TEACHING STATEMENT

Kai Shu (kai.shu@asu.edu)

“While we teach, we learn,” said the Roman philosopher Seneca the Younger. My principal reason to pursue an academic career originates from my firm belief that teaching is the best way to learn. In my opinion, teaching is not only to impart knowledge to cultivate the future generations but also to strengthen my understanding of the subject as it forces instructors to present the gist of complex concepts in a clear and intuitive way. Besides teaching, another driving force of being a faculty member is to have the privilege to work with young talents. Mentoring them, witnessing their growth and sharing their happiness will be a gratifying part of my academic life. During my graduate studies at Arizona State University, I have participated in a wide range of teaching and mentoring activities, including teaching a course, delivering tutorials in academic conferences, being a teaching assistant for multiple courses, and mentoring students for high-quality research.

1 Teaching Experience

Lecture: I had wonderful opportunities to systematically develop my teaching skills by delivering lectures to students of different levels in several courses. In the Fall semester of 2019, I co-taught a graduate level course CSE 472: Social Media Mining with 40 undergraduate and 40 graduate students. My roles in the course are in all facets: given lectures, designing homework, assignments, and exams, and mentoring students throughout the course projects. I had occasions to give guest lectures in other courses such as an advanced graduate-level course CSE 691: Advanced Topics on Social Media Analysis in the Fall semester of 2018. The experience significantly improved my communication and leadership capabilities, and curriculum design skills. Meanwhile, lecturing in the classroom also allowed me to experiment with and accordingly modify my teaching approaches for students of different levels.

Tutorial Presenter: Delivering conference tutorials for a comprehensive overview of a particular research area yields a precious experience to practice my teaching skills. I had the chances to teach two tutorials on “Fake News Research: Theories, Detection Strategies, and Open Problems.” in the premier data mining conference ACM KDD in 2019, and “Fake News: Fundamental Theories, Detection Strategies and Challenges.” at ACM WSDM in 2019. In both tutorials, the recent research advances of understanding and detecting fake news were presented, which attracted more than 150 researchers and practitioners from different areas and disciplines. This experience further sharpened my capability to distill high-level insights from the complicated concepts and math to audiences beyond my field.

Teaching Assistant: I started my teaching training early since my first year at ASU. I was the teaching assistant for CSE 240: Introduction to Programming Languages, a freshman-level course on introducing programming for beginners with more than 200 students. Throughout the course, I witnessed many struggling students grew and developed their interests in programming, surpassed their expectations, and successfully finished the class. I also worked as a teaching assistant in a graduate-level course CSE 572: Data Mining with more than 120 students, which covers the basic concepts and models for data mining techniques. I frequently communicate with students to understand their needs and concerns, and coordinate with the instructor to organize the course adaptively.

2 Teaching Philosophy

“Teaching the students we have, not the students we wish we had,”—I believe we need to listen the voices of students to adapt the teaching. My teaching philosophy is shaped by my experiences as a student, teaching assistant, research assistant and interns in research labs.

- Explaining concepts with real-world examples and stories I truly believe in the importance of linking complex concepts with tangible examples and stories to show how the algorithm was developed and how it can be used in real-world applications. For instance, in my lecture of unsupervised learning, I explained how the k-means algorithm was derived step by step, and used an application of leveraging rideshare data for traffic planning to show how k-means clustering can be used in big technology companies like Uber. When the students were attracted by the real-world examples and stories, they were more interested in learning the concept itself.

- Encouraging hands-on experience Students could have a better understanding of the subject and would be able to internalize them if they have hands-on experience. Therefore, when I taught CSE 472: Social Media Mining, I designed course projects in two phases to help them solve emerging problems from the scratch. For the first part, I

http://www.public.asu.edu/~skai2
encouraged students to apply off-the-shelf tools to collect web data, and then to perform simple data analysis and interesting data visualization. The second part required students to use the collected data to solve a real-world problem of their interests, such as recommendation, community detection, and fake news detection.

- **Facilitating collaborative learning** I view collaborative learning as an essential pedagogical methodology in my teaching. Students will engage in the whole learning process if they start to communicate and cooperate with their peers. Hence, when I taught the aforementioned courses, I created an environment to ask students to solve challenging problems with the “think-pair-share” model yet guided the whole process to ensure a welcome and inclusive atmosphere. Specifically, when I raised a question in class, students were asked to form groups for discussions, and then to share their opinions and views. Meanwhile, I encouraged them to establish study groups for homework, exams and course projects, by capitalizing on one another’s resources and skills.

3 Mentoring

In addition to teaching, advising students on research projects has been one of the most enjoyable and valuable experiences of my Ph.D. journey. I had the honor and pleasure of mentoring two master students to finish their theses, six junior Ph.D. students, and two visiting scholars. During the mentorship, I helped them through the whole process of scientific research, including introducing necessary background knowledge, probing a good research problem, formulating novel ideas, designing experiments, and organizing results into an academic paper. This experience has led to 10 papers at prestigious conferences including AAAI, WSDM, CIKM, MICCAI, and refereed journals such as WWWJ. I believe it is important to tailor the research projects and level of difficulty to suit different individuals, making a virtuous circle for them to acquire knowledge and create innovations. Notably, Shuo Yang, a Ph.D. student I advised, joined our group as a visiting student from Shanghai Jiao Tong University, with limited research background on social media mining. In the beginning, I encouraged Shuo to learn the basics of machine learning techniques such as matrix factorization, probabilistic modeling, etc. Meanwhile, I lead him to engage in the fake news detection project for some algorithm implementation and helped him get familiar with the fundamental concepts of machine learning and social media mining. Half a year later, Shuo had a more comprehensive understanding of the main techniques in the field and gradually fostered his interests in fake news detection and unsupervised learning. He was able to publish a full conference paper in AAAI within his one year visiting study.

4 Teaching Interests

My academic background in computer science equips me to teach a broad spectrum of undergraduate and graduate courses. I would be comfortable teaching all the core courses that traditionally appear in the curriculum of undergraduate computer science education (e.g., Introduction to Programming, Data Structures and Algorithms, Programming Languages, Operating Systems, and Software Engineering). I would also be thrilled to teach introductory and advanced courses on Data Mining, Machine Learning, Artificial Intelligence, Optimization, and Social Network Analysis. Furthermore, my rich research experience over the past few years allows me to design new interdisciplinary courses and organize advanced seminars. Below I detail two representative sources on Computational Social Science and Advanced Topics in Misinformation and Fake News.

- **Computational Social Science**: It is an interdisciplinary course across the areas of computer science, sociology, and economics, and beyond. It is designed for undergraduate students in the form of lectures, homework, projects, and exams. This course focuses on the knowledge and skills necessary for modeling social phenomena with computational tools. It will cover: (1) the discussions of promise and pitfalls of big data for social science research; (2) hands-on projects to collect social data from online platforms; and (3) techniques in analyzing digital data from machine learning, social network analysis, and natural language processing.

- **Advanced Topics in Misinformation and Fake News**: This advanced seminar course will cover the recent research advances in misinformation and fake news. The goal of this course is to show the research frontiers of detecting information manipulation to graduate students with relevant background and motivate them to explore novel research issues and pave the way for their research. Lectures of covered topics (e.g., text mining, fact-checking, style analysis, network embedding, multi-modality learning, model interpretability, and weak supervision) will be combined with paper and research-oriented project presentations from students.

http://www.public.asu.edu/~skai2