Onur VAROL   Teaching Statement

Looking back to my college years, I can clearly see the influence of my activities in student branches to my career. I completed my undergraduate education at Istanbul Technical University (ITU), which is the best engineering school in Turkey. Throughout my undergraduate studies, I was an active member of student branches, where I obtained a diverse set of technical skills, valuable experience on teaching, and joy of team work. Lessons learned from these experiences helped me to teach as an associate instructor during my academic life, work as a freelance consultant and trainer on robotic systems. As a researcher, I keen on teaching and lecturing on diverse topics relevant to my background and interests. I believe in advancement on teaching is a never-ending process and I seek for opportunities to develop myself.

Associate Instructor Experience

My teaching experience as an associate instructor (AI) started during my Master's studies. I worked as an AI for four different courses: machine learning, microprocessors, discrete mathematics, and probability and random variables. In these courses, I was responsible for grading, assisting students in office hours, and teaching in problem sessions.

Teaching in university courses is different compared to my experience in student branches, where students are keen on learning and improving themselves other than passing classes and earning grades towards their diploma. I observed how different incentives can impact the learning environment and performance of the students. Being an AI in mandatory courses introduced me a different aspect of teaching. I accepted this challenge and focused on teaching the subtle details and insights of the topics and mentoring them to motivate on classes.

During my Ph.D. studies, I had great opportunities to work on different projects as a research assistant. One of the perks of having research position is publishing several journal articles and conference papers. However, I didn't have a chance to teach except my last semester at Indiana University. I taught in a selective course, *Performance Analytics*, for senior Informatics students. In this course, we taught students how to retrieve and extract online data, measure and characterize performance using statistics and network theory, and build predictive models. As one of the AI of this class, I developed short tutorials on web scraping, network visualizations, and practical applications of natural language processing, machine learning, and network analysis.

As a postdoctoral researcher, teaching opportunities are limited but I am glad that opportunities created by my mentors to teach in a graduate level course on *Data Mining Techniques* offered at Northeastern University. In this course, I was invited to present two lectures: overview of probability and linear algebra and my research on social bot detection.

Mentoring

In my new role as a postdoctoral researchers, I have begun to mentor graduate students of my current and previous groups. I am meeting regularly with 2 students from my previous groups through Skype for improving Botometer and study questions on social bot detection. I mentored two other Indiana University students for their class projects on detecting organizational accounts on Twitter. These collaborations are great since I have been learning to effectively communicate, provide them guidance to complete their project by planning clear intermediate steps and suggest the most appropriate analysis and tools for their goals. I have been also mentoring a PhD student in my current group and collaborating with her for two projects on building a novel learning-to-place algorithm and algorithmic fairness.

In the CNetS and NaN group at Indiana University, I witness an importance of friendly lab environment and how social activities can motive student to work more efficiently and enjoyably. I am eager to follow footsteps of my great advisors not only by following their academic lessons but also social ones.

Lecturing and Outreach

Starting from my freshman year in college, I engaged with the activities in student branches. I joined different teams to learn programming languages like C and Python and built mobile robots. After I got experienced in programming and electronics, I volunteered to teach in our student branch. In my second year, I taught C programming and data structures to over 30 students. In these lectures, I had a chance to explore different models to convey information and engage with the group. I believe in the importance of interactions, so in each lecture, I was providing a challenging problem at the very beginning and explain the concepts relevant to that problem. By the end of each class, we go through the solutions with students and discussion in a group. At the end of the year, we put our knowledge into practical applications by programming microcontroller to build mobile robots and building web applications to support international robotic olympics of our university (ITURO).

My experience during college in robotics and computer vision created opportunities to participate international competitions and serve as a referee in Euro Skills and World Skills competitions. I also worked as a consultant and trainer for Festo's mobile robotic platform called *Robotino*. As a trainer, I presented in day-long workshops in high schools and universities, where I teach functionalities of Robotino and its applications as a testbed system. This experience is beneficial because I had a chance to reach the diverse audience. Depending on the group I explained basics of control and image processing algorithms in various levels of details. By doing so I improved my abilities to make abstractions on concepts and then building on top of those to provide insights of more complicated systems.

Teaching Agenda

As my educational background and research spans various fields, I can teach a broad spectrum that includes any introductory computer science class, as well as advanced undergraduate and graduate courses on data science, machine learning, and network analysis. Richard Feynman, who is a great educator and scientist whom I truly admire, once noted the difference between knowing the name of something and knowing something. I take his insights seriously and trying to apply that to every aspect of my research and teaching. I also look forward to designing new classes that can address requirements of vivid data science field not by only introducing different concepts but also explaining them in sufficient details and providing practical examples. I am interested in teaching or developing courses in machine learning, network science, and computational social science.

Data Mining and Information Discovery: In this class, students explore novel ideas for their class projects. They learn all steps of data analysis and apply weekly to their project: crawling and cleaning dataset, dataset exploration and visualization, building machine learning models, and system evaluation etc. Every week relevant scientific publications especially research questions and methods are discussed in class. Students are encouraged to select topics relevant to their personal interests and there are no limitations on topics or domains for research. The successful interdisciplinary project usually emerges from such mindset and creativity will be the key factor to be evaluated in this class. Students with a successful hypothesis and strong analysis will be supported for publishing their work.

Practical Data Science: Nowadays data science have become a vibrant subject and different schools across the world offering degree programs in data science. In this course, students learn a broad list of topics for research and business application purposes. Core components of this course are probability theory, statistics, and hypothesis testing for background; methods for supervised and unsupervised learning for machine learning; and data visualization. Throughout the semester students are introduced to various technologies, packages, and tools. Learning through interactive classrooms are also important and I am planning to effectively use the Jupyter notebooks encourage students for reproducible research. Assignments are the main component of this course to put knowledge into practice.