ΥΣ19 Artificial Intelligence II (Deep Learning for Natural Language Processing)
Fall Semester 2022-2023
Homework 3
25% of the course mark
Announced: December 21, 2022 Due: January 10, 2023 before 23:59)

In this homework you have to develop a sentiment classifier for the dataset `imdb-reviews.csv` of Homeworks 1 and 2 using a bidirectional stacked RNNs with LSTM/GRU cells. For the development of the models, you can experiment with the number of stacked RNNs, the number of hidden layers, type of cells, skip connections, gradient clipping and dropout probability. Use the Adam optimizer and the cross-entropy loss function. The inputs to your model must be GloVe word embeddings (`https://nlp.stanford.edu/projects/glove/`). It is expected that you will experiment with more than one neural network architecture to choose the best for the problem.

You should use the machine learning framework PyTorch (`https://pytorch.org/`).

Before you do the homework, make sure that you have studied the relevant slides of the course (PDF files "Language Modelling and RNNs", "Vanishing Gradients and fancy RNNs", and "Machine Translation") or any other relevant literature you may find useful.

You should plot learning curves that show that your models are not overfitting or underfitting.

You should evaluate your classifier using precision, recall, F-measure and ROC curves like you did in Homework 2. Please also compare your best model with your best models from Homeworks 1 and 2.

Your code should be written in a way that your models can be evaluated on the test set by simply passing the path of the test file to a specific variable.

You will get a bonus 20% if you also utilize profitably the mechanism of attention in your architecture.

You should hand in:

1. A PDF document with a detailed explanation of your solution including citations to relevant literature that you might have used in developing your solutions. If you use LaTeX for your document, you will get a bonus 5%. In this case, you have to hand-in the LaTeX source files too.

2. One or more Colab notebooks (`ipynb` files using `https://colab.research.google.com/`) containing your code.