**Natural Language Processing**

*Spring 2021*

Programming Project #3

The final project is open ended. You may complete this either as an individual or else as a group with up to three total members. The purpose of the project is to install TensorFlow or PyTorch on your own machine and use it, within a Python program, to implement any project involving an NLP task and a neural network. For most tasks, I would prefer if you use some variation of a recurrent neural network, but I am open to other sorts of architectures if you think something else makes sense for your project. The task can be something that we covered (or will cover) in class, but it does not have to be. You should test your implementation on a dataset and report the results. (You are allowed to create a dataset, but it will be much easier if you find one.) Note that we are not covering either TensorFlow or PyTorch in class, so you will have to go through an on-line tutorial to figure out how to install and use the library.

Default project: Use one of the libraries to re-implement Project #1, for any one of the three datasets. If you choose dataset #2 or #3 (the ones for which I did not provide my test set), you will need to split the dataset into a smaller training set, probably a tuning set, and a test set. Use the training set along with the tuning set to experiment with architectures and hyperparameters, and only test the final version on the test set. If you choose dataset #1, keep the test set as is, and you'll probably want to split the training set into a training set and a tuning set. My original expectation was that a deep learning technique (including any recurrent neural network variation) would likely work best for the second dataset, because the documents contain only single sentences. I was not sure if the results would be good for any of these datasets, because they are very small by deep learning standards. Based on students who tried this last year, the results actually varied quite a bit; most were not as high as the strong naïve Bayes systems, but a couple of students got very strong results for the second dataset (albeit, with a different test set than mine, so the results are not directly comparable).

Whether you choose the default project or something entirely different, I expect more from a two- or a three-person group than from an individual. From an individual, just getting a project to work with a single reasonable architecture is enough. From a group, I expect to see more experimentation (with architectures, hyperparameters, etc.)

When you are complete, you should submit a **SHORT** writeup (*one to three pages*) explaining:

* Which library (TensorFlow or PyTorch) did you use?
* What task did you work on?
* What dataset did you use?
* How was the datasets split into training, tuning, and testing portions?
* What architectures and other variables did you experiment with? (Include types of networks, types and sizes of layers, hyperparameters, etc.)
* Summarize the results of the things that were varied.
* What were the choices for the final network?
* What were the final results for the test set?

E-mail your code and the writeup to CarlSable.Cooper@gmail.com (Please use my Cooper Gmail account to avoid problems receiving Python files at the cooper.edu account). The project is due the night of Tuesday, May 12, before midnight.