CS 6390: Phase 1 Project Report

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1   IE Task

My IE task is a multi-label, multi-class sequence tagging task. The input is a sentence and a list of fragments from the sentence, for which each is assigned one of the following labels: Appeal to authority: ATA, Appeal to fear/prejudice: ATF, Black-and-white Fallacy/Dictatorship: BF, Causal Oversimplification: CO, Doubt: D, Exaggeration/Minimisation: E, Flag-waving: F, Glittering generalities (Virtue): GGV, Loaded Language: LL, Misrepresentation of Someone's Position (Straw Man): MOSPSM, Name calling/Labeling: NC, Obfuscation, Intentional vagueness, confusion: OIVC, Presenting Irrelevant Data (Red Herring): PIDRH, Reductio ad hitlerum: RAH, Repitition: R, Slogans: Sl, Smears: Sm, Thought-terminating cliche: TC, Whataboutism: W, and Bandwagon: B. The output is (currently) a list of predictions for each sentence from a test dataset, where each entry in the list corresponds to the predicted label for the token.

This task is based off of *subtask 2* of SEMEVAL-2021 Task 6.

2   Resources List

For this task, I used the following libraries:

- PyTorch for implementation of an LSTM using a linear mapping from hidden layers to the prediction layer

- NLTK for tokenization, lemmatization, and stopword filtering

- The repository for this specific task, which contains all the necessary corpora as well as the scoring script for my task

3   Technical Description

My IE system implements a RNN using an LSTM which implements a linear layer for predictions. Tokens are given a BIO-labeling scheme according to the IE task description above (for instance: B-ATA, I-ATA, O, B-ATF, I-ATF, O, etc.). Sentence tensors are provided to the model and are *not* padded as is. The vocabulary provided to the system is currently

limited to the training and testing datasets provided with the project. The project is set to have an embedding size of 40, a hidden layer size of 40, and to run for 20 epochs over the training data. It also uses stochastic gradient descent to update values in the model and negative log likelihood as a loss function.

4 Evaluation

The script itself as is is not prepared to output predictions into the scorer script provided with the task. As is, the tokens are printed out with their predicted label, where I need to be able to extract predicted labels for spans of a given sentence in the test dataset. However, it is clear that my model is *not* correct. This is for implementation-based reasons as well as conceptual reasons. An example of the output of my script is as such:

```
['B-Sm', 'I-LL', 'O', 'I-NC', 'I-NC', 'O', 'O', 'O', 'I-LL', 'O', 'O', 'O',
'I-NC', 'I-NC', 'I-LL', 'I-LL', 'I-NC', 'O', 'O', 'O', 'I-LL',
'I-LL', 'I-LL', 'O', 'O', 'O', 'I-LL']
```

This is clearly not in-line with the baseline for BIO tagging. To some degree, I imagine that this makes sense, because this is the attempted label for the entire sentence – not necessarily spans in the test dataset that I am supposed to test my predictions against. However, a **significant** problem of my system as is is that it does not implement a bidirectional LSTM. This LSTM could also utilize transition probabilities by implementing a CRF layer, which would allow for my system to extract much better context. Additionally, the LSTM does not pad sequences for tensors, which is incredibly important given that, obviously, not every sentence is going to be of equal length. Finally, I could implement character-level processing for my LSTM, as well as Viterbi Decoding to help increase the accuracy of my system. I will continue working on this system, but save my progress as of the due date of phase 1 in a commit so as to accurately demonstrate the progress of my system at the time of submission.

Although this system is not particularly prepared for full demonstration and is sorely lacking on several implemention-based and conceptual fronts, its groundwork is well-laid out – that is, I have the basis for it, and I have concrete plans to improve upon its performance.

5 Contributions

I am a one-person team, so I have done all the work for this project.