Fumeng Yang | Teaching Statement

In pursuit of a faculty position, my role extends beyond discovering new knowledge to fostering its transmission across generations. Ensuring this continuity is a threefold task: **teaching** to pass on existing knowledge, **mentoring** to equip future scholars with tools of inquiry, and **community building** to broaden its growth. The heart of my pedagogical philosophy is to **foster active learning and creativity**. I provide a scaffolding of encouragement, support, and guidance to spark students' interests and help transform their creative potential into substantial progress.

Teaching Experience

My teaching approach has been shaped by a variety of hands-on experiences. I served as **a graduate teaching assistant** (TA) for five courses over nine semesters at Tufts University and Brown University: *COMP40 Machine Structure and Assembly Language Programming*, *COMP150 Visualization*, *COMP160 Introduction to Algorithms*, *CSCI2370 Interdisciplinary Scientific Visualization*, and *CSCI1951A Data Science*. I have also been **a co-instructor** for the conference course, *Transparent Practices for Quantitative Empirical Research*, at ACM CHI and IEEE VIS. My involvement as **a guest lecturer** at Northwestern University for *COMP_SCI 333 Interactive Information Visualization* added depth to my experience, and participating in **teaching seminars** further equipped me with diverse pedagogical strategies.

In formulating a course, I follow two core principles: clear communication of objectives and timely feedback. As a TA, I helped build the course syllabi of *Visualization* and *Scientific Visualization*; for the former course, I designed five assignments and nine labs, offering students step-by-step guidance, stencil codes, and checklists. When creating my lectures for *Transparent Practices* and *Interactive Visualization*, I always began by articulating the course objectives and used video demonstrations to elucidate my expectations. On the other hand, in *Assembly Language*, I provided pre-feedback on design documents within 24 to 48 hours of submission, and post-feedback on coding style and structure. Similarly, in *Scientific Visualization*, I ensured weekly feedback along with the development of students' projects and concluded with a review-style document for their final reports. These strategies have proven effective; they enabled students to understand and assess their learning process in a timely manner, and also allowed me to continuously refine the teaching approach.

When conducting a course, I ensure students' engagement and creativity using two strategies: incentive systems and in-class activities. In *Visualization*, I helped run an extra credit system. I shared videos of my implementations and elucidated possible directions for creative designs. Incentivized and inspired, the students in the class demonstrated exceptional creativity in their submissions. I also helped set up a design lab where students physically translated their visualization designs onto paper. This exercise generated palpable enthusiasm and resulted in 140 designs from 60 students. Additionally, in courses like *Visualization*, *Interactive Visualization*, and *Transparent Practices*, I instructed in-class labs to engage students, which also helped me gauge their learning progression in real time. These in-class activities also enabled me to teach students problem-solving skills interactively instead of providing ready solutions. The result was affirming. One student emailed me after a lab: "...Your suggestions are really helpful. I learned so much from your sessions with our class!"

After concluding a course or a lecture, I use reflection for self-assessment, adjustment, and growth. In my first year of running *Visualization*, the course feedback indicated that some of our assignment expectations were perceived as overly demanding. Addressing this feedback, the professor and I revisited the requirements. In the second year, we simplified them without compromising on learning objectives. As a result, our class attendance doubled, and the feedback was much more positive. Later, I learned systematic strategies from *Reflective Teaching* seminars at Brown University, and incorporated these into the *Transparent Practices* course I co-taught. Navigating the teaching challenge within the tight time constraints of a conference setting, my co-instructors and I collected course feedback immediately after each lecture, amended course materials for the next round, and observed gradually improved feedback.

Mentoring Experience

My mentoring approach has been deeply influenced by a lineage of wisdom passed down from my advisors and mentors, who themselves were guided by adept scholars. Over the course of my Ph.D. and postdoc, I have had the privilege of **directly or jointly mentoring eight students** (three undergraduates and five Ph.D. students) spanning five universities. This collaboration has resulted in **three top-tier publications** and **two more in the submission process**. In addition to direct mentorship, I helped my advisors and mentors shape collaborative and supportive lab environments, emphasizing mutual assistance. Looking ahead, I believe an effective advisor wears multiple hats, supporting and learning alongside her advisees.

An advisor's primary role is that of a supporter. I tailor my support to each student's unique strengths, background, and needs. For instance, I mentored Junxiu Tang, a fourth-year Ph.D. student from Zhejiang University with several publica-

tions. While he excelled at critical thinking and articulating his research, he was relatively new to methods for human-subject studies. I walked him through the processes of experimental design and data analysis, while he maintained the lead otherwise. Our collaborative effort culminated in a submission to IEEE TVCG, for which Junxiu expressed appreciation for my mentorship. In contrast, Yuan ("Charles") Cui, a third-year Ph.D. student at Northwestern University, brought different strengths and challenges to our collaboration on his debut first-author paper. Charles was excellent at managing technical specifics but had less experience with broader framing and peer reviewing. My mentorship concentrated on providing strategic directions, enhancing his research communication, and navigating revisions through multiple rounds of discussion. This hands-on approach resulted in his paper being published at IEEE VIS 2023 and in a well-received conference presentation.

An advisor also acts as a facilitator. I employ an "eliciting" approach to prompt thoughts and share viewpoints. When (co-)mentoring Junxiu, Charles, and other students (e.g., Mandi Cai, see below), I encourage the growth of students' thinking and reasoning processes. One strategy I applied was to solicit students' opinions before providing an answer. This strategy not only encouraged a richer conversation but also helped me understand students' current abilities. In the short term, I found that this approach effectively sparked reasoning, facilitated co-learning, and instilled a sense of value and respect in students. Moving forward, I plan to cultivate students' inquiry skills, echoing my own experience of structured growth through active questioning with my advisors and mentors.

An advisor's ultimate role is to empower students. **I foster students' habits of planning their paths and conducting self-assessments, while being mindful of mental well-being.** For example, I co-mentored Mandi Cai, a first-year Ph.D. student at Northwestern University. In our collaboration on the election forecasting project that I led, we both prepared pre-meeting agendas and established deliverables for the next meeting. We then revisited and adapted our plan midway through the project. This resulted in our paper being accepted at IEEE VIS 2023, with Mandi independently handling all secondary analyses. Meanwhile, Mandi embarked on her own research project. She exhibited immense potential and unique perspectives on data journalism. Yet, like many early-stage researchers, she grappled with defining research objectives and attempted to submit immature work due to a tight deadline. Instead of letting her rush, I provided candid suggestions on her progress, emphasizing the pitfalls of succumbing to time pressure. It was heartening to subsequently learn that she took our collaborative planning experiences, valued my suggestions, and submitted a high-quality paper to an alternative venue six months later.

Community Outreach

In addition to the students in my labs and courses, I extend my reach to other students within my institutions and broader research communities. At Brown University, I advised several younger students, helping them steer career paths and offering feedback on their Ph.D. applications. From 2017 to 2020, I served on the organizing committee for the IEEE VIS conference and led the Student Volunteer program. I facilitated the participation of hundreds of students from over 20 countries and 80 institutions, and upheld my ties with many of them after concluding my role. My efforts continued at Northwestern University, where I prompted several meetups for the visualization community in Chicago. Finally, I have reviewed nearly 100 papers and served as a member of program committees, including ACM CHI AC, IEEE VIS short papers, and EuroVIS short papers. As I transition into a faculty role, I will continue these efforts and more to help build a vibrant academic community.

Proposed Courses

While I am qualified to instruct introductory-level courses, my interest lies in imparting knowledge in the following areas:
Visualization. The learning objectives will be to author visualizations, learn visualization tools like D3.js, understand graphic design principles, and experience visual analytics. This course will also touch on research topics in visualization.
Human-computer Interaction (HCI). The learning objectives will be to design and evaluate user interfaces and interaction techniques. Students will learn design principles, and practice them in designing and assessing their own user interfaces.
Data Science. The learning objectives will be to grasp techniques and tools for data cleaning, manipulation, and analysis. The course will cover topics in hypothesis testing, generalized linear regressions, dimension reduction techniques, exploratory data analysis, introduction to Bayesian statistics, and the basics of SQL and machine learning.
I am also interested in (co-)developing **seminar courses** on topics such as **human-centered visual computing**, **visualization**, and **statistical methods for HCI**, to uncover new academic horizons and involve students in research explorations.

While much of my hands-on experience came from small courses, I am prepared to handle **large class sizes**. I will form a teaching team, train head TAs to lead their peers, and pair students to encourage collaboration. This framework was efficient in several courses where I served as a TA, such as *Assembly Language*, *Algorithms*, and *Data Science*, each catering to hundreds of students. With the rise of **generative AI**, teaching students to use AI tools judiciously is essential. I will lecture on my use cases, encourage discussion, and require a record of AI interactions and a reflection of critical thinking.