Teaching Statement

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I teach three courses at the Ohio State University: an introductory AI course (CSE5522), an advanced AI course on natural language processing and speech (CSE5525), and a new course I designed that is related to my research (CSE5539-0010). All these classes are lecture-based and offered to both undergraduate and graduate students. I take different teaching approaches for each course with different audiences (see below for more details). My general teaching philosophy is that the lectures need to be engaging to raise students' interest, whereas AI algorithms must be taught in a serious way to be understood beyond just how to use them. I experimented with various formats to maximize student engagement, and I found that many are effective, including (a) conducting anonymous surveys midterm and/or at the end of the semester to gather student feedback, in addition to OSU's formal teaching evaluations; (b) sharing my work experience at Amazon and Microsoft to illustrate when and where a specific algorithm can be applied; (c) utilizing white/blackboard to walk through key equations and algorithms in addition to using slides; and (d) handing out colored papers as students enter the classroom to randomly mix students with different backgrounds for in-class discussions.

There are more than 1,200 CS undergraduates at OSU. I recruit several undergraduates to work with me on research projects every year. I am also actively involved in both the undergraduate study and the curriculum committees in my department to help shape and improve the undergraduate program. I proposed changes to the undergraduate graduation requirement to increase the number of research credit hours. I also investigated AI curricula at different universities (including the University of Washington, the University of Texas at Austin, the University of Maryland at College Park) to help design the prerequisites, sequence of courses, and separation for undergraduate/graduate courses.

CSE 5539-0010 Social Media and Text Analysis (course website: http://socialmedia-class.org)

I developed a completely new lecture-based AI course on social media and text analysis, which is related to my research and has been taught three times for both undergraduate and graduate students. It covers basic machine learning algorithms as well as timely research topics in natural language processing (NLP) and social media analysis. I have been working on NLP for social media data since 2012 when this research field first started forming. Analyzing social media data has become increasingly important for marketing and business, and for studying computational social science and political science. A recent DoD Small Business Technology Transfer (STTR) solicitation directly cited the Workshop on Noisy User-generated Text that I co-founded and co-organize, and the technology advances in named entity recognition (NER) that have come out of the workshop. NER for Twitter is one of the topics I teach in this class.

I designed a set of twelve full lectures and three programming assignments, including one with open-ended research questions. Students are asked to get Twitter developer accounts, use Twitter APIs to obtain data and analyze its language mix with visualization tools. The *Twitter API Tutorial* I wrote has been used by other universities and disciplines, including business analytics (e.g., Georgia Tech CS6452, University of Utah CS1060, Iowa State University MIS546). The course website I created with open-source educational material is publicly accessible and actively updated. The current version of the class I am teaching at Ohio State aims to give undergraduates an early exposure to AI algorithms and research. The course has thirty two students enrolled this semester (the limit for one grader), with many students on the waiting list. I also taught a version of this class to an interdisciplinary student audience at the North American Summer School on Logic, Language, and Information (NASSLLI) in 2016.

CSE 5522 Artificial Intelligence

I taught this introductory AI course twice and received rating of 4.5 and 4.8 out of 5.0, respectively, from student evaluation (department average is 4.17) at Ohio State. This is a class that both undergraduates and graduate students take to fulfill their graduation requirements with an AI specialization. The students enrolled in this class have very different backgrounds. I took the following approaches to meet students' varied learning needs while maintaining the depth of the content and the speed of teaching: (a) having a student survey during the first class to access their prior knowledge; (b) using the white/blackboard frequently to explain important algorithms in depth, and sharing scanned copies of my lecture notes with students; and (c) assigning weekly take-home quizzes to help students keep up. Perhaps counterintuitively, students repeatedly praised these quizzes and commented that they are very helpful. These quizzes also allow me to catch anything students have missed, for which I do a quick recap in the next class and/or write additional notes to post online for students. To prepare for teaching this class, I investigated AI curricula at several other universities and largely followed the Berkeley AI (CS188) course material, which is very well made and used by many prominent AI researchers at other universities, including Luke Zettlemoyer, Dan Weld, and others at the University of Washington for both their undergraduate class and graduate class.

CSE 5525 Speech and Language Processing

This advanced AI course is related to my research, in which I teach more challenging content and give information-dense lectures to advanced undergraduate and graduate students. The class meets twice a week for fourteen weeks. I covered multi-class logistic regression and perceptron; hidden Markov model (HMM), log-linear models, maximum entropy Markov model (MEMM), and conditional random fields (CRF) for sequential tagging; parsing; and neural network models for speech recognition and language modeling. One highlight of the class for me is that I updated the lectures on speech to cover connectionist temporal classification (CTC) models and used Baidu's speech system as an example to demonstrate the difference in speech recognition between English and Mandarin and the difference between academic research and commercial engines, where data and computing efficiency are very important. I taught this class once at Ohio State because junior faculty members are required to teach the introductory AI course (CSE5522) mentioned above. I will be very excited about and capable of teaching natural language processing (NLP) classes at any difficulty level, for both undergraduate and graduate students. I can also teach more specialized NLP classes, for example, natural language generation or natural language understanding.

Mentorship of Undergraduate and Master's Students

I recruit five to eight undergraduate students each year to work on research projects. I am currently working with seven undergraduates (two are women). I supervise these students through independent studies or paid research assistantships. In 2018–2019, five undergraduates (four are women) worked with me for two semesters or longer. My own career was profoundly influenced by working in university research labs when I was an undergraduate. I also had a very positive experience mentoring two undergraduates and two master's students when I was a postdoc at the University of Pennsylvania, each of whom has published one or two research papers with me. I design about two projects each year that are suitable for undergraduates. My current approach for recruiting undergraduates is to formulate a small testing assignment, which can be completed within a week. Besides offering these opportunities to the students who contact me or take my classes, I also send an advertisement to the undergraduate mailing list in the autumn semester to reach out to all 1,200+ CS undergraduates at OSU and provide everyone interested in research a fair opportunity. Depending on the student's capabilities and preferences, I either work closely with the student on an independent project or let the student work on a project collaboratively with my PhD students.

Outreach Activities and Diversity in Computer Science

It was many other people's efforts and kindness that sparked me interest in science and made me feel comfortable as one of the few female students in CS classes. I want to give back and pass those efforts and kindness on to younger students. I have given talks and demos on AI research to all age groups at science festivals and events, including the Ohio High School Hackathon (2017 and 2019 in Columbus, OH), Franklinton Fridays (2019 in Columbus, OH), CogFest (2018 in Columbus, OH), Women in Analytics (2018 in Columbus, OH), and the Philadelphia Science Festival (2015 in Philadelphia, PA). I also served twice as a mentor for the Widening NLP (WiNLP) Workshop, which was co-located with ACL 2017 and NAACL 2018. Most recently, in 2019, I created and gave a tutorial – *A Beginner's Guide: Python, NLP, and Twitter API* – to high school students with hands-on exercises using Google Colab at the Ohio High School Hackathon. I believe in social equality, education, and early exposure to learning opportunities, which also motivate me to direct a large part of my research efforts on natural language processing toward educational applications and assistive technology for children, language learners, and people with disabilities (see more details in my Research Statement).