Zhu-Tian Chen | Teaching Statement

The opportunity to teach and help students grow and succeed is a driving motivation for me to seek a faculty position. I have been privileged to work with teachers, students, advisors, and collaborators who help me realize my potential and become a better person. I am passionate about joining this workforce and paying this support forward.

Teaching Experience

In my Ph.D. and Postdoc, I have practiced my teaching skills as a teaching assistant, teaching fellow, and guest lecturer in various universities, and received a **Distinction and Excellence in Teaching Award** at Harvard University. Based on my experiences of interacting with students in teaching, I have developed three principles that shape my philosophy of building a stage with students as the protagonists in the teaching process:

Active learning by nudging. To promote active learning, I often make subtle adjustments to the learning context to nudge students toward more desirable outcomes. For example, when I served as a teaching fellow for CS271 Topic in Data Visualization, an upper-division course with 40 students at Harvard, I found some students hesitated to criticize the papers in class discussion because they felt that the papers were written by experts and published in top venues. To mitigate this situation, I shared some anecdotes about the papers or the authors (e.g., "*This best paper was rejected multiple times before winning the award.*"), making the papers down-to-earth. Such a warmup effectively encouraged the students to actively voice their opinions. I was rated highly (*avg.* 4.78/5) by the students, one of whom commented: "*[Zhu-Tian] provides really good context about the papers that we are discussing, which most have found really helpful and sometimes humorous.*"

Fig.1 The sketch and final user interface of a visual system for music data presented by a group of students I mentored at CS271.

Inclusion through empathy. I firmly believe that understanding students' thoughts and feelings from their perspective is essential to create an inclusive learning environment. For instance, as a teaching fellow for CS171 Data Visualization, an upper-division course with more than 100 students at Harvard, I mentored students in web-based programming in the lab sessions. I proactively reached out to and helped students who were introverted or had less programming background. Besides, I recognized that some students pretended to understand the code in class. For these students, I would reach out to them after class to ask if they need further explanations. They often asked more questions than in class and appreciated my thoughtful help, which gave them more confidence in taking the course.

Fig.2 Examples of visualization design sprints at CS171 I served as a teaching fellow.

Explicit learning objectives. I explicitly use progressive learning objectives to plan instructional content and incentivize students. When I TAed COMP2711 Discrete Mathematical Tools for Computer Science, a lower-division course with 90 students at Hong Kong University of Science and Technology, I designed and taught quiz questions in recitation sessions. In each session, I always started by telling the students what they were expected to learn and ended by telling them what I had taught. For each question, I further explained its importance, such as telling the students how it connected to the knowledge in the textbook and how necessary to understand it for the exams. This method could help students develop expectations for each question and "*keep track of the class progress.*" As a result, the students could intentionally allocate their time to different questions, such as questions that were important for the exams or those for bonuses.

Mentoring Experience

I have had the pleasure of working with more than 18 students on research projects, including 7 undergraduates, 5 masters, and 6 Ph.D. students. Under my guidance, all 6 Ph.D. students published or submitted their first-author papers at top venues. Two of them each received an honorable mention award in IEEE VIS. My successful mentoring experiences affirm my belief in being a personalized coach for each student, for example:

For undergraduate students, I strive to help them understand and experience all aspects of a research project. I always **articulate the rationales and purposes** of my suggestions to the students, as I believe understanding the *why* is more important than understanding the *how*. For example, Qisen Yang, an undergraduate research intern at Harvard, used to misunderstand engineering efforts for research contributions. After I explained the main difference between research and engineering to him, he became more active in exploring new ideas instead of being tangled in implementation details. We together have finished two papers (Fig.3), and he decided to apply to a Ph.D. program.

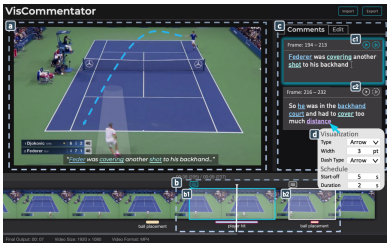

Fig.3 Qisen learned React.js and helped to develop the editing panel in VisCommentator.

For graduate students, I aim to guide and help them lead their research independently. I always remind the students to **make concrete, actionable plans** and regularly review the plans with the students to help them calibrate and identify pitfalls. I stick to this practice as I find that junior graduate students often cannot *see the forest for the trees*. This was exemplified when I mentored Tica Lin (a Ph.D. student at Harvard) on a project on visualizing data in basketball videos. I actively tracked and calibrated her plan, and guided her to keep the big picture of the research question in mind instead of falling into the trap of exploring the endless design space of visualizations. Our efforts led to an awarded paper in IEEE VIS (Fig.4). Besides, I particularly pay attention to **providing emotional support** when mentoring students on research projects, as I know the pressures of finding a way out of a dark void. When I mentored Wai Tong (a Ph.D. student at HKUST), his paper had been rejected three times. I kept encouraging him and worked with him to improve the paper, which was later accepted to IEEE VIS and received an honorable mention award.

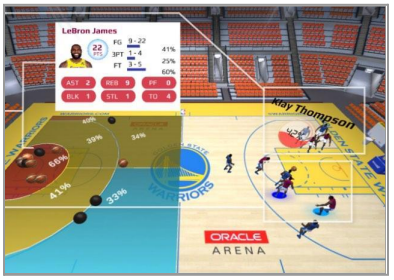

Fig.4 Tica developed a simulated 3D basketball game to explore embedded visualizations in game watching.

Community Outreach

I have and will continue to **promote diversity, equity, and inclusion** in my research group, my courses, within the department, the university more broadly, and my research communities. I was first introduced to and fascinated by the idea of equal education when I developed a visualization system for the MOOC platform (Fig.5) at my Ph.D. alma mater. Since then, I have actively supported historically underrepresented populations in my career. For example, I have volunteered to be the research supervisor of multiple students from minority groups (e.g., females, people of color) in CS91R at Harvard. As a faculty, I will extend my endeavor to bridge the gap in educational resources among students.

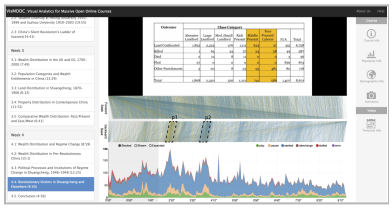

Fig.5 I developed a visualization system to improve the MOOC platform at HKUST(https://github.com/HKUST-VISLab/vismooc).

Example Courses

Besides introductory courses, I am qualified to teach and would like (co-)design curriculums of courses in the following areas:

- **Data Visualization.** Potential courses include Introduction to Data Visualizations, Data and Visual Analytics, and Research Topics in Data Visualizations. These courses cover fundamental principles for data visualizations, programming skills and toolkits (e.g., D3.js) for creating visualizations, necessary data wrangling and analysis techniques, and advanced topics in data visualization. I will involve programming labs and in-class design activities in the courses.
- **Augmented and Virtual Reality (AR/VR).** Potential courses include Introduction to AR/VR, Developing AR/VR Experiences, AR/VR Experience Design Studio, and Research Topics in AR/VR. These upper-division and graduate-level courses will cover the basic concepts of AR/VR systems, the methods and tools to create AR/VR experiences, the design of 3D/AR/VR user interfaces, and advanced topics in AR/VR. Students will engage in developing their own AR/VR applications.
- **Human-computer interaction (HCI).** Potential courses include Introduction to HCI and Interaction Design Studio. These practice-oriented courses teach the design, development, and evaluation of interactive systems. Topics include user-center research methods, prototyping, and usability testing.
- **Applied Artificial Intelligence (AI).** I also plan to develop this course based on the CS197 taught by Prof. Pranav Rajpurkar at Harvard. This course will introduce basic concepts and modern development of AI techniques, their applications in computer vision and natural language processing, and human-centered AI topics. Students will learn engineering skills to implement, train, and deploy AI models for various real-world applications.