

I have had the privilege of teaching several times during my academic career, and this has been a significant factor in solidifying my desire to become a professor. As an undergraduate at IIT Bombay, I worked as a teaching assistant five times – twice for *Computer Programming and Utilisation*, twice for *Digital Logic Design + Lab*, and once for *Software Systems Lab*. At UW CSE, I was the co-instructor for *Introduction to Deep Learning* twice – once each with Professors Ranjay Krishna and Ali Farhadi. During these teaching engagements, my responsibilities spanned formulating theoretical exams, setting up labs, providing mentorship to students on their projects, and lecturing classes of over 80 students from different majors and backgrounds at UW.

In addition to teaching, I have been a research mentor for the past six years, guiding undergraduate, master's, PhD students, and software engineers interested in machine learning while at Microsoft Research, UW CSE, and Google Research. I have mentored 18 research students, with 8 of them pursuing PhD at top computer science programs. Four students continue to pursue research under my guidance, and the software engineers have contributed to impactful launches at Google. Overall, Ten of my students have made substantial individual contributions to 8 top-tier machine learning publications. I am also proud to have guided two honors theses at IIT Bombay and Delhi, one of them received the Best Undergraduate Thesis Award at IIT Delhi.

I realized that *good research is pedagogical*. My teaching and research philosophies are shaped by this realization, placing a strong emphasis on intuitive comprehension of fundamentals, learning through questioning, and by actively sharing knowledge with peers.

### Teaching Experience and Philosophy

My initial teaching experience involved designing theoretical exams for the Computer Programming and Utilisation course at IIT Bombay with over 500 first-year undergraduates – most of them lacked prior exposure to computer science concepts. Drawing from my own experiences as a student with a similar background, I collaborated with my colleagues to develop theoretical **exams that fostered intuitive understanding and guided learning through problem-solving**. For the next offering, I was responsible for leading a lab section which served 96 students through a team of 12 TAs. Another distinct experience was creating problem statements for the Software Systems Lab at IIT Bombay where the goal was to motivate the students to **self-learn** new software technologies each week and go **beyond their comfort zones to explore things**.

The most challenging experience as a teaching assistant was the revamping of the Digital Logic Design + Lab at IIT Bombay. This was a non-traditional course for computer science majors and often was perceived to be hard and un-intuitive. We did a complete overhaul of the course, especially the lab component and project. This led to a change in perception of the course with students enjoying the experience and building creative projects using FPGAs. This was a unique experience that taught me how to **redesign an older course to make it more relevant and engaging**. For my efforts, I was awarded **Teaching Assistant of the Month Award** twice across two offerings. Teaching assistantships highlighted the importance of **open communication and feedback** in refining and adapting my approach to cater to diverse learning styles.

These prior stints helped me with my first experience as a co-instructor alongside Prof. Ranjay Krishna for the Introduction to Deep Learning at UW. At the same time, I led the logistics and a team of 6 teaching assistants to support the students' learning. My personal learning experience with Deep Learning was very different from a traditional classroom setting. Most of my research insights and intuitions come from breaking down the fundamental building blocks

of Deep Learning models and systems. I brought this into the class by nudging the students to **question the fundamentals behind building blocks** and have a **discussion to develop intuition from diverse points of view**. It feels ecstatic to see the students grasp hard concepts through fundamentals. The course received a rating of 4.9 out of 5, which is considered exceptional.

In Fall 2023, I am co-instructing the same class with Prof. Ali Farhadi. This time, I replaced the midterm exam with 3 quizzes testing concepts corresponding to the 3 assignments. This reduced the students' stress significantly, further letting them focus more on understanding the concepts. I am also striving to **integrate interdisciplinary perspectives** and practical applications to make deep learning more tangible and relatable beyond traditional applications like image classification and language modeling. Overall, these two experiences of teaching large in-person classes have honed my teaching skills while also reinforcing the importance of **incorporating diverse viewpoints to overcome potential blind spots rooted in my own learning experiences**.

## Teaching Plans

It would be natural for me to teach future courses in deep learning and advanced/empirical machine learning. However, I would also eagerly teach undergraduate and graduate level courses in artificial intelligence, computer vision and natural language processing. I also want to develop new courses that revolve around **building and understanding web-scale ML systems**.

While numerous courses delve into the fundamental building ML building blocks, it would be immensely valuable for students to witness how these intricate components seamlessly intertwine to form systems (e.g., web-search) that serve over a billion users daily. I envision a course that prioritizes the interplay between fundamental ML blocks and introduces the essential systems that enable large-scale deployment. My aim is to ignite student enthusiasm not only for AI but also for the reliable, scalable and responsible deployment of AI systems. Ultimately, I aspire to create a capstone project course where students gain hands-on experience through the collaborative and sustainable development of a real-world, large-scale system.

## Mentorship

I have been fortunate to be supported by great mentors throughout my academic career and I hope to pay forward. They have taught me that the most important thing is to **help the student find what they are truly interested in and passionate about**. At the same time, the core aspects of the teaching philosophy translate immensely to research mentorship. In the past few years, I have been employing and improving my mentorship guided by these principles.

Navigating the diverse needs of research mentees poses a unique challenge. To effectively cater to their varied learning styles, I have found that open communication and **encouraging exploration of underlying interests**, rather than focusing solely on specific problems, are highly effective strategies. I also advocate for my students to broaden their perspectives beyond publications and consider the **impact of their research on real-world problems**.

The sheer brilliance and diversity of ideas that students bring to the table never ceases to amaze and inspire me. Instead of limiting their exploration to my current research interests, I encourage my students to share their newfound knowledge with me and others in the group. This approach has proven effective in helping students identify collaborators with complementary skills and interests for research projects. Moving forward, I will strive to continuously improve how I mentor students and foster even better community dynamics in my future research groups.

**Mentoring students and teaching are the two main reasons why I want to be a professor.**