**What is the name of your organization?\***

The Machine Learning for Language Group (NYU lab, Prof. Sam Bowman)

**What is the best email address to contact you?\***

bowman@nyu.edu

**What is the project?\***

Research into deep learning models that use linguistic structure for natural language understanding tasks. Specifically:

Investigating whether the bias in ST Gumbel softmax forces suboptimal decisions in “[Learning to Compose Task-Specific Tree Structures](https://arxiv.org/abs/1707.02786)” by Choi et al. 2017. Furthermore, testing out the possibility of always investigating all possible parse trees so as to increase the probability of choosing for optimal tree structures.

**What does the data look like?\***

The system will be tested on existing public reference datasets, including at [SNLI](https://nlp.stanford.edu/projects/snli/) and [MultiNLI](https://www.nyu.edu/projects/bowman/multinli/), each of which contains hundreds of thousands of sentence pairs labeled with textual entailment annotations.

**What is the proposed scope of the project?\***

To first gain a strong understanding of the possible pitfalls of the ST-Gumbel softmax method for latent tree learning. Then write a new less-efficient but potentially more effective deep learning model (in PyTorch) that explores all parse trees during training, and analyzing the ways in which this model differs in its behavior from ST-Gumbel.

**What are the rubrics of success?\***

* Reasonable performance of the new model on the SNLI and MultiNLI test sets and on the metrics described in “[Learning to parse from a semantic objective: It works. Is it syntax?](https://arxiv.org/pdf/1709.01121.pdf)” (Williams, Nangia, and Bowman 2017).
* Clear scientific conclusions about the merits of the ST-Gumbel method for latent tree learning.

**What is the the relevant background needed with respect to the project?\***

* Experience with neural network models for natural language understanding.
* Experience with PyTorch.

**What is the relevant organizational, project or institutional history ?\***

This project is an offshoot of a larger project that has already resulted in one published paper and one submitted paper. Nikita Nangia, the proposed student participant, has already contributed to another part of the project, and has completed two other research papers (one published, one under submission) on a separate topic in the same lab.

The lab is a part of the Center for Data Science.

**How will the organization support and mentor the students?\***

I will meet weekly with the student participant, and provide access to existing source code for one of the models under study (the other is to be implemented during the project by the student participant).