Statement of Purpose

Charles

"I have come that they may have life, and that they may have it more abundantly."

–John 10:10

The most vital purpose of my application to TOP University is to pursue a Ph. D. degree in your reputable graduate program of Computer Science. My long-term career goal is to be a professor, devoting myself to teaching Computer Science knowledge and pioneering in AI advances. For decades, simulating the human brain by computers has been continuously surveyed, yet the results are still not close to what the nature has made. For the next century, I strongly believe that the exploration will remain challenging for scientists of various fields. This motivates me to pursue higher studies in CS. By receiving complete graduate and double major undergraduate education from the top university in Taiwan, I have constructed a solid base of CS research methodology as well as mathematical training. Moreover, I have experienced various research practices, from writing device drivers to finishing a first-authored IEEE journal paper. In the following paragraphs, I will further describe the path leading to my application and briefly elaborate my research experiences; please refer to my Curriculum Vitae and "Bilingual Experiences: in English vs. in Chinese," if you are interested in more details.

Algorithm design and analysis, the kernel of every computer application, has always been my favorite area. However the lack of research resources in National Taiwan University (NTU), my alma mater, prevented me from receiving the complete research training in this domain. Since my sophomore year I have been interested in the cryptography subfield; however, my department did not deliver any cryptography courses, and courses available in other departments always conflicted with my obligatory subjects. Nevertheless, although cryptography is still the missing part, I have profoundly studied on all my obligatory courses. I was ranked top 3% in my class regarding the overall GPA, and was the best on the courses of Data Structures, Intro. to Algorithms, Discrete Math, and Intro. to Computer(II) (a scheme/Lisp course), and the rest. Moreover, I continuously took relevant selective courses such as Logic, Elementary Number Theory, and Algebra. During my graduate year, my high performance was shown on the courses of Computing Theory and Geometric Computing & Visualization. Besides, to maximize my knowledge about algorithm, I audit courses of AI, Design Strategies for Computer Algorithms, and Algorithms for Bioinformatics in another reputable university and reserach center. Furthermore, I have experienced some practical applications for these courses; for instance, I applied the 3DES & RSA strategies learned in the Network Data Security course to a part-time RD project that was crucial to the company's annual income. Even after graduating from NTU, I continued my study by reviewing papers and books on matrix computation, concrete mathematics, approximation algorithms, and so forth. As a consequence, it is my eagerness in CS that drives me to join in your esteemed Algorithms Group to obtain orthodox training. Meanwhile, I strongly believe

that my thorough training on the areas of mathematics and machine learning hones my analytical ability, which will facilitate my Ph. D. study in Algorithm domain.

I majored in machine learning during my graduate years, and enjoyed it very much. I began my research work on preliminary knowledge about Support Vector Machines (SVM) with Dr. Chih-Jen Lin. Our lab was to develop the best SVM software, and meanwhile I was participating in the part of solving large-scale classification problems. To appear in *IEEE Transactions on Neural Networks*, our paper"A Study on Reduced Support Vector Machines" investigated deeply on the RSVM method published in year 2001. We proposed various implementations on RSVM, and carefully compared the performance of these implementations with that of the regular SVM. From the scheduled coding works and hands-on experience, I learned how to handle the numerical computation issues derived from the optimization problems within SVM. More significantly, I understood and experienced the basic procedure of machine learning. To learn the characteristic of different learning method, I kept in touch with other machine learning techniques by taking relevant courses of Statistics, Neural Networks, Pattern Recognition, etc. Also, I am aware of various applications such as Independent Source Separation and the hottest, most up-to-date bioinformatic techniques.

Indeed, I have joined a bioinformatic research project during my first graduate year, by which I have understood how much computer scientists could assist biologists. I, together with another graduate student, Mr. Jung-Ying Wang, have studied on the topic of protein secondary structure prediction. We found this a typical machine learning problem and used SVM to solve it. The result was nice but not efficient enough, so we finally concluded the project and turned to some other bioinformatic problems. We realized they were not a bit easier: issues, such as feature selections, aroused when applying many machine learning methods. Nowadays, "inefficiency for large-scale datasets" and "curse of dimensionality" still occur when dealing with bioinformatic handy data. To make progress on these hard problems, I am eager to study in some bioinformatic programs, and your honored Bioinformatics Group attracts me the most.

Though my interests seem versatile, my lifetime objective is quite definite. I hope to invent technologies to benefit users and researchers on the society. With my strong ability and motivation, I am confident to absorb any state-of-the-art ideas by attending your respected Ph. D. program. Then, through intensive learning and lab-researching, I will not only weave my dream but also achieve my ultimate goal.