Systems and Biomedical Engineering
Clinical Decision Support System (SBE 3030)
2023-2024

Final Project

For this project, you're required to use **Python** to develop a **deep learning model** for a healthcare problem.

Please choose **ONE** of the following projects:

a) Project 1:

1- Choose a novel **healthcare problem**. Define the problem and your objective.

2- Conduct a **literature review** for your problem (include at least 2 scientific papers). For each of the chosen papers, you should mention: **their objective, methodology and results**. (References to the papers should be added along with an available online link)

3- Select **dataset(s)** to use for your problem. **Describe and visualize** the dataset. (a link to the used dataset should be provided)

4- **Prepare your data** to be used by the model.

5- Implement a **deep learning model** to solve your problem. Describe your architecture using a **schematic diagram** and explain the process conducted to reach the final architecture. Show the used loss function and explain why it is relevant to your problem.

6- **Evaluate your model** on a test set. Show a sample of the model's predictions vs the true labels.

b) Project 2:

1- Choose a novel **healthcare problem**.

2- Choose **two scientific papers,** one that solves this problem through machine learning and the other solving it through deep learning. For both papers, explain their methodology and results and compare them. (References to the papers should be added along with an available online link)

3- Select **dataset(s)** to use for your problem. **Describe and visualize** the dataset. (a link to the used dataset should be provided)
4- Using Python, **implement and use** the methodologies (same data preparation, architecture, …) conducted by both papers. (if your dataset is different from the ones used in the papers, you might need to adjust the data preparation to suit yours)
5- **Evaluate** both methodologies you implemented and **compare** the results.

c) Project 3:

(Implementing this project correctly and with a high level of understanding will grant you Bonus grades)

1- Choose a novel **healthcare problem**. Define the problem and your objective.
2- Conduct a **literature review** for your problem (include at least 2 scientific papers). For each of the chosen papers, you should mention: **their objective, methodology and results**. (References to the papers should be added along with an available online link)
3- Select **dataset(s)** to use for your problem. **Describe and visualize** the dataset. (a link to the used dataset should be provided)
4- **Prepare your data** to be used by the model.
5- **Use transfer learning** to solve your problem, by using a **pre-trained deep learning architecture.** Explain why you chose this architecture. Make changes to it if needed. Use a **schematic diagram** to describe the final used architecture.
6- **Evaluate your model** on a test set. Show a sample of the model's predictions vs the true labels.

Items to be submitted

1- Report:

- Your report should include all the requirements mentioned in the project of your choice.
- Your report should include a **schematic diagram** of the used deep learning architecture(s) and a **block diagram summarizing your overall process**.

- Add your Group number and group members at the beginning of the report.

2- Poster:

You're required to **print a poster of size A0**. Your poster should include the same content of your report, in a summarized and eye-catching manner. The block diagram and schematic diagram(s) should be included in the poster.

Notes for a good poster:

- Study the size of your poster. Choose suitable sizes for the fonts and visual content.
- Use eye-catching colors and fonts. Avoid plain text and use visual methods as much as possible. (If text is a must, avoid narrative paragraphs)

3- Code:

You're required to submit your python code file (.py or .ipynb). Your code should be clean and explained with comments.

Submission Instructions

- Each team leader should submit a **zip file** named "FinalProject_Team#", containing **the report in pdf**, a **soft copy of your poster** and the **python code file**.
- **In-person presentation** and **poster hardcopy** submission date: Monday, January 1st 2024.
- All the team members should be present for the presentation.

Evaluation Criteria

Novelty of the problem	Poster	Report, code and satisfying the requirements	Presentation and discussion	**Total**
10	20	40	30	**100**

- Novelty of the problem corresponds to your idea not being repeated with any other group. Additionally, choosing a new/interesting idea might grant you a bonus.