Teaching Statement

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As an academician, the purpose of my life is to increase the collective knowledge of the human society. I consider teaching to be integral to this purpose for the following reasons: Firstly, by navigating the students through difficult concepts, a teacher plays a significant role in transforming them into productive members of the society. Some of them may in turn choose to become researchers themselves. Secondly, teaching improves the skills required for effective knowledge dissemination which are transferable to disseminating research results and increasing its accessibility and impact.

I find teaching a very satisfying exercise. At the same time I understand its gravity. A good teacher does not simply provide answers, rather she inspires the students and provides them with necessary tools to ask the right questions and explore the answers themselves.

Teaching Experience. Unofficially, my teaching experience started in my senior year of undergraduate. During the fall semester of my senior year, I created a volunteer group to teach courses which would be important in the then-upcoming industry placement season. I myself taught several courses such as algorithms and operating systems. While the initial motivation was to help my fellow students, the fact that it improved my understanding by leaps and bounds was not hidden from me.

My official teaching experience started when I became a Teaching Assistant at the University of Southern California. I taught two courses: EE 457 - Computer Systems Organization for four semesters and EE 451 - Parallel and Distributed Computing for two semesters. While both courses were senior under-graduate level courses, my duties as a TA and the target audience differed significantly. I will briefly describe my experience and take aways from these two courses: *EE 457 - Computer Systems Organization:* My duty in this course was to conduct discussion sessions. A discussion session is a one hour lecture in which I needed to highlight the key concepts taught by the main instructor (Professor Gandhi Puvvada) by solving problems. I also needed to hold office hours to answer questions by the students. The enrollment in this course was predominantly by graduate students most of whom were international students with this being their first course at USC. I had to learn the skills of effective communication - to ensure my speaking was accessible to everyone and navigate bias due to prior knowledge - to ensure that the concepts taught by me are in synergy with their prior understanding of the subject and does not confuse them. *EE 451 - Parallel and Distributed Computing:* The instructor — Professor Prasanna taught the theoretical aspects of parallel computing, while it was my responsibility to teach the tools for practical implementation. Every week I needed to prepare one hour lecture to teach the platforms for various programming models. I also created several programming assignments for the course. An example can be found at https://github.com/sanmukh/ransac. In addition, I pro actively helped the instructor in creating and grading the exams. I relished coming up with interesting and challenging questions for the exams. The enrollment in this course was predominantly by undergraduate students, mostly juniors and seniors. These students were highly enthusiastic and energetic and I had to constantly make sure that my delivery was interesting enough so that they did not get distracted.

Future Courses. Due to my research and teaching at USC, I am knowledgeable in and prepared to teach a wide range of courses including algorithms, approximation algorithms, probability theory, programming, convex optimization, parallel computing, computer organization and architecture, etc. at both undergraduate and graduate level.

Teaching Philosophy. One of my hobbies in my grad school was improv theatre. I found several similarities between teaching and improv theatre which helped me hone both these skills in tandem. In improv theatre, one starts with a template of a performance and with audience interactions, the template is materialized into a full fledged performance on stage. Similarly, in teaching, prior to each lecture, I would painstaking develop a template i.e. the presentation slides as well as the key phrases or statement that I need to use to make a certain topic accessible. In the class, the template gets materialized into actual lecture by interactions with the students. I believe this makes the lecture more interactive and I appear more approachable to the students. This also help me in customizing the lecture to diverse audience and the mood of the classroom.

Hours of teaching experience has helped me prune my teaching style. Listed below are few strategies that I found useful in communicating effectively:

- **Enthusiasm:** I try to explain each topic enthusiastically. I achieve this by using performance techniques such as upper body movement, hand movement, voice modulation and the use of blackboard. I have realized that the more enthusiastic the instructor is, the more effective the classrom becomes.
- **Not Using Podium:** In my experience, I have found that not using podium greatly improves my presentation quality. I believe this is because it creates a psychological barrier between the students and the instructor. Instead I put the computer on the podium and use a remote to switch slides while standing in front of the poduim.
- **Repetitions and Alternate Explanations:** For difficult topics, repeating the key phrases or providing one or two alternate explanations greatly helps the students in understanding the topic.
- **Discussions:** I would periodically scan through the classroom to gauge the interest and ask questions or encourage students to ask questions. Difficult topics, if not explained properly leads to students losing interest. Discussions in such scenarios help reigniting the interest and in tailoring alternate explanations on the spot by understanding the root of difficulty.

Outside the classroom, creating challenging yet interesting assignments and exams, and providing meaningful and timely feedback to the students is critical to a successful course.

Feedback. I have received positive feedback and useful criticism about my teaching from anonymous student evaluations. Student comments (verbatim) which hearten me include: "Most patient and approachable TA. He can explain a solution in n possible ways to ensure the student did understand all the possibilities", "He always encouraged me to ask questions, no matter how stupid i found them", "He always leads students to the point let us catch the knowledge more accurate", "Sanmukh is by-far the BEST TA I had while attending USC for 4 years. SERIOUSLY.". On the other hand, I have been asked to reduce my pace of lecture and improve my writing on blackboard (or tablet) of which I am constantly mindful of while giving a lecture. In alignment with the evaluations, I have been awarded the Ming Hsieh Department of Electrical Engineering Charles L. Weber Outstanding Teaching Assistant - Honorable Mention in Spring 2017. Please email me to if you need access to my evaluation reports.

Research Mentorship. I have had significant experience in mentoring students due to the trust that my PhD and Post-Doc advisor - Prof Viktor Prasanna placed in me. The students range from undergraduate students to junior and senior PhD students. I have advised seven PhD students. Two of the students (Chi Zhang, Chung Ming Cheung) are senior PhDs whom I have been helping with focusing their research to produce a coherent thesis proposal. The other PhD students are at their early stages of PhD and I have been helping them in learning critical skills such as identifying research problems and writing effective publications. In addition, I have mentored four masters and three bachelors students. Full list of students that I mentored can be found at https://sanmukh.github.io/mentoring_teaching.html.

I tailor advising style to cater to each individual student. With some students, interactions at the idea level are sufficient whereas interactions with others, especially undergraduate, requires more hands-on approach. I avoid micromanaging, while at the same time I try to motivate students so that they do not fall behind. My aim in each interaction is to ensure that the student comes out of it with more clarity and more confidence.