I am very interested in the field of artificial intelligence (AI) and natural language processing (NLP). I am planning to obtain a Ph.D. degree in computational science, which will enable to pursue my long-term aspiration in academia. I have strong backgrounds in both research and engineering, and am confident that I am a good candidate for your exciting program,

I participated in the XXX Competition as a member of the XXX Group in my junior year. Our project was building an online community for synthetic biologists. Together, we designed and constructed a website, Biohub 2.0, with an efficient search engine, a forum and a flexible plugin system. My main main role in the project was to build and optimize the search engine. I cleaned the offical dataset to removed noisy data. Then, I built an intelligent search engine with features such as fuzzy search and multi-condition search. In addition, I used a third-party java library to accelerate database access and search. Eventually, our search engine achieved high precision and high speed. Our website was unanimously appreciated by the judges and ultimately won the gold prize. This experience inspired my interests in computer science, especially data-driven intelligent systems, and laid the foundation for my further study on artificial intelligence.

In 2018, I joined the Honors Program in Artificial Intelligence of XXX University and took many theoretical courses, such as Pattern Recognition and Digital Image Processing. I felt deeply attracted by the exciting field of AI and earned A or A+ in all AI-related courses.

In the meantime, in order to apply the theoretical knowledge and explore cutting-edge technologies of AI, I joined XXX Lab (under the supervision of Prof. XXX) and XXX Lab (under the supervision of Prof. XXX) and actively participated in several research projects on AI.

Among these projects, the most special one for me is the XXX Competition held by the Conference on Computer Vision and Pattern Recognition (CVPR). From April to May 2019, I teamed up with a graduate student in XXX Lab and participated this competition. To detect oriented objects, we proposed Adaptive Period Embedding (APE) to improve the representation of the tilt angle. Our embedding method was simpler than previous methods and easier for the model to learn. APE could also be applied to other models that need to handle oriented objects. Then, we observed that long objects are common in aerial images, but traditional IoU calculation often results in their missed detection. Therefore, we proposed Length Independent IoU (LIIoU) to improve the recall rate for long objects. I also experimented with a few-shot object detection model, RepMet, to handle categories with less training data. Ultimately, we won the first place in the oriented bounding box detection task and the second place in the horizontal bounding box detection task. Our paper, *XXX*, is currently under review by IEEE Transactions on Geoscience and Remote Sensing.

This project made me understand the charm of scientific research: through careful analysis of existing problems, bold brainstorming and extensive experimentation, we defeated all existing methods and achieved state-of-the-art results, thereby contributing to the entire computer science community. I felt deeply excited by this process. In addition, I was deeply impressed by the power of AI ​​models: After careful engineering, the black box-like neural network can solve tasks far beyond the traditional algorithm's capabilities. I had a strong belief that AI technology will profoundly affect our future life. This experience made me decide that I will devote myself to AI research.

Later, from Jul. 2019 to Sep. 2019, to get in touch with USA’s world leading computer science research and gather more experience, I undertook an internship in the University of California, Los Angeles (UCLA). I worked in XXX Lab under the guidance of Prof. XXX, and I studied the application of Graph Neural Network on long document modelling. I showed that the state-of-the-art text encoder, Transformer, is equivalent to the Graph Attention Network (GAT) applied to a fully connected graph of words. To apply Transformer to long document modeling, I reduced the memory consumption of the Transformer via graph sparsification. Then, to extend the model's receptive field and capture long-range dependency, we propose Sequential Edge Pooling (SEP) based on Edge Pooling, a graph pooling method. SEP merges consecutive and semantically related words into a single node, preserving the structural information of the text sequence and producing an interpretable "parse tree". Our method is competitive with the state-of-the-art methods on document classification datasets. This project introduced me to the amazing field of natural language processing (NLP), which has become my major research interests.

Currently, I am working in the ML group of MSRA and studying transfer learning from Transformer-based NMT models to general language understanding. After obtaining my B.S. degree, I aspire to conduct research on AI and especially NLP. I am particularly interested in multi-task models that can serve as a unified language understanding and generation framework. Current methods (such as BERT and the latest T5) are working towards this goal, but I believe that the scalability and versatility of these models can be further improved. I’m also interested in the interpretability of NLP models and commonsense reasoning.

I am interested in your XXX project because of your world’s top research and computation resources. I am especially interested in Prof. XXX because XXX. I am excited by the prospect of learning from and contributing to this excellent programme, and I appreciate your consideration of my application.