Personal Statement

I am a master degree candidate studying in Hangzhou Normal University, majoring in computer application technology. My master's research direction is theoretical research of single-objective evolutionary algorithms. Now I am in my second year of master's studies and expected to graduate in June of next year. After two years' studies, I have accumulated certain experience in fundamental academic knowledge and experimental design. I want to say that I have experienced the hardships and pressures of academic research, but also the fulfillment and satisfaction it brings to me. As for me, these positive senses cannot be replaced by any other kind of happiness. With careful consideration, I made the decision to apply for a doctoral degree to further improve myself.

Personal experience

In 2016, I took the National College Entrance Examination. Unfortunately, I didn't get accepted into my desired college and was reassigned to Anhui University of Traditional Chinese Medicine to major in information management and information systems. At that time, this reassignment dealt a heavy blow to me and I just found myself deeply trapped in self-pity and self-blame. After going through a period of low spirits, I adjusted my mindset and began to take actions. Since then, I dedicated myself to study and learn knowledge.

Review my undergraduate years, I entered the college with excellent grades, which earned me a one-year tuition exemption. In the first year, I received the *Third-class Scholarship*. Next year, as I ranked 4/44 in my major then I received the *First-class Scholarship*. In my junior year, I ranked 1st in my major and received the *National Inspirational Scholarship*. In 2020, I successfully graduated from Anhui University of Traditional Chinese Medicine as an *Outstanding Graduate*. My undergraduate GPA is 3.33 and I want to mention that during the initial period of my college, I struggled to adjust my mindset and take control of my blue mood which resulted in my normal grades of some subjects. Additionally, as my college required some compulsory courses of economics and medicine, I faced challenges in certain subjects such as " Macro and Micro Economics" due to the lack of relevant knowledge, and the same reason led to almost no one in my class passing this course at that time.

In my junior year, I made the decision to **pursue my master's degree**. Unfortunately, shortly before the National Postgraduate Entrance Examination, I was unable to participate in the exam due to my health problems. Then I took the exam in the following year. In 2021, I applied to East China Normal University but I wasn't able to proceed to the next round of assessments as my score was 10 points below the interview threshold. During the adjustment phase, I ultimately choose to apply for Hangzhou Normal University to major in computer application technology and I was admitted with ranking 1/20 in the written examination and ranking 2/20 overall.

As my undergraduate institution focused on medical specialties and provided limited resources for computer-related majors, I cherished every learning opportunity that I

have encountered **during my master's studies**. In many courses, I tried my best to acquire new knowledge while filling in my previous knowledge gaps and deficiencies. Overall, I completed a total of 16 courses in the first year and achieved an average grade of 88. I excelled in several courses, such as *Algorithm Design And Analysis* in which I achieved an outstanding score of 96/100.

Experience in the field

During my graduate studies, I conducted theoretical research in the field of single-objective evolutionary algorithms followed by associate professor Libin Hong. In the second semester of my first school year, I completed **my first experiment**. Initially, I started to research on a particle swarm optimization variant named EPSO, aiming to design a more efficient algorithm based on its structure. Meanwhile, I became acquainted with the concept of cluster on my graduate courses which I found to be valuable in my own research. Then through literature research, I discovered niching method in evolutionary algorithms field shared a similar concept with clustering. Additionally, I learned about a local search strategy from my peers' literature reports during group meeting. Finally, through my reflections and attemptions of applying ideas and existing methods I learned and acquired, I designed a new algorithm which yielded promising performance results. A paper based on this research had been published in *Swarm and Evolutionary Computation* this year.

While conducting the comparative experiments in my first experiment, I observed the excellent performance made by one of the compared algorithms. Intrigued by its structure and ideas, I further delved into this algorithm which lead me to embark on **my second experiment.** Based on my previous experience and related knowledge, I modified two major mechanisms within the original algorithm and proposed a new algorithm with highly-improved performance. The proposed algorithm first uses particle swarm optimizations to conduct global search, and then proceed with a mechanism involves sequential quadratic programming methods for local search. Recently, this article was submitted to *Information Sciences*. (PS: Initially, it was submitted to the *Complex & Intelligent Systems* and it had entered the second round of review. However, there had been some changes in the journal's quartile ranking a few month ago. After discussion with my supervisor, we believed this paper held significant value and then we decided to resubmit it to another journal.)

Over the two years of research, I have undergone significant personal growth. Initially I had limited experience in programming, but later on, I quickly learned a new programming language (Matlab) and gradually became proficient in programming. Furthermore, I overcame my fear of expressing my opinions in front of public and I'm able to share my thoughts with my professors and peers now. Additionally, my English reading capability, information retrieval skill and logical thinking ability have been greatly improved, too. All of these personal growths benefited me a lot.

Motivation of applying for further education

During my master's study, I focused on theoretical research in single-objective optimization evolutionary algorithms. A few month ago, I had the opportunity to

collaborate with other group in my school on program of applying evolutionary algorithms to solve the parameter optimization problem in neural network models. Prior to this project, I had no experience with algorithm applications. And as I searched for relevant information, I gradually realized that, compared with single-objective optimization problems, multi-objective optimization problems are relatively closer to real-world problems, and evolutionary algorithms better demonstrate their characteristics and strengths in the field of multi-objective optimization.

I was fortunate to come across excellent ideas of multi-objective algorithms such as MOEA/D, NSGA-II, etc. However, my understanding and knowledge of these concepts is still limited and I have many questions and doubts at that moment. I don't want to stop at a superficial level and hope to conduct in-depth research on more aspects of evolutionary algorithms in my future research. I am interested in researching and improving multi-objective Particle Swarm Optimization algorithms. I want to explore how to integrate the techniques and methods of single-objective optimization that I have previously learned into multi-objective optimization. Additionally, throughout my previous research, I observed the irreplaceable advantages of traditional optimization methods in single-objective problems. I am also keen to learn more about traditional optimization methods and investigate whether they can be integrated with evolutionary algorithms and how to introduce into existing algorithm framworks. I really hope to gain a better understanding and insight into these aspects during my doctoral studies.

A summary

As I mentioned earlier, my two educational transitions were not really smooth. Therefore, my decision this time was made with careful consideration and thorough preparation. Although there may still be moments of stress and anxiety in the future's research process, I think I have acquired strategies of self-regulation and developed determination to overcome challenges. Apart from the mental preparation, my self-disciplined study habits cultivated at undergraduate stage, as well as the programming and relevant research knowledge gained during my master's research have also fully prepared me for my future research. I believe that my previous experiences will help me progress further on the path of academic research.