Statement of Purpose

Yao Xiao *Apply for PhD in Natural Language processing*

Career Goal

After I got my bachelor degree, I worked as a java engineer for almost two years. When I was working, I spent a lot of time thinking about what I am going to pursue for a career goal. Eventually, I got my answer.

Nothing could grant me more honor than to make a contribution to the most influential advances in the modern world. Taking part in research in Natural Language Processing is one way to win this ultimate honor. I have a deep interest in the area of Natural Language Processing. I was fascinated by complexity of language as well as the practical application of Natural Language Processing in our society. This technology really benefits the whole world. I also want to donate something to this area.

My interest in Natural Language Processing was enhanced by access to research when I was studying for master degree in Shanghai Jiao Tong university. In addition, the experience of being remote intern in SUTD StatNLP singapore for about a year helps me broaden my knowledge about Natural Language Processing. These experiences urged me to set my career goal, very board but clear, to be a researcher who can not only work independently to explore the beauty of linguistic but also design better language model for practical use.

Preparation for the Goal

Deep learning for natural language processing

Deep learning has been the most predominant approach for natural language processing in these years. It releases us from the burden of feature engineering which needs expert knowledge. Furthermore, neural network is capable of extracting the salient features and capturing the interactions between features, which are essential for the high performance of deep neural model. The word2vec can be considered the start of the new era in natural language processing history. After that, there is a boom of work about embedding. Bert based on attention mechanism now achieves dominant performance in various natural language tasks. Some work have even suggests that Transformers pretrained on a language modeling objective can capture syntactic information. Significant advances in this area are happending every year. To better apply neural network for natural language processing, I have to equip myself with a broader and deeper knowledge of this field.

I have been involved in work of natural language processing for some time. My master experience lays a solid foundation for me. It takes most of my time to follow the latest progress in this area. During my remote intern at SUTD StatNLP in Singapore, I also gained some experience about structure prediction and induced latent structure which further reinforces my interest in this area. The desire to develope a more systematic methodology of natural language processing pushes me to pusue a PhD degree in it.

Academic Plan

Mental State

First of all, I have to develop the ability of thinking independently and thinking critically. These two qualities are most important when pursuing a PhD in my eyes. It often happens that we would get inspiration if we can detect the shortage of previous work. Furthermore, I have to develop the ability to solve problems independently. Supervisor may give us advice but not solution. Only after achieving such state can we reasonably graduate.

Personal Thinking

I am always seeking better ways for feature interaction. Current approaches simply stack different modules and refine features by the order of module. For example, GCN may continue to process the output from LSTM. Structure messages encoding in the distributed representation from GCN is definitely underutilized in this way. It is intuitive to assume there exits better ways for features to interact. In addition, more inductive bias or prior knowledge should be incorporated into model when designing it.

Specific Issues

Meanwhile, to handle more practical situation, we have to develop better methods for better zero-shot and few-shot performance. Because in reality, it is quite often impossible to annotate sufficient samples to train a supervised learning model. **Currently, it seems that a unified framework(by converting the original task format to another like prompt) is likely to emerge for various NLP tasks, which is a promising direction.** The potential, however, is also still underutilized.

Methodology and Reliability

One of the drawbacks of neural models for natural language task is that they are sort of uninterpretable. This may hinder the practicality of our approaches when we install it for practical use, e.g. in medical field. It is definitely necessary that we have to develop more reliable methods to understand the decision of our model. In a word, a PhD degree on natural language processing is a journey for me to explore the intricacy and complexity of linguistic with computational methods. I wish that my efforts could make a difference to this world in this process.