Stanford CSLI Short Answers

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1.

Last summer, I had the opportunity to work at Noah's ARK group at the University of Washington, Seattle. I pursued exploratory work in my own interests of deep learning and grammar representation. While we did not produce any publishable work, our goal was for me to familiarize with deep learning methods. I began with an exploration of how LSTMs could resolve postfix expressions (e.g. "4 5 3 * +" evaluates to 19). This task was particularly interesting to me because we could manipulate expressions to make them long but shallow, or short but deep. We could also produce left and right leaning expression trees, which tests a model's memory capacity.

After a student pointed out to me it was impossible to deduce where the model makes mistakes, I implemented sequence-to-sequence models to convert postfix to infix expressions. Unfortunately, I found that LSTMs could not generalize at all due to the task's algorithmic nature, and it was hard to make interesting analyses and parallels to language. At this time, I began other work, such as reproducing agreement attraction experiments which were more linguistic oriented investigations, and the project was dropped.

In this pursuit, I fulfilled my original goal of familiarizing with deep learning sequence models. This upcoming summer, I'd like a chance to revisit similar problems of grammar representation in language models that I have dedicated my thesis towards. I believe that it may be possible to develop interpretations of our powerful neural language models in familiar experimental settings from psycholinguistics.

2.

I am most fascinated with the potential of human language technologies. To this end, my undergraduate studies consists of a blend of linguistics, computer science, and mathematics. My main coursework is in mathematics. I am a proficient programmer, and I have implemented many models in the past, including seq2seq constituent parsers and recurrent neural network language models, both of which are implemented in my own Dynet library. All my code mentioned above can be found on Github.

Coursework in linguistics and research projects made me realize the importance of syntactic structures. In the past, I have collected eye-tracking data for experiments on reflexives in Prof. Brian Dillon's lab. I have also independently conducted a research project in psycholinguistics on the Chinese reflexive, although there was a null result. In the statistical social language analysis lab headed by Prof. Brendan O'Connor, I helped annotate treebanks for African American English, and language identification datasets for Twitter.

This semester, I begin literature review for my thesis. My thesis hopes to provide a partial answer for how syntactic knowledge is being used in language models, and a sound metric of evaluating grammatical fluency. Towards this direction, I have been able to learn a lot of bayesian inference, variational methods, and interpertibility in neural models to observe linguistic phenomena. This summer, I will be in a position to conduct research on language models and the their syntactic capabilities.