3684 – Advanced Topics in Machine Learning, Spring 2022
Home Assignment #3 – Self Supervised Learning (SimCLR)

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General instructions:

1. Submission is **individual.**
2. Submission must include python code **and** a written report.
3. You may use external libraries. Specify all required libraries in a proper manner.
4. Your code must be reproducible. Code that will not run will result in a grade reduction.
5. Your report should be clear, coherent, and concise. The report should not exceed 10 pages.
6. Invest thoughts and considerations to the way you choose to present data and experimental results.
7. All figure and plots should include captions, labels and data units. Pay attention to data visualization guidelines.

Assignment tasks:

The goal of this assignment is to demonstrate the use of Self Supervised Learning (SSL) to improve the performance of an image classification task. For that, you will implement the SimCLR framework for SSL. This assignment is based on an assignment from the CS231n course in Stanford University.

1. Download the zipped folder named "SelfSuperHW.zip" from the course website
2. Extract the file to **your Google Drive**
3. Open the ipython notebook "3684_HW3_Self_Supervised_Learning.ipynb" **in Google Colab** and follow the instructions in the notebook.
4. The notebook will guide through:
    a. Implementing image augmentations
    b. Generating training pairs for the SimCLR model
    c. Implementing the Contrastive Loss function for the SimCLR model
    d. Training the model
    e. Assessing the effect of using SSL on the performance of a simple image classification task.
5. Summarize your work in a short report.
6. Submit:
    a. notebook
    b. python files in simclr dir
    c. report

Class presentation:

If you have chosen this assignment as your class presentation assignment you are required to prepare a 20-30 minutes presentation in which you will need to showcase your work. In your presentation, expand the discussion beyond the technical details of the implementation and add more analyses and insights regarding the SSL process.