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Teaching Statement

Teaching and research are the two essential components of academia and were two equally important motivations for me to go to graduate school. I believe that good teaching motivates, educates and challenges students regardless of their background. During my graduate studies, I have had several opportunities as a teaching assistant, guest lecturer and mentor to teach students from a variety of disciplines and with different levels of expertise in programming. Looking forward, I am thrilled by the prospect of designing a learning environment that helps a diverse body of students to excel in their career paths.

Teaching experience and philosophy

Introductory Natural Language Processing. Natural Language Processing (NLP) is a highly interdisciplinary area with growing applications. I strongly believe in the importance of introducing NLP techniques to other disciplines and inspiring interests in NLP among young students. When lecturing, I judiciously use examples that are familiar to the audience and combine research with practical applications.

I was invited to give a lecture to the Philadelphia Python User Group about an NLP tool I have developed. The audience (~100 people) came from a variety of disciplines: students and faculty from non-Engineering departments at universities as well as professionals from industries such as finance and health. Instead of going into implementation details, I dedicated ample amount of time introducing concepts in machine learning and NLP, as well as discussing the tool’s usage in tasks such as sentiment analysis and sentence simplification. The lecture inspired numerous follow up discussions and interests to use the tool. I also gave three lectures to high school students about NLP: two at the Lower Merion High School and another at the Women in Computer Science High School Open House at UPenn. NLP is usually a topic discussed in upper-undergraduate classes and it was a challenge to give an inspiring overview of the field to high school students. I started with well-known applications such as Siri and Google Translate and led the discussion into core NLP tasks and challenges involved in these applications. The lectures became very lively and were highly appreciated; I was invited back for another lecture the year later. Several students further discussed with me how to design an undergraduate curriculum to pursue a career in NLP.

Advanced Natural Language Processing. I was a teaching assistant for the graduate NLP class at UPenn for three semesters. One of the main challenges in the class was that students have diverse backgrounds. They differ in prior experience in programming, machine learning, linguistics and statistics; some were in Computer Science, some were from the Business School or the Linguistics department. As a teaching assistant, I was heavily involved in designing programming assignments and term projects, as well as holding office hours. My goal was always to motivate and challenge students from all backgrounds. We ground each programming assignment question in practical applications, for example, classifying documents using language models. For each task I designed a series of functions for students to implement such that each became an essential component in the final system. This method helped students to think about specific steps to achieve a high level goal. To challenge advanced students, I encouraged them to explore alternative approaches. We designed bonus questions; for example, an open-ended question or a competition in the class project. I also introduced students to libraries and tools for NLP and machine learning. They were especially appreciated by students in non-CS disciplines. Finally, I encouraged students who were interested in research by discussing with them state-of-the-art approaches from technical papers.

Introductory programming. I have had two different experiences teaching introductory-level programming: as a lab instructor and as a lecturer. Regardless of the size and level of the class I adopt active learning, where I used feedback to tie a student’s background to new materials and challenges.

I was a lab instructor for the Programming Languages and Techniques class at the University of Pennsylvania (UPenn) and the Introduction to Programming class at Shanghai Jiao Tong University. The courses include large lectures (~150 students) plus small lab sessions (10-15 students). Naturally, the level of understanding varied among students. My goal was to give meaningful lab sessions for all levels. I challenged more advanced students by discussing ways to improve their solutions, and gave extra help to students without enough background. I also twice lectured the Introduction to Python Tutorial for the Natural Language Processing class at UPenn (~50 students). They were attended by graduate students who mostly had no
prior experience in Python but rather in other programming languages such as Java or C++. Here I gave feedback-directed lectures. I guided the tutorials by asking students at the beginning of the class the programming languages they were familiar with; hence I linked concepts in Python to similar ones in the languages they already knew. I also did interactive live coding throughout the tutorial, which allowed me to monitor the students’ understanding. Despite the lack of knowledge in Python before the tutorial, most of them did well in the Python-based programming assignments.

**Mentoring.** When mentoring and advising students, I pay attention to each person’s background and interests. I have been involved in mentoring three undergraduate students in a research project to build a corpus for text specificity. Two of them were freshman undergraduates in Engineering, while the other was a senior student in Humanities. When I held tutorial sessions with the three of them together, I asked questions that aimed at getting feedback from each student; when there was a difference in understanding, I often asked the students to help one another. During individual meetings, I tailored the content of the conversation to the part of the project that most interests each person and used it as an anchor to address the challenges at hand. These methods worked well, and our dataset was published in LREC 2016. I also consult with people in disciplines other than computer science about using NLP for their tasks. For example, I gave tutorials and guidance to researchers from History, Law and Healthcare on projects such as how to use NLP to characterize language changes during a political movement, identify certain legal documents and improve patient-doctor communication. In each case I aimed at clearly stating the link between the task at hand and particular techniques, avoiding unnecessary details that could distract the conversation.

**Teaching interests**

In my prior experience I have instructed students from a variety of backgrounds at different levels. I have also worked with and learnt from brilliant professors who are passionate about education. I believe these experiences have prepared me to teach; I am excited to teach undergraduate introductory courses in Natural Language Processing, Machine Learning and Artificial Intelligence. I am also interested in teaching undergraduate special topics related to Data Science, such as crowdsourcing and social media analysis. I can also teach undergraduate courses on introductory programming and data structures. At the graduate level, I am interested in teaching graduate classes in Natural Language Processing, Computational Discourse and Machine Learning for NLP, as well as organizing seminars around topics in these areas.

I look forward to the new role of being a teacher and an advisor. I will continue to strive to create a fruitful and inspirational learning environment that helps students from diverse backgrounds to succeed in their pursuits.