Teaching Statement

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Teaching and mentorship are critical components of a professor's job. I have found both to be rewarding and hope to continue to teach and mentor students as a faculty member.

1 Teaching

Teaching experience. My primary teaching experiences come from teaching underprivileged students introductory computer science in Ethiopia and being a teaching assistant (TA) for CS197 at Stanford, a class for undergraduates to learn how to do computer science research. Through these experiences, I have learned to be flexible in my teaching and the importance of teaching to a wide audience.

I taught an accelerated computer science course in Ethiopia with AddisCoder in 2016 and 2018. In 2016, I was a TA, where I answered individual student questions in a laboratory setting. Unfortunately, there were a number of surprises that I led the TAs to adapt to. For example, the university's lab did not have internet (despite promises to the contrary), so we were unable to use the automatic grading system we had prepared. I led the TAs in creating self-contained assignments so the students could learn without internet.

After my experience in 2016, I returned in 2018 as a lecturer. Based on my experiences in 2016, I helped implement several changes to the course. First, we designed the exercises in the course to be self-contained, even without access to the internet. Second, in teaching the first week of the course, I focused on enabling the students to explore basic programming concepts on their own in the lab. Finally, I gave the TAs dedicated roles to empower them to make autonomous decisions. For example, I assigned a TA to be in charge of ensuring the exercises were complete on time and another to be in charge of grading.

In 2019, I was also a TA for CS197, a new course at Stanford designed to teach undergraduate students how to do research. As this was a new course, I assisted with developing the focus of the course. Furthermore, since CS197 focused on research, I designed several research projects for undergraduate groups in my recitation. These projects were designed to be open-ended and allow the students to learn the research process through doing research. Several of the students have gone on to do research in labs at Stanford.

Teaching philosphy. Through my past experiences, I have learned the importance of learning by doing and the importance of having a flexible approach towards teaching.

Unlike mentoring in research, it is difficult to give individualized attention to every student in a lecture setting. As a result, I strongly believe that the best way to empower students to learn the material is to give them structured ways of learning by doing. I believe this is particularly useful in computer systems, where students can modify code and see the results. I will continue to give structured exercises to build students' understanding of material as a faculty member.

I have found that unexpected situations often arise during teaching. In my experiences in Ethiopia, I had to be flexible with how assignments were created and in designing lectures that resonate with different cultures. Similarly, the pandemic has greatly affected the nature of teaching. Broad-strokes plans with specific details to be resolved as situations arise have been useful in my past teaching experiences. I will continue to take this approach as a faculty member.

Teaching interests. Based on my research and teaching experiences, I am excited to teach both undergraduate and graduate courses. I plan to primarily teach courses in computer systems, but would also be happy to teach courses in machine learning. For example, I would be happy to teach introductory computer science, systems, and deep learning courses.

In addition to standard courses, I hope to design and teach new courses. I hope to teach a course on systems thinking for deploying machine learning at scale. Due to the popularity of machine learning, graduate courses on machine learning are now prevalent. However, deploying machine learning involves more than just training models: real deployments have complex resource constraints and require understanding hardware resources for full utilization. Machine learning presents unique challenges and opportunities from a systems perspective. For example, how should practitioners trade off accuracy and computational resources? Can we optimize end-to-end machine learning pipelines for more efficient utilization of computational resources? I plan to design a course that helps students answer these questions.

2 Mentorship and Graduate Supervision

In addition to teaching, mentorship is an important part of a faculty member's job. I have mentored over 10 undergraduate and masters students. Additionally, I have co-authored papers with five of the students. Several of the students I have mentored have gone on to top computer science graduate schools and created companies. In mentoring these students, my approach has been to take a structured approach to teaching the mechanics of research while giving freedom for them to explore research topics. I plan to continue doing this as a faculty member.

Mentorship exeprience. I have mentored a number of students. Of the students I have co-authored papers with I helped mentor Logan Engstrom at MIT and mentored Animesh Koratana, Ankit Mathur, Teja Veeramacheneni, and John Guibas at Stanford. Logan Engstrom is now a graduate student at the Madry lab at MIT and Animesh Koratana has gone on to found `testgram.ai`, a software testing company.

My philosophy towards mentoring these students has remained consistent, while my day-to-day approach has varied per student. Many of the mechanics of research can be taught in a structured way, e.g., what lesion studies and factor analyses are, but much of research requires a tailored approach. This reflects in my mentorship. Before and during the parts of the research process that can be taught in a structured way, I explicitly outline overall approaches and goals, such as designing a lesion study or designing plots. For the part of the research process that requires a problem-specific approach, I make myself available whenever necessary to discuss issues that arise. These often take the form of whiteboard sessions or Slack conversations.

I also understand that students have different needs, so I have taken a tailored approach towards mentorship. For example, several students I have mentored are earlier in their research careers, so I have focused on the "nuts-and-bolts," e.g., teaching good software engineering practices. On the other hand, I have mentored several students who "hit the ground running," where my advice has been more high level.

Group structure. Throughout my graduate career, I have benefited greatly from my fellow lab mates and my advisors. As a result, I strongly believe in the importance of group structure.

My group was socially tight-knit, supportive in research, and flexible in terms of projects and collaborations. For example, we organized ski trips and social outings on a regular basis, we had regular feedback sessions for papers and talks, and we were able to collaborate with whomever fit our research interests well. I enjoyed the flexible yet supportive nature of our group.

However, I hope to change several aspects in building my own research group. First, I hope to have more structure in feedback sessions, which were primarily student-driven during my PhD. Second, I plan to give the option for new students to work with more senior students in the group. While I found it enjoyable to build my own research agenda, I believe some students thrive with more structure, so I plan to encourage this option where it fits well. Finally, I plan to explicitly outline my advising and group structure to any potential students. While I plan to give my students flexibility, I believe that clear expectations for both my advising and my group structure will help potential students decide if my group is a good fit.