Teaching Statement

Vincent Liu

Education is a topic that I care deeply about, and it is one of the reasons a career in academia is so attractive to me. I am truly excited at the prospect of teaching and mentoring students and have thoroughly enjoyed the opportunities that I have had as a teaching assistant, guest lecturer, and mentor to younger graduate students.

**Teaching.** In my first year of graduate school, I served as a teaching assistant (TA) for an experimental senior-level class on Distributed Systems, which covered topics such as Remote Procedure Call (RPC) and Paxos, in addition to the design of distributed systems like Google’s GFS and BigTable. As a TA, I had two responsibilities that I took very seriously: creating a series of guided projects and leading two recitation sections.

For the project, my adviser and I wanted students to learn, first-hand, the inner workings of mechanisms like transactions, concurrency control, and Paxos. At the same time, we also wanted to teach them how to build correct distributed systems; often the most important and interesting parts of these systems are how they handle unreliable computers and networks. To that end, I built a framework that was able to insert node failures and message delays/drops. Students wrote normal Java code for each participant in the distributed protocol, and my framework would transparently inject failures and message delays, either randomly or using a manually-defined sequence. To assist in their debugging, my framework included features like deterministic replay, the ability to run across multiple machines (and a real network), and the ability to simulate a failure at any point within any method.

For the recitation sections, I focused on clarifying the material the students needed to complete the project assignments. Direct interaction gave me a chance to gain immediate feedback about my teaching approach, to see what students actually understood, and to more effectively engage them. I tried to continually refine my approach and learn from my mistakes while serving as a TA for a subsequent professional masters version of the class and while guest lecturing for a graduate networking class.

I look forward to teaching courses in computer networks, distributed systems, and distributed algorithms. With the increasing prevalence of cloud computing and big data, it is important for students to understand how these systems work and how to build them. More broadly, I am capable of teaching other systems courses including systems programming, operating systems, big data, databases, and compilers as well as more foundational computer science classes such as algorithms, data structures, and programming.

**Mentoring.** The other vital aspect of academics is guiding student research. As a senior graduate student, I have had the pleasure of working with two very smart junior students, Danyang Zhuo and Qiao Zhang. For both, I served as their first point of contact, providing day-to-day guidance and assistance. Because they had very different strengths and weaknesses, I needed to provide different types and amounts of advising. For instance, Danyang proved to be a talented experimentalist, but needed more work with his writing; I encouraged him to take on as much writing as possible and provided him with extensive feedback on any piece of writing he showed me. Qiao was the opposite in that his writing was relatively clear and concise, but needed more guidance when debugging implementations and experimental setups. As they have grown into stronger and more independent researchers, I find myself at least as excited about their successes as I would be of my own. Combined, so far three submissions have resulted from my collaborations with them.