The Hong Kong University of Science and Technology
Department of Computer Science and Engineering

COMP 5423: Deep Learning for Medical Image Analysis (Spring 2024)

- Final Project -

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Due: **Apr 15, 2024, 11:59pm**

1. Overview

Medical image analysis is a field that utilizes computer vision and machine learning techniques to interpret and analyze medical images which includes many modalities, such as X-rays, CT scans, MRI, and ultrasound. Common data modalities include X-ray, CT, MRI, and ultrasound, each providing unique insights into different aspects of the human body. Tasks in medical image analysis encompass image segmentation, classification, lesion detection, and image reconstruction, etc. In this project, you can choose any topics about deep learning for medical image analysis.

2. Requirements

You are required to implement medical image analysis tasks (e.g., classification, detection, segmentation, and registration) with deep learning. This project is open-ended, so you can choose any topics in medical image analysis for the project. Everyone needs to finish the final project individually. We hope you can use and develop some advanced techniques and propose new views about the topic you focus on. Meanwhile, you must accomplish an up-to 8-page writing report (excluding references) and an oral presentation (around 20mins, 15min for presentation and 5 mins for Q&A) in this project. You are required to propose novel ideas to improve existing methods and make insightful conclusions. This is an opportunity for you to get hands on deep learning for medical image analysis.

Here we list the key points about final project:

1) You are recommended to use Python-based deep learning framework (such as Pytorch, Tensorflow and Keras).
2) Model evaluation on more than one public datasets is preferred.
3) An oral presentation and a final project report.
4) Source codes and corresponding executable shell file (.sh).
5) Submission by the deadline.
6) Abide by academic integrity.

3. Submission Materials

The submission includes the following materials. Everyone needs to submit these materials to Canvas. Specifically, all materials are zipped into one file and submitted to Canvas -> Assignments -> Final Project. The zip file should be named StudentID_FinalProject.zip, i.e., 1234567_ FinalProject.zip

1) Writing Report

Everyone is required to submit ONE writing report (pdf file). The report needs to be organized in CVPR template within 8 pages (excluding references and appendix):

- Download LaTeX/Word Templates Zip file.

The report should include problem definition, motivation, contributions, method, implementation details, dataset description, experimental results & comparison, discussion, and conclusion. You are required to highlight the contributions clearly.

2) Source Codes

All source codes are required to be submitted to Canvas. Besides, you must provide a shell file (.sh) to execute your source code.

3) Presentation Slides

ONE PowerPoint file (ppt or pptx file) containing the content of oral presentation.

4. Grading Scheme

100 points for the final project, 60% score out of final course grade.

Details:

- Writing Report (40pts)
- Source Code (20pts)
- Oral Presentation and Slides (40pts)
- Bonus (max. 20pts)

Late Penalty: Late will get 20% deducted. Late than one day is not accepted (i.e., 0 pts).

Plagiarism: Students must observe and uphold the highest standards of academic integrity. Once plagiarism is confirmed, the case will be handled by ARO for further process.

Remark: Turn-it-in will be used in Canvas.

Some Resources:

Here we provide some publicly available data resources for your reference. You are welcome to explore other datasets and related tasks as well.

[Grand challenges] (a very useful website for medical image analysis tasks): https://grand-challenge.org. You need to register the competition to get the datasets.
[Kaggle] (the world's largest community of data scientists): https://www.kaggle.com.
[Stanford AIMI Shared Datasets] https://stanfordaimi.azurewebsites.net/. You need to sign in the website to get the datasets.
[Google Dataset Search] (The data set search engine launched by Google can search data sets around the world.) https://datasetsearch.research.google.com/