TEACHING STATEMENT

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Becoming a professor will allow me to utilize my academic and professional experiences to help students appreciate the beauty of science. Working closely with students, I aim to encourage and develop their learning and research goals. By guiding, coaching, and mentoring students as they deepen their knowledge and grow into experts in their fields, in addition to continuing my research work, I will be professionally fulfilled, challenged, and inspired.

Teaching Philosophy

Every student has his/her distinct interests, strengths, and passions. Each student works hard to reach his/her goals and to realize his/her potential. It is the teachers' job to build a foundation in various subjects, fill in the knowledge gaps, to help students recognize their talent, and kick-start their careers. I have been working closely with undergraduate students on research projects. Most of the students realized that research was their genuine passion and they chose to apply for graduate schools to pursue further study and research opportunities instead of working in industry after graduation.

I am experienced in helping students with different backgrounds, and various goals find their passions in and out of classrooms. I provided my students with personalized learning experiences by tailoring exercises to various skill levels to build a solid foundation and stir their interest in challenging problems when teaching the Computer Graphics course at Princeton University. During my work as a postdoctoral researcher at UC Berkeley, I created a research and development environment mirroring industry practices to immerse my students in real-world team-working conditions, solving real-world problems.

Teaching Experience

As a masters student at the University of Michigan, I immediately got the teaching bug when I was an Assistant Instructor for the Intro to Comp. Complexity course. Differing from most other application-driven computer science courses, this course emphasized abstract constructs. To better illustrate the theoretical concepts, I began by explaining different forms of the same concept to help students understand the idea from various angles. For example, when discussing the proof of NP-completeness of 3SAT, I compared it with 2SAT to illustrate why 3SAT is much harder. By showcasing actual applications, I demonstrated how theoretical concepts such as reduction and complexity classes could be utilized to solve real-world problems. Most importantly, I encouraged my students to ask questions to identify missing links in their understanding. I felt rewarded by helping my students understand these difficult concepts in computer science.

I continued my passion for teaching during my Ph.D. by seizing every opportunity to teach subjects in computer science. I taught scientific computing techniques to students without much programming experience, being responsible for guiding students on their programming projects. Because of students' varied backgrounds, I emphasized the impact of low-level machine implementation on the resulting program by constructing programming exercises for students to have first-hand experience in converting mathematical procedures to code efficiently. I also created a mini-course on Structure from Motion, which covered the whole pipeline of 3D reconstruction from a collection of monocular images, from point cloud representation to dense multi-view stereo. The audience of the course was graduate students from various fields. I began by introducing the mathematical foundation of 3D reconstruction before moving to more advanced topics. To reinforce understanding and retention of key points, I slowly introduced the core ideas and reviewed them in the context of the new material to help the audience understand the big picture while learning necessary technical details. A software suite was also developed as a companion to the lectures to provide the students with an environment to explore those ideas outside of the classroom. The lectures were well-received, and the public lecture notes became the default material for new students who wanted a crash course on standard 3D reconstruction techniques.

My teaching experience has led me to believe that the students learn better with clear goals in mind and problems of their genuine interests. At Berkeley, I de facto led a 12-person project course for

Master of Engineering students. My students were encouraged to select projects related to their interests in topics of autonomous driving and large-scale data processing. To help the students make informed decisions about their commitment, they and I spent the first two lectures on brainstorming the ideas and components of a large-scale or real-time computer vision system. In the discussion, they could see clearly what the ultimate goal was and how their interest could fit in. Then we held a project auction to place each student in the most optimal spot. This warm-up process provided great motivation and clear goals for their project works. The students were willing to go out of their comfort zone to acquire the necessary knowledge and skills to achieve their goals.

Mentoring

Besides teaching an M.Eng. class, I have also been mentoring a group of about 20 students in various degree programs including undergraduates, masters and Ph.D. students. As a mentor, I aim to help students find their interests in research and careers. I see that it is essential to keep in mind each of the students has different strengths and skills. My mentoring process starts by talking closely with new students about their interests and where they wish to grow. Then I design a small project to verify our understandings and get the students started on their personalized learning plans. I am fortunate to have worked with these students for the past two years, and I have been proud to watch them grow while accomplishing their goals.

I make sure to tailor projects according to the student interests. Students who want to become scientists and hope to build strong research reputations for their academic career are encouraged to dive into the research literature and propose new challenging ideas. I brainstorm with them before helping them plan their future steps. I ensure that they have both short-term achievable goals and long-term vision. I also make myself available on a daily basis in case students need help. The key point I hope to convey to the students is to think critically about the existing solutions, jump out of the current solutions, and construct a new testing bed for new insights. Several research papers led by undergraduate students came out of this collaboration on the topics of 3D shape editing, predictive learning, and optical flow.

Engineering-oriented projects can lead to real-world impact, and some students are eager to get out of school to push forward the technological innovation. To bridge the gap between classroom learnings and real-world engineering practices, I set up an industry-standard development environment for the team and rigorously implement the software design process. Consequently, besides solving the problem, the students also learned the importance of technical communication and team working. They could experience the latest development pipeline in high-tech companies while still in school, which prepares them for real company work right after school. Some of my students chose to work as research engineers at UC Berkeley, instead of taking job offers in the Silicon Valley, because they believed they could grow faster for their career goal in the long term with my tailored projects.

Future

Teaching is a skill I want to improve for the rest of my career. It requires articulation of elusive ideas to ever-broader audiences. I am excited to pass on what I learned to the future generations of students and pass on the excitement of discovery of new knowledge.

I am delighted to teach undergraduate and graduate students, especially in computer graphics, computer vision, and autonomous driving. I have good knowledge of programming techniques, software design, mathematical foundation of computer science and research experience in projects on autonomous driving and large-scale data processing systems. I will focus on the importance of the mathematical formulation and theoretical results underlying the application-oriented fields to prepare my students to drive future innovations.