Teaching Statement

Richard Peng

The fluid nature of many areas of computer science, such as algorithm design, means that courses on them often cover a wide range of concepts. I believe problem solving is crucial for internalizing these concepts and should play an integral role in the teaching process. Over the past five years, I have strived to incorporate problem solving into the teaching of recitations and classes, the mentoring of research-oriented students, and the organization of student events and outreach activities.

My teaching draws upon my research in data structures, algorithms, graph theory, optimization, statistics, geometry, numerical analysis, and parallel computing. Connecting these topics and enabling students to effectively utilize key ideas from them is one of my main teaching goals. These connections are often best motivated by key problems on the boundaries of these areas. Solving such problems usually requires adapting various tools from these areas, leading to a deeper understanding of both the tools and the problems. For example, instead of presenting sorting algorithms and balanced search trees separately, I prefer to discuss applications that integrate them such as geometric plane sweep algorithms. I believe this problem oriented exposition is helpful for using the tools later on, as well as for moving towards open-ended exploration in an area.

This teaching approach was developed and refined during my teaching experiences. While a graduate student at Carnegie Mellon University (CMU), I served as teaching assistant (TA) for undergraduate and graduate courses on algorithms and was responsible for many of the problem sets and exam questions. These experiences motivated me to seek out instructional roles. In my last two years at CMU, I incorporated state-of-the-art topics into a graduate level course on spectral graph theory (attended by fifteen students) and taught an informal course on algorithmic graph theory (with about ten regular attendees). My more recent involvement with courses on combinatorics and differential equations in the Math Department of the Massachusetts Institute of Technology (MIT) presented me with the challenge of teaching a wider range of topics and broadened my horizons. In Fall 2014, I co-taught an upper year algorithms course at MIT that had an enrollment of two hundred and forty.

Collaborating with junior researchers is one of the most gratifying aspects of teaching. During the 2011-12 school year, I worked with an undergraduate student, Hui Han Chin, on his senior thesis that won the Allen Newell Award for Excellence in Undergraduate Research at CMU. Since then, I have worked on submissions to major conferences with students from CMU, the Indian Institute of Technology Dehli, MIT, the Max-Plank-Institute for Informatics, Yale University, and the University of Southern California. Several of these projects have evolved into long-term collaborations. In summer 2013, Michael Cohen worked with me as an undergraduate research assistant at CMU, and we have continued to collaborate while at MIT.
I also seek opportunities to interact with students in a wider range of academic activities. Having participated in outreach activities such as math and programming camps while in high school, I regularly volunteered for them after graduating. Since 2006, I’ve been involved with the USA Computing Olympiad, whose annual online competitions attract around two thousand participants from high schools worldwide. I helped with the monthly contests, and taught at the annual week-long camp. I was also involved in organizing the International Olympiad in Informatics four times, being responsible for the preparation of technical materials. While at CMU, Daniel Sleator and I restructured and formalized the weekly meetings, leading to three CMU teams placing among the top five at the regional programming contest, and CMU placing first among North American teams at the 2013 ACM International Collegiate Programming Contest. This role continued at MIT in a more informal setting, with about ten students regularly participating.

My teaching experiences and research background make me well-suited for teaching subjects such as algorithms, discrete math, and optimization. I am keen to expand my horizons, and would be interested in the challenge of teaching a wider range of topics. I also plan to continue my involvement with the supervision of research projects and the organization of outreach activities.