Statement of Purpose (Berkeley PhD in OR)

Steve Jobs's story about "connecting the dots" in his 2005 Stanford commencement address is among the most inspiring speeches I have seen in my life. I am now taking the exact approach that he suggested to make this important decision to apply for the Ph.D. program in Operations Research at University of California, Berkeley. As I look back now, one of the earliest dots of my life in OR dates back to my high school days, when I prepared for and participated in the National Olympiad in Informatics in Provinces, a contest that involved solving problems with an algorithmic nature. Along the road I learned a lot of classic optimization models, including network flow, dynamic programming, etc. Without knowing anything about OR at the time, I highly enjoyed the process of converting a problem written in plain text into an unambiguous and well-structured formulation and then solving it by coding up a smart computer program.

The early years in Tsinghua University saw me developing a solid background in advanced mathematics and computer programming. As a student in Math and Physics, I received the most rigorous undergraduate training in mathematics and modeling. As of the end my junior year, my GPA ranked 1/50 within our Academic Talent Program. In addition, I achieved the first rank in all of my computer courses, and my programming skills have been continuously honed through various course, research, and intern projects. I am grateful

that I have laid this strong foundation for pursuing a Ph.D. in OR.

I have completed several projects that are in essence OR problems, without my awareness at the time. For instance, I was in charge of developing core algorithms for a Tsinghua campus tour guide app, for which our team was awarded the Meritorious Winner of the university-wide Challenge Cup and our work has been published on Tsinghua University - Outstanding Academic Papers by Students. I independently devised an algorithm to generate the optimal touring paths, or, with my much improved OR knowledge now, to essentially solve a "traveling salesman problem". In another course project, I developed a Chinese input method program, in which I first estimated word frequencies from a large text data set and then designed a DP algorithm to fast translate inputted Latin script into a list of corresponding Chinese words with the highest frequency. Another intern project of mine was about optimal portfolio management with risk control, which I later know is a classic OR application in finance.

My participation in the 2013 Mathematical Contest in Modeling turned out a sudden revelation moment on OR for me. The most important outcome was not the Outstanding Winner award, but an opportunity to formally introduce myself to the OR field and to inundate myself with OR research in four days of intense working. It was the first time for me to go through a complete cycle of facing a practical OR problem, modeling it, solving it, translating the results into a research paper and finally presenting my work on an academic

conference (2013 SIAM Annual Meeting). I was immediately fascinated after consciously being involved in the entire process. Just as Jobshas put, "you can only connect them looking backwards." The contests, the coursework, the research projects, the internships – all the dots suddenly connected in front of me from an OR perspective.

With the insight in mind, I began to actively look for every opportunity to educate myself with OR. I have been taking elective OR courses such as Intro to Operations Research, Stochastic Process and Applied Stochastic Model. To prepare myself for potential future research that involves big data, I am enrolled in several courses on machine learning as well. Besides, I have talked to OR graduate students and professors about conducting OR research. In particular, my recent discussion with Prof. Lei Zhao from Dept. of IE, Tsinghua University has made me interested in approximate dynamic programming by its interdisciplinary feature of machine learning and dynamic programming. I have decided to complete my undergraduate thesis under his supervision on using ADP to optimize a goods delivery problem. The more I know about OR, the more I am convinced that I belong to this world. Honestly speaking, before the MCM, I had been planning to be a quant which appears to be a well-paid job for math/physics major students. However, as I reflect, I realize that my enthusiasm was never in trading or making money per se, but in using mathematics to extract insights that would otherwise be improbable to with merely instincts and intuitions. That, I believe, is the power and beauty of OR.

Now that the dots are connected, I see a clear career path ahead of me – pursuing a doctoral degree in OR and becoming an OR researcher. In addition to my solid background, I have personality traits that well fit an academic position. First, I am never satisfied with any result without fully understanding the mechanism behind. My advisor Prof. Hao Wang once commented that I would be a good researcher "because I like to ask why and figure things out." Second, I enjoy projects that involve a great extent of creativity and autonomy, in which I can lay out my own plans to tackle challenging problems. Moreover, various group projects like the MCM have proved that I am good at communicating my idea and collaborating with others, which are essential in a research environment that increasingly needs cooperation.

Since I have not officially been an OR enthusiast for too long, I am still in searching for a specific research area. In general, I am excited to do research that closely bridge intricate mathematical models and real-world applications. Given my experience of dealing with large data set, I am particularly interested in doing data-driven OR research. My belief is that ideally models should be coming directly from real data, and should in turn be validated by real data to make a real impact. I also have an interest in the OR/Finance interface, which naturally stems from my undergraduate research and industrial experience in Finance.

Berkeley has one of the best programs in Operation Research.

Specifically, IEOR's focus on bridging theory and practice and on combining models with data perfectly accords with my academic goal. With my solid background, determined personality and keen interest, I am confident that I can succeed in my graduate studies. I also believe that pursuing a Ph. D. degree at IEOR, Berkeley would be an invaluable dot to be connected with my career path in OR.