

Hands-On Assignment

Introduction to Deep Learning

800883-B-6

Spring, 2022

Description

This is a group assignment. Groups should be of 3 to 4 people. For this assignment, you will need to implement a model and evaluate it on a given test set. You will need to submit the outputs generated by your model on the test set, as well as a report describing your solution(s) and the code you used. The performance of your model will be compared to the one of a baseline model.

This assignment is worth 30% of your course grade. The assignment grade will be based on your work's quality as judged by the instructors based on your **report** and **code**.

Additionally, you will get a bonus based on your ranking on a shared task leader board. Specifically:

- if your rank first, you will receive bonus 2 points;
- if your score is no better than a provided baseline you will receive no bonus;
- for intermediate ranks the bonus points will be linearly interpolated. The performance of the baseline solution will be shown on Codalab.

All the information about the Codalab submission will be specified on a separated document later on.

Passing the assignment is not mandatory to pass the course, but it is highly advisable to hand in your solutions as not doing so implies a of 0 on 30% of your final grade. There will be no resit for this assignment as passing it is not compulsory. The exam may include questions that might be easier to answer if you have worked on the shared task.

1 Shared Task – Denoising and reconstructing audio signals

Analyzing sequential data or time series is very relevant and extensively explored task in the field of Deep Learning. This kind of data appears in many domains and formats; for example, stock prices, videos, and electrophysiological signals.

In this task, you will be working with voice recordings. In this particular case, the data set consists of short audio fragments of different people reading aloud. However, these signals are to

be down-sampled and transmitted through a noisy channel. Thus, you get a low quality version of each signal along with the original one in the training set.

Your goal is to build a Deep Learning model that is capable of reconstructing the original signal. More specifically, given a set of recordings and their noisy versions, your final model should be capable of reconstructing the original signal from its noisy and down-sampled version as good as possible.

Each sequence in the data set contains a person's voice and lasts about one second. In the file that you receive there is an array containing the original signal and the noisy version.

Your final model must be evaluated on a given test set that will be provided later. The test set only contains noisy signals. You have to submit your reconstructions to Codalab to get the performance of your model on that set.

2 Data format

The data is given in a .pkl file that should be loaded using the pickle library. The file contains the sequences and noisy versions in two arrays: [originals, noisy]. Each original sequence contains 11000 points.

3 Deliverables

3.1 Report

A one-page report should be submitted by May 23rd, 2022. The report should include the following:

- Title including names and student numbers
- A diagram of the architecture used.
- Brief description of your experiments, including training, hyperparameter tuning, and optimization.
- A table with the results and, optionally, a graph.
- Short discussion and conclusions on the performance of your solution in bullet points.
- The name of the account under which you submit your results to Codalab.

Your report should be a PDF document, with a single page of content, and optionally additional pages for references and appendices. Note that the content page needs to be self-contained, and the appendices should only contain auxiliary material. If any of the points listed above are in the appendix they will be considered as not present.

3.1.1 Code

Your code should be a plain Python script that can be run to generate your predictions. You do not need to include the training data or the weights of your trained model.

3.1.2 Submission format

For the submission, your report and code should be in a single zip file named with your group ID, e.g. group_1.zip, and submitted through the assignment on Canvas.

3.2 Performance

In addition to the report, you will need to submit a file with the predictions to the competition's server. The competition will be hosted on <https://competitions.codalab.org>. You will need a Codalab account for the group; make sure to indicate this account's name in your report. **The account should be created with a TiU email, otherwise it won't be accepted to the competition** (Only one account per group is allowed). There will be a separate document on the submission to Codalab with additional details.