

ASSIGNMENT 4

CS5304 - SENTIMENT ANALYSIS USING CONVOLUTIONAL NEURAL NETWORKS

In this assignment, you'll recreate the CNN for NLP model from [Kim EMNLP 2014](#) for Sentiment Analysis. This CNN model should be trained on the Stanford Sentiment Treebank dataset that can be downloaded from <http://nlp.stanford.edu/~socherr/stanfordSentimentTreebank.zip>. More details on the dataset can be found at the [SST](#) site. Please note that the zip file contains several files. You'll be using the **dictionary.txt** file which contains the phrases and their corresponding ids. The sentiment labels for these phrase ids are given in **sentiment_labels.txt**. You'll have to convert the raw score into 5-classes as follows: $[0, 0.2] \rightarrow 0$, $(0.2, 0.4] \rightarrow 1$, $(0.4, 0.6] \rightarrow 2$, $(0.6, 0.8] \rightarrow 3$, $(0.8, 1.0] \rightarrow 4$. The phrase ids for the **training**, **validation**, and **test** partitions are given in the following links. Please use them in your experiments.

- (1) [Training](#)
- (2) [Validation](#)
- (3) [Test](#)

You'll conduct a total of 6 experiments as follows:

- (1) Train a CNN Sentiment Classifier using pre-trained and frozen skip-gram word2vec as your word embedding on the Sentiment data from above
- (2) Train a CNN Sentiment Classifier using pre-trained and frozen GloVe vectors as your word embedding instead of skip-grams
- (3) Train a 2-channel CNN Sentiment Classifier using both pre-trained and frozen GloVe and skip-grams
- (4) Repeat experiment 1 allowing the skip-grams to be fine-tuned for this task
- (5) Repeat experiment 2 allowing the GloVe vectors to be fine-tuned for this task
- (6) Repeat experiment 3 allowing both GloVe and skip-grams to be fine-tuned

Here are some helpful links:

- <https://github.com/DSKSD/DeepNLP-models-Pytorch>
- <https://github.com/mmihaltz/word2vec-GoogleNews-vectors>
- <https://nlp.stanford.edu/projects/glove/>
- <https://stackoverflow.com/questions/37793118/load-pretrained-glove-vectors-in-python>
- <https://gist.github.com/mrdrozdov/2a5049914db63136199556f18dfbf854>

For your submission, we'll expect the following in CMS.

- Your PyTorch code (**assign4.py**) which contains your implementation of CNN for Sentiment Analysis, including simple instructions on how the code can be used to run the 6 experiments.

- ~~A text file called **results.txt** that contains your class labels for each phrase in the **test** partition. These class labels should take Integer values of (0, 1, 2, 3, 4) as specified above. The format of each row in the file should be~~
~~**<phraseid>|<label>**~~
- A writeup called **assign4_writeup.pdf** that discusses your experiments along with accuracy measures (evaluated on your validation set) for all 6 models summarized in a table.

You'll be evaluated as follows:

- Results that exceed expected baseline and experiments done properly (e.g. not trained on the test set). 6 points
- Writeup that demonstrates all 6 experiments along with their results. For full credit, you'll need to compare the performance of your models in a non-trivial way. Hint: Did one model do especially better than others on a particular label? On a particular phrase length? 6 points.
- Working Python code file that contains no errors. 3 points

To ensure that we are able to recreate your experiments exactly (in case we need to), do hard-code any random initializations that you use in assign4.py. If we are unable to recreate your results using your submitted assign4.py file, we'll deduct points.