CS445 NLP Individual Report

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# Introduction

I was tasked in performing the R&D processes of the project. I did extensive research regarding the long-short term memory architecture and slot filling. Slot filling helped us to get important features to be further used for intent detection. That is why a system regarding the balance between slot filling and intent detection was developed. My contribution to this project made it so that we were able to surpass the original paper’s accuracy and f1-measure by improving over it.

# Contributions Made

As told previously, I was the one responsible for the R&D over the paper BiLSTM with slot-gated SLU. Their approach was already robust in terms of integrating a system such that they used predictions to further enrich other predictions. I made it so that their model focused on intent detection more. Reduced the effectiveness of the slot filling loss over the general loss function by introducing a new hyperparameter called alpha. This alpha variable is a hyperparameter because slot filling is required in order to gate the process of predicting the intent labels.

Another improvement that I made was that I refined their codebase such that their code was also able to produce f1-measures and introduced Dense layers instead of outdated \_linear layers. In other way around, it was not even possible to run their code since support for tensorflow version 1.4 is so outdated that it is not maintained in Anaconda or PyPI repositories.

I also take the responsibility of introducing the conditional random field layer over the softmax function to effectively predict the slots before gating occurs. This is made possible via the Viterbi function implementation too. This made it possible to predict the slot fillings more accurately, thus increasing the overall accuracy of the system.

Before the experiments, I performed the smoke tests over the dataset to investigate the constituents of the dataset, and explored the contents of it to further enrich the research and development process. During this operation, it was discovered that the data was extensively labeled, which helped us develop robust machine learning models to predict the correct labels.

I also visualized the model workflows, prepared the presentation and presented our findings. Indicated the changes to the original paper and helped over the process of creating additional baselines and models such as the BERT with FC NN model and the Naive Bayes model with Text frequency inverse document frequency embeddings.

# Remarks

I would like to thank everyone in my team for their precious contributions in creating the baseline and additional models so that we had a metric to work on. Their contribution made it so that we had the final form of our project, and helped me to learn more about intent detection tasks.

Due to the contributions I made, we have increased the base 93 percent of the NAACL18 paper’s accuracy to 95 percent, and their f1 measure by nearly 15 points. I learned so much about research and development of pre-existing models. My affinity towards PyTorch and Tensorflow increased greatly.