TEACHING STATEMENT

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Teaching and mentoring students is an essential part of academic life, and my passion in teaching drives me to pursue an academic career. Teaching fundamental concepts to students in a simple way can effectively foster their interest and curiosity in the subject. Teaching also facilitates research. The teaching process can lead me to a deeper and novel understanding of certain topics, and will bring about new insightful discoveries in my research. In addition to teaching, an academic position also provides me with the opportunity to mentor and work closely with students. Junior students, with a fresh bent of mind, can think about problems freely and creatively outside the box. Knowledge and idea exchanges in both teaching and mentoring junior students can often lead to amazing academic insights. In the past four years, my experiences as an assistant lecturer, course teaching assistant and graduate student mentor have shaped my teaching and mentoring philosophy. I will provide a sample of them below.

A. Teaching Experience

A.1 Assistant Lecturer: Delivering lectures for students is one of the most exciting parts in teaching. Explaining problems, concepts and approaches in a concise and systematic way will make it much easier for students to digest the details and construct their own knowledge networks. During the Spring Semester of 2013, I worked with Prof. John Lillis to deliver an undergraduate course, *CS151 Foundations of Computing*, in University of Illinois at Chicago. It was an introductory course but the challenge was that we need to cover a large number of basic concepts from several fundamental areas in computer science. These areas included *computer programming*, *discrete mathematics*, *mathematical logic*, *set theory*, *graph theory* and *probability theory*. I was responsible for delivering the weekly lab session lectures. In addition to synchronizing with the regular course lectures delivered by Prof. John Lillis, I needed to design the lab class materials very carefully. The lab class should provide a consistent knowledge network covering these diverse domains for the students. According to the department course registration information, one of the prerequisite course for CS151 was *CS107 Introduction to Computer Programming*, and all the students had taken that course in advance. To ensure the students can transit smoothly to the new course, I started the first lab class with basic programming problems about the sum of arithmetic and geometric sequences from the prerequisite course. Based on that, in the second lab class, we introduced the mathematical induction method in *discrete mathematics* about the formal proof of arithmetic and geometric sequences sum equations. With the prior knowledge, students could follow the new materials very easily. Then we transited to topics in *mathematical logic* when introducing the truth table based proposition proofs from *discrete mathematics*. We started talking about *set theory* after finishing the element-belonging propositions in *mathematical logic*, and covered basic *graph theory* knowledge after introducing the set product in *set theory*. Finally, I also prepared some materials about basic *probability theory* for the students. According to the feedbacks received from the students, they could all grasp the key knowledge points very well and make the topic transitions smoothly.

A.2 Teaching Assistant: In University of Illinois at Chicago, I worked as the Teaching Assistant on two other different occasions, for one undergraduate level introductory course and one graduate level advanced course. During the Fall Semester of 2012, I worked as the *teaching assistant* of an undergraduate level course, *CS201 Data Structures and Discrete Mathematics I*, delivered by Prof. Mitchell D. Theys. For *CS201*, I was responsible for (1) providing homework assignments about basic concepts in data structure and discrete mathematics, (2) participating in the design of interesting hands-on course projects, such as *Sudoku Solver*, *Word Morphing Game*, (3) organizing group discussion with students and answering their questions via the online Q&A platform *Piazza*, and (4) holding weekly office hours. That experience was extremely rewarding and instructive for me. By interacting with students, I may understand the challenges they encountered and would figure out how to help them. Since students in that course came from very diverse academic backgrounds (e.g., engineering, computer sciences, math), when designing the homework and projects, I naturally switched my position to the students' perspective. I would think about both the detailed knowledge points to be covered as well as the big picture.

Recently, in the Fall Semester of 2016, I'm working as the *teaching assistant* of an advanced graduate level course, *CS584 Advanced Data Mining*, with Prof. Philip S. Yu. Different from the basic introductory courses for undergraduate students, this course is designed for graduate students, especially PhD students, with background in data mining specifically. The goal of this course is to show recent data mining research developments to the students. In this course, I'm responsible for (1) hosting the weekly in-class presentations and group discussions, (2) organizing the course schedule by inviting students and visiting professors to talk about recent data mining research works in each class, and (3) grading the final course papers in terms of their novelty and technical contributions. The experiences gained from this class by working and discussing with frontier researchers are totally different. To ensure everyone can benefit from the course, for junior students I need to review the major lines of research works that lead to the current technological innovations. Meanwhile, for senior students and visiting professors, I need to point out the specific strong points and drawbacks of each presented paper to motivate their new research ideas.

A.3 Teaching Philosophy: Based on the experiences in teaching students, my teaching philosophy comes from several dimensions:

- *Individualization based Teaching*: When teaching students of diverse academic backgrounds, according to the students' particular levels of expertise, the presenting approach and materials need to be calibrated correspondingly to ensure the ideas are easy to digest. Individualization is extremely fundamental in teaching.
- *Active Learning based Teaching*: I think fostering passion is the most important duty of a teacher. Motivating students to bring about their inspiration and curiosity into independent active learning is the ultimate goal of teaching.
- *Hands-on Projects based Teaching*: "Learning from doing" is my own study and research quote. Based on my own experiences, new problems can always be discovered when going deep into the real implementation of the models/systems. Teaching with hands-on projects can achieve remarkable success.

B. Example Courses

I am interested in teaching courses related to the newly evolving inter-disciplinary areas of *Computational Social Science*, *Data Mining* and *Advanced Large-Scale Data Mining*. The following shows the brief goals of these three courses:

- *Computational Social Science* (lecture for undergraduate and graduate): An inter-discipline introductory course of social science and computer science. This course focuses on seeking solutions to problems that are motivated by sociological observations underlying our daily life. The approach to addressing these problems will be largely computational, utilizing robust and scalable tools/methods to analyze reliable sociological data.
- *Data Mining* (lecture for graduate): A principal course introducing problems, algorithms and applications in data mining. The goal of this course is to equip the students with basic knowledge and skills about data mining. A couple of course projects will be designed to help students get familiar with real-world data mining problems, approaches and tools.
- *Advanced Large-Scale Data Mining* (seminar for graduate): An advanced course on recent data mining research breakthrough works. The goal of this course is to show the data mining research frontiers, and motivate students to push the knowledge boundary (of data mining) further forward with their own research works. A variety of recent promising data mining topics will be covered in this course, such as scalable data mining, deep learning, social media/science, recommender systems, urban computing, crowdsourcing, etc.

C. Student Mentoring & Advising

C.1 Student Mentoring Experience: As a senior PhD student in Prof. Philip S. Yu's lab at University of Illinois at Chicago, I have mentored several junior graduate students with their research works. Some of my mentoring experiences include:

Qianyi Zhan (PhD Student): I started to work with Qianyi Zhan since September 2014 until present, and we have 7 collaborated conference papers (6 accepted and 1 under submission) and 3 journal articles (1 accepted by AISC journal and two submitted to WWW journal and KAIS journal). Our cooperated works mainly focus on information diffusion across multiple online social networks, some of which are accepted by top-tier data mining conferences, like CIKM, ECML/PKDD.

Junxing Zhu (PhD Student): I have been mentoring Junxing Zhu for about one year, and currently we have 4 collaborated papers (1 accepted by WSDM recently). Our prior works mainly focus on entity alignment across multiple social media, and currently we are studying several interesting application problems about multiple aligned knowledge libraries.

Chenwei Zhang (PhD Student): I have been working with Chenwei Zhang for half a year, and our cooperated projects focus on applying deep learning models to mine large-scale heterogeneous network data. Currently, we have crawled two large-scale movie knowledge base datasets, IMDB and Douban, based on which we have 2 conference papers in preparation.

Ye Liu (PhD Student): I start to mentor Ye Liu since September 2016, and our cooperated project is to analyze different factors affecting the movie box office. Now, we have 2 academic conference papers in preparation.

C.2 Student Mentoring Philosophy: An advisor's ultimate role is to help students gain the necessary expertise to carry out their independent research. According to my past experiences, I summarize several key points in mentoring as follows:

- *Bold Thinking*: Young graduate students with limited experiences can actually think very freely, which can sometimes trigger amazing research ideas and lead to exciting discoveries. Bold thinking can foster the passion and creativity of students, and help them discover what they are really interested in.
- *Free Exploration*: Few students can learn the skills of research without tries and mistakes. When students come up with new ideas, I will encourage them to explore and check the ideas with simple experiments. In the process of exploration, students can gain invaluable research experiences and deeper understanding about the problems.
- *Strong Support*: The research exploration process never lacks of puzzle, failure, frustration and helplessness. As the advisor, I will always stand with the students along the way whenever they turn to me for help. By cooperating with the students, they will eventually overcome the problems and achieve great success in the projects.