Teaching Statement

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My teaching goal is to foster students’ personal development and prepare them for future real-world challenges. In particular, my teaching philosophy is to cultivate students’ interest, encourage interdisciplinary thinking and fostering student collaboration on real-world problems. As a faculty member, I am prepared to teach introductory and advanced courses in Speech and Dialog, Natural Language Processing, Machine Learning and Artificial Intelligence. I would also like to design new courses, such as Deep Learning in Speech and Natural Language Processing, Intelligent Systems and AI Application Prototyping.

1 Teaching Experience and Philosophy

The teaching experiences below have helped form my teaching philosophy.

1.1 Speech Processing

Fostering students’ learning interests is the first step towards better learning outcomes. When I designed and instructed the spoken dialog systems section of a graduate-level speech-processing course for 20-30 computer science and electrical engineering students, I noticed they were often distracted by their laptops and cell phones during lecture. After speaking with them, I realized that it was not because the course material was boring, but rather that they felt the need to multi-task, due to competing obligations from other courses. Therefore, I began incorporating mini-discussions in the lectures to better cultivate their learning interests, such as prompting students to name the most annoying problem related to mobile phone assistants. Opening conversations with these real-world problems that students can relate to stimulates students’ interests, helping them engage more with the course material.

I also directed students to put theory into practice through carefully designed homework. For instance, one assignment was to build a dialog system for ordering pizza. We held a competition in which students interacted with each other’s systems, and the one with the best user experience won a prize. Using competition as an assessment measure makes students more involved and driven to learn, and ultimately helps them to connect theoretical knowledge to a real-world context. In addition, I encourage students to pursue their ideas further after the class is over. In this particular course, one student had an idea for a dialog system for chatting with people in real time during sports games. I discussed the idea with him and helped him turn it into an independent project.

1.2 Introduction to Machine Learning

Equipping students with an interdisciplinary mindset helps foster their creativity. Introduction to Machine Learning is a graduate-level course with more than 200 students every semester. I was one of the five TAs for the course. We equally shared the responsibilities of mentoring students’ group projects, designing and grading homework, giving recitation lectures on homework solutions and statistics fundamentals, and answering students’ questions in an online forum. Students in the course are from various majors besides computer science. I encouraged them to work on real-world problems in their own fields, utilizing their domain knowledge as priors for designing computational models, as working on problems they are familiar with can provide students with a deep understanding of algorithms and interdisciplinary connections.
During the course, I would meet with students bi-weekly to check on their intermediate results. I would also refer them to domain experts if needed. For example, in one of the interdisciplinary projects I mentored, the group constructed an image-based wildlife ontology using clustering methods. I pointed them to a computer vision expert when they were having trouble tackling an object segmentation problem. I also encouraged them to talk to people from different backgrounds to get inspiration for their project, and the other TAs and I organized a poster session to invite people inside and outside of CMU to discuss the results of the course projects with students. When students complete one of my courses, I want them to not only have the foundational knowledge necessary to ground their ideas in practice, but also the ability to think beyond the constraints of a single discipline.

1.3 Spoken Dialog System Labs

Promoting student collaboration on complex systems prepares them for real-world challenges. The Spoken Dialog System Lab is a graduate-level course with around 10 students. I have been the TA for this course for two consecutive years, and I was involved in designing the course, organizing discussions, and providing both theoretical and technical support. As a spoken dialog system consists of multiple modules, such as speech recognition, natural language understanding and dialog management, we designed the course so that each student would work on one of these modules and then integrate their work in the end to develop a complete system. Thus, this project provided them with the experience of managing a large collaborative software project. I was the designer of the software framework that students used, so I provided both design suggestions and implementation support for their projects.

In order to reinforce the real-world stakes of these projects, I am working to revise the course to include both graduate and undergraduate students and to collaborate with Amazon to deploy course projects on Amazon Echo. This industrial collaboration will also help prepare students for future job opportunities. Additionally, the course has also led to collaborative research projects, and I encourage students to turn their course projects into publishable research. Several students in this class later became my research collaborators and we published a paper on our joint project in SIGDIAL (SIG Meetings on Discourse and Dialogue, the best academic conference for dialog system research) [1].

2 Research Mentoring

The teaching objectives addressed above are also reflected in my research mentoring. During my graduate study, I had the opportunity to mentor four wonderful undergraduate and graduate students during their research internships and seven semester-long research assistants who contributed to annotations and user studies. I created an inclusive learning environment by recruiting research assistants with a 50/50 gender split and with various cultural backgrounds.

At the beginning of each student’s research project, I would design a week-by-week plan with them. Throughout the project, we would meet weekly to discuss progress and adjust the plan based on intermediate results. Students found this process especially beneficial, as they would have a big picture at the very beginning and approach it incrementally with my support and guidance. This process also taught them how to manage their own projects in the future.

After working with me on an eye-tracking project, one of my undergrad interns took this interest further by pursuing a Ph.D. in CMU’s Human Computer Interaction Institute. Another intern who worked with me on a project about cultural differences in user behaviors went on to join CMU’s Master’s Program in Language Technology, and we continue to work together. I have enjoyed providing support and guidance to students from various backgrounds, and I am excited to see them continue to learn, grow and become creative contributors to their communities.
3 Teaching Interests and Plans

Based on my teaching experience and research interests, I would like to offer introductory and advanced courses in various aspects of AI and machine learning, such as: *Speech and Dialog, Natural Language Processing, Machine Learning* and *Artificial Intelligence*. Besides these traditional classes, I would also enjoy designing and teaching the following new classes:

- **Deep Learning in Speech and Natural Language Processing**, an advanced course on applying deep learning methods to speech and natural language processing problems. This course will emphasize discussions of different models, including which model to use for which real-world problem and why. Real-world problems include automatic speech recognition and synthesis, language understanding and generation, machine translation, dialog generation, etc.

- **Intelligent Systems**, a middle or advanced-level course on design principles, algorithms and implementations of intelligent systems. Topics will include: user behavior and intention modeling, multimodal interfaces, dialog systems, information retrieval, information extraction, etc.

- **AI Application Prototyping**, an entry- or middle-level course on building prototypes of AI applications. Special topics could include: design processes and methods for fast prototyping, the use of open-source toolkits and APIs for AI technologies, user study design, and evaluation, deployment and monitoring. I would continue to build industry collaboration into the course design.

References