visualizations.

- **The recorded presentation contributes 10%** to your overall course grade. You will be required to deliver a presentation, recorded in video format, where you showcase and explain your project, including its objectives, methodology, results, and conclusions.

The team

- Each team should consist of a minimum of three and a maximum of five individuals.

- It is crucial for every team member to contribute actively.

- The final grade reflecting the collective effort.

Task0 : Project Proposal, Data Selection, and Description (Due 9th of July)

The Project Proposal, Data Selection, and Description component hold a significant weightage of 5% in determining your final course grade. This stage of the project requires you to submit a well-structured project proposal that encompasses several key elements:

- **Project Proposal:** You need to outline the objectives and goals of your project clearly. Explain the problem you intend to address using deep learning techniques and describe the overall approach you plan to take.

- **Data Selection:** Selecting appropriate data is crucial for the success of your project. You should detail the sources from which you will obtain your data and explain why these sources are suitable for your project. Additionally, discuss any preprocessing steps that may be required.

- **Data Description:** Provide a comprehensive description of the data you will be working with. This includes information about the data format, size, attributes, and any inherent challenges or limitations associated with the data. Clearly state how the selected data aligns with your project objectives.

Task1 : **Professional Jupyter Notebook Report**

It requires you to create a comprehensive and well-structured Jupyter notebook that effectively presents your project work, including the following components:

- **Data Preprocessing:** Describe the methods and steps you employed to preprocess and prepare the data for your deep learning model. This may involve tasks such as data cleaning, feature engineering, data augmentation, or any other relevant preprocessing techniques.

- **Model Implementation:** Detail the architecture and implementation details of your deep learning model. Include code snippets, well-commented code cells, or references to external code repositories if applicable. Explain the rationale behind your model choices and any modifications or enhancements you made to existing models.

- **Methods:** Provide a clear description of the methodologies used in your project. Explain the algorithms, techniques, or frameworks employed, ensuring that your approach is well-documented and reproducible.

- **Experiments and Results:** Present the experiments conducted during your project and report the results obtained. Include relevant performance metrics, accuracy scores, loss curves, or any other measurements used to evaluate your model's performance. Use tables, graphs, or visualizations to effectively communicate your experimental findings.

- **Conclusion:** Summarize the key findings and insights derived from your experiments and results. Discuss the implications of your results in the context of your project goals and objectives. Reflect on the strengths and limitations of your approach and provide suggestions for further improvement.

- **Future Work:** Outline potential avenues for future work and extensions based on your project's outcomes. Identify areas where additional research, experimentation, or improvements could be explored.

Task2 : **The recorded presentation**

The recorded presentation contributes 10% to your overall course grade. You will be required to deliver a presentation, recorded in video format, where you showcase and explain your project, including its objectives, methodology, results, and conclusions. This should not exceed 10 minutes and should be presented by all team members.