

Teaching Statement — Dani Yogatama

A solid foundation in computer science requires a thorough understanding of theoretical concepts and proficiency in implementation. I think the best way to teach computer science—especially as computer science continues to grow in popularity—is to promote a *collaborative environment* where students can learn from their peers just as much as they do from course instructors. While students only meet with course instructors a few hours a week, they often interact with other students on a daily basis. As teachers, we can leverage peer interactions to create an environment that supports collaborative learning that can happen both inside and outside of class. I think the main role of in-class lectures is to teach *fundamental concepts*, since computer science is a continually evolving field. Given rigorous understanding of these concepts, students should be able to keep up with exciting new developments through self-study or collaborations.

During my time at CMU, I have assisted courses at both the undergraduate and graduate levels. I have also co-taught a tutorial at an academic conference. I am passionate about increasing diversity in computer science. For example, I initiated and co-organized the inaugural Southeast Asia Machine Learning School to inspire and educate machine learning engineers, researchers, and practitioners in Southeast Asia. At DeepMind, I manage a research group and regularly advise research scientists, research engineers, and graduate students on research projects. I will describe each in detail below.

TA—ML and NLP. At CMU, I was a teaching assistant for the Natural Language Processing (Spring 2013, Prof Noah A. Smith) and Machine Learning (Spring 2014, Prof. Barnabas Poczos and Prof. Aarti Singh) courses.

The NLP course is an introductory course that gives an overview of NLP, primarily offered for undergraduate students and graduate students with no NLP background. My responsibilities included giving a guest lecture, holding office hours, designing and grading homeworks and exams, and mentoring students on their class projects. Students in the class had varying computer science experience. I led the effort to switch the supported scripting language to Python (from Perl) by co-designing and teaching a “Python for NLP” lecture in the class. My main considerations were that many students already used Python as their scripting language and Python is more practically useful nowadays. Students in this course often came to office hours asking for help with programming components of their homeworks and projects. I observed that encouraging students to review each other’s code enhanced their understanding of the problems since they often have different ways to approach the same problem.

The ML course is a PhD level course on fundamental topics in machine learning. There were about 150 students from various departments (e.g., computer science, biology, architecture, physics, etc.) in the class. I taught recitations, held office hours, designed and graded homeworks and exams, and supervised eight research projects. As a TA, I learned how to teach machine learning concepts to students with non-CS backgrounds that might not be familiar with CS terminology. I observed that students with similar background often have easier ways to explain ML concepts to each other, since they can draw from examples in their common discipline. My recitations were on major topics that had not been covered in detail in class due to time constraints (e.g., convex optimization, Bayesian networks). They were always well attended and recorded to accommodate students who could not come to class. This experience taught me how to give lectures to a large audience and how to keep everyone engaged. I also learned useful skills for teaching for a camera. For example, since students can set their own pace when watching recorded lectures (e.g., fast forward or backward as necessary), it is important to keep lecture contents as modular as possible, even within a single lecture. If students think they are already familiar with some parts of the lecture, they can jump to other parts without much difficulty if we have a clean organization of the lecture.

Tutorial. I have also actively sought to disseminate my research ideas within my research community by giving tutorials at academic conferences. I co-taught a three hour tutorial on “Structured Sparsity in NLP” at EACL 2014. The tutorial covered recent advances in sparse modeling with applications to NLP, focusing on how to choose the right regularizer for the kind of sparsity pattern intended and how to solve the optimization problem efficiently. Tutorials at academic conferences are different than class lectures since they assume a solid background in the fundamentals and focus on emerging topics in the field. For this kind of audience, the main goal is to convey the relevance of a new topic of interest to a broader community. For example, our EACL 2014 tutorial focused on core concepts in structured sparse modeling that are applicable to a wide range of NLP problems.

Diversity. In Summer 2019, I co-organized the first Southeast Asia Machine Learning School (SeaMLS) in Indonesia. Data from ICML 2018 suggests that fewer than 0.5% of ICML attendees are from Southeast Asian institutions. I am passionate about increasing diversity in machine learning and eager to contribute through this effort. The summer school is a five-day event where participants (students, industry practitioners) attended lecture and practical sessions given by world-renowned experts. As a lead organizer of this event, I invited speakers from academia and industry (DeepMind, Facebook AI Research, New York University, Monash University, National Taiwan University, OpenAI, etc.) to lead the sessions. I also co-raised funding for the event. Our sponsors include both international companies (e.g., DeepMind, Google) and regional companies (e.g., VinAI, Gojek). Together with other organizers, I selected 200 participants from approximately 1,200 applicants. SeaMLS 2019 was a major success and we received very positive feedback from participants and invited speakers. Our long-term goal is to build a regional machine learning community in Southeast Asia that could actively contribute to the global ML ecosystem. We plan to continue this effort and I am currently involved in organizing SeaMLS 2020 in Vietnam.

Advising. My advising philosophy is to guide students and junior researchers to work on problems with important short-term and long-term goals that they are passionate about, while leaving enough room for independent creative thinking. At DeepMind, I supervise research scientists, engineers, and interns on research projects. I regularly meet with them, influence research directions, and work with them to break these down into smaller milestones. I also help with implementations and setting up experiments. Importantly, I give feedback to help them grow as researchers. In my experience, the critical role of the advisor is to keep advisees thinking about the big picture—why the problems are important and why the approaches are the best fit to solve them—working against the natural tendency to get lost in low-level technical questions and comfortable day-to-day engineering tasks. I think this is important for setting long-term goals.

Future directions. I enjoy teaching as it helps me grow as an academic. I am very interested in teaching machine learning and natural language processing courses. I am also qualified to teach courses on artificial intelligence, optimization, and introductory CS courses (e.g., algorithms, data structures). I am excited to be more involved in offering graduate-level seminars on topics that are of interest to my research (e.g., representation learning). I also seek to explore possibilities of contributing to new teaching paradigms that are enabled by rapid technology development in this area (e.g., massively open online courses), either as a researcher to make it more accessible and easy to use, a course designer, or an instructor. Lastly, I intend to continue my effort on increasing diversity in computer science, particularly with the Southeast Asia Machine Learning School.