Medical Images Processing with Deep Learning - 336033

Project Instructions

General Guidelines

- Choose one paper from the provided list and implement an extension of the core idea. This extension should be meaningful, such as modifying the architecture, changing the training strategy, incorporating an interpretability method, or applying the approach to a new domain. Focus on a clear and well-motivated change that builds logically on the original paper's contribution.
- All work (code and report) must be done in **pairs**, unless prior approval is given by the course staff.
- Each group must submit:
    1. A working implementation (in Google Colab)
    2. A final written report (see structure below)
- Due to the large number of students, course servers will **not** be provided. All implementations must be done on **Google Colab**. Focus on proof-of-concept implementations rather than full-scale training on large datasets. Your model should demonstrate the feasibility of the extension on a small subset of data or a simplified task.
- The final project grade will be based on the creativity and impact of the proposed extension, the clarity and structure of the submitted code, the depth and reasoning behind the chosen extension as discussed and demonstrated in your report, and the overall quality and completeness of the project documentation.

Technical Requirements

- The final submission deadline is **08.08.2025**, the last day of the exam period. Any delay must be approved in advance by a member of the course staff.
- Students who are serving in reserve duty or are significantly affected by the ongoing security situation in Israel are encouraged to contact the course staff to discuss specific resolution.
- Submit a single .zip file via Moodle. The file should be named: id1_id2.zip
- The .zip file must include:
    - Your complete source code
    - A **PDF report** (see structure below)
- Ensure your code is readable and well-documented using standard Python commenting conventions and docstrings for all functions.
- You do not need to include the dataset files in the submission, but clear instructions for accessing them must be provided.

Report Guidelines

Your report should be a **maximum of 6 pages** and written in clear, academic language. It must include the following sections:

1. Title Page

- Project title
- Names and ID numbers of both students
- Title of the selected paper
- Your proposed extension

2. Introduction

- A short summary of the selected paper
- The problem it addresses and its relevance
- Your motivation for choosing this paper

3. Proposed Extension

- A clear and detailed description of your extension to the original paper
- **Explain the reasoning behind your extension**:
    - What limitation, assumption, or gap are you addressing in the paper?
    - Why did you believe your proposed change would be useful, interesting, or effective?
    - How does it relate to the goals or architecture of the original method?
- Clearly state your hypothesis or objective when designing the extension
- If applicable, briefly describe alternative ideas you considered and why you chose this one

4. Methodology

- Description of your model or changes to the original model
- Dataset(s) used, preprocessing steps
- Training details (loss function, optimizer, number of epochs, etc.)
- Tools and frameworks used

5. Results and Analysis

- Main results (quantitative and/or qualitative)
- Visualizations or example outputs (if applicable)
- Comparison with the original method (if relevant)
- Discussion of any failure cases or challenges encountered

6. Conclusion

- Summary of your findings
- Limitations of your work
- Suggestions for future work