Teaching Statement

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My passion in teaching drives me to pursue an academic career. Teaching provides me the absolute pleasure to share my knowledge with students and foster their passion and curiosity in computer science. It is essential for cultivating the next generation of scientists and educators for continuous advancement of the field. Moreover, teaching can facilitate research. The process of teaching often gives the teacher a new perspective to the body of knowledge, which can lead to new discoveries.

My background makes me well-suited for teaching data mining, computer algorithms, machine learning, and digital image processing. I am interested in developing courses that address the recent advances in data mining techniques. In the University of Illinois, I have served as a lab instructor and teaching assistant for an undergraduate course, CS101 computer programming, which is one of the most work-intensive courses. I have served as a teaching assistant for two graduate courses, CS501 computer algorithm and CS584 advanced topics in data mining. I have also given numerous seminars and invited talks at conferences, universities and industrial labs.

Teaching Experience and Approach

One important skill for teaching is explaining course material clearly and concisely. A good lecture usually requires a lot of effort to prepare. Explaining problems, concepts, or solutions often requires the teacher to prepare the course material in a certain way, such that students can easily follow and feel excited. During my graduate studies at University of Illinois at Chicago, I took every opportunity to practise my presentation skills in conferences, seminars and classes. In the second year of my PhD, I started a book-reading seminar in our research lab and gave many oral presentations with well-prepared lecture notes. I always make sure that my presentation includes the following key elements: conveying the importance of the topic, using the right order to introduce different concepts, using interesting pictures to illustrate the key ideas, adding the right amount of details in the class.

In addition, I also like to incorporate real-world applications and the state-of-the-art techniques into the course. Modern technology, especially in computer science, is evolving at a very fast speed. Many important techniques in 2013 (e.g., social media, crowd sourcing, Apache Hadoop) do not even exist in 2005. As a result, I think the ultimate goal of teaching should be more than simply conveying information; it should be “preparing students for jobs that don’t yet exist, using technologies that haven’t been invented, in order to solve problems that we don’t even know are problems yet”. As a teaching assistant for a graduate course at the University of Illinois, I took many opportunities to include state-of-the-art techniques into the course. In several lectures, I discussed the recent issues in data mining, such as big data, Hadoop MapReduce and social influence mining. I also reviewed the major lines of research that leads to the current technological innovations, and discussed the core principles behind them. By doing so, I could raise the curiosity of the students and encourage the students to learn about new technology.

I also believe that hand-on experiences are important parts of the teaching process. For both the undergraduate and graduate courses, interesting projects would help students to better understand the concepts we teach. Group projects can help students to learn and collaborate with peers. For example, in CS101, an entry-level programming course, I designed a course project to foster the
students’ interests in coding. In the project, the students used simple coding to build a program that can help people solving any “spot the difference” puzzle. By reading the two images into two arrays, and simply computing the differences between the two arrays, the program can output a list of answers in less than a second. Usually, each of these puzzles can easily take minutes for a student to solve. But with the help of the program they wrote, solving each puzzle only take seconds.

**Example Courses**

Here are some courses that I am well-suited for teaching.

- **Computer Algorithms**: (undergraduate and graduate) An important introductory course. Students can be introduced with basic principles in computer algorithms and practise their skills in designing algorithms to solve various problems.

- **Data Mining**: (graduate) Introduces theories, methods, algorithms and applications of data mining techniques. A couple of course projects will be designed to help students to get familiar with data mining tools, and work on real-world data science problems.

- **Digital Image Processing**: (undergraduate) A practice-oriented introductory course, that introduces basic concepts and techniques for processing digital images. I will incorporate mathematical derivations and practical assignments into the course.

- **Data Mining for Big Data**: (seminar) Recent advances in data mining approaches for big data research. The methods discussed will cover a variety of application domains, such as graph mining, social networks, viral marketing, biomedical research, etc.

**Student Advising**

During my PhD study, I have had the pleasure of mentoring numerous students (more than 7 students), including undergraduate students and junior PhD students. I believe that the key issues in mentoring students are as follows:

1) **Share my knowledge and experience with students**: Few students can learn the skills of research without trail and error. Though it is still important to share with them my knowledge about the project and my previous experience that is related to the project. The proper guidance helps students to know how to avoid obvious mistakes in research and manage the risks of failure in the project. I would encourage graduate students to discuss with other students and researchers in order to learn from their experience as well.

2) **Foster passion and creativity by giving enough freedom for exploration**: I believe that an important way to foster passion and creativity of students is to encourage them to start their “own” projects that fit their interests. Research projects should include enough flexibility for students to discover and explore, and the research direction should be important and exciting enough to boost their passion. By having the students working on the topics that he/she is truly excited, the journey of research becomes a reward to the student. Students are more likely to innovate and feel proud of these projects. I also feel very proud to have been working with numerous students on topics beyond what I could think of, such as location-based social networks, crowdfunding, multi-network alignment and incomplete social networks.

3) **Be students’ best ally on the road of research exploration**: The research exploration of students never lacks of stress, failure, frustration and helplessness. I would give my strong support and encouragement to students along the way. Several of the students that I have mentored have met with some setbacks during research, but all are able to yield valuable research contributions eventually. All the undergraduates that I have supervised are now pursuing graduate studies or are applying to graduate programs, and most have contributed useful works to the research project.