

Teaching Statement

Ning Luo

Fostering the growth and success of future researchers is crucial for advancing the field of computer science as a whole. I am dedicated to cultivating a positive and inclusive learning environment where students can thrive, be inspired, and receive guidance. Guiding students in exploring their career paths and providing mentorship is an essential part of my commitment. I possess a profound enthusiasm for imparting my extensive knowledge and expertise to undergraduate students, encompassing a diverse spectrum of topics, from the realms of theory, including logic, cryptography, optimization, and computational complexity, to the practical domains of computer system security, software verification and analysis, and software engineering.

Previous Experience

Teaching. During my time at Yale University, I was fortunate to serve as a teaching fellow for **7 semesters**, which exceeded the required number (2 semesters). I had the opportunity to work with both undergraduate and graduate students in various courses. Guiding and supporting students in their academic journey has been a profoundly fulfilling experience for me. The courses I taught covered a wide range of topics, from theory-based courses like *Algorithm via Continuous Optimization* to practical application-focused courses such as *Software Engineering*. Through these teaching experiences, I obtained my skills in delivering lessons and facilitating learning in both theory and application-oriented subjects.

One particularly remarkable experience was serving as a teaching fellow for *Law, Security, and Logic*. The students in this class came from diverse backgrounds, including computer science undergraduates and professional law students. Some students had limited computer science training but were eager to explore the use of automated reasoning techniques for modeling and verifying legal systems. I was also inspired by a student who initially struggled due to a lack of computer science and mathematics background. He showed great determination by attending my office hours every week, seeking guidance and clarification. Witnessing his progress was incredibly rewarding. He eventually designed an automated procedure to determine whether a specific case fell under the purview of *The Foreign Intelligence Surveillance Act of 1978 (FISA)* for foreign intelligence surveillance. This success story reminded me of my passion for teaching and the profound impact it can have on students' growth and achievements.

Mentoring. During my Ph.D. studies, I had the opportunity to co-advise several students alongside my advisor. One notable experience was my involvement as a de facto advisor for a Yale undergraduate student, Yichao Chen, during her senior thesis. Her research focused on the development of privacy-preserving linear temporal logic (LTL) model checking. In our collaboration, I provided guidance and introduced her to cryptographic primitives and LTL model-checking concepts. We held regular and productive weekly meetings, engaging in in-depth discussions. These discussions resulted in promising preliminary results for her research. Even after her graduation, our collaboration continued, and we successfully published our joint work, titled "Looking Beyond Privacy: Towards Privacy-Preserving Linear Temporal Logic Model Checking," in INFOCOM [1].

Education for special needs. I strongly believe in inclusive education and providing support to students with special needs. During my Ph.D., I had the opportunity to collaborate with Yale undergraduates and develop software for a high school in Virginia that catered to students with severe special needs. These students faced challenges such as limited verbal communication abilities and low motor skills. Unfortunately, existing technologies were either incompatible with their motor abilities or required expensive hardware.

To address this gap, we developed software that enabled nonverbal students to communicate using a simple switch or even without any additional hardware. This experience was personally meaningful to me,

as it highlighted the importance and challenges of education for students with special needs. It reinforced my commitment to always consider their needs and strive for inclusivity in my work.

Teaching Plan

Advising Graduate Students. I am deeply dedicated to offering guidance, support, and mentorship to graduate students as they embark on their academic and research journeys. Growing up in a diverse academic environment has instilled within me a profound appreciation for students from various backgrounds, and my commitment lies in assisting them in exploring and pursuing their own passions. Recognizing the importance of understanding the diverse backgrounds of students, I possess the ability to empathize with them and identify their unique strengths, weaknesses, and needs.

In my role as an advisor, I am wholeheartedly dedicated to delivering professional and personalized guidance, ensuring that students receive the necessary support to excel in their academic pursuits and research endeavors. To achieve this, I will cultivate a nurturing and supportive laboratory environment and equip students with valuable information and resources to facilitate their success. I firmly believe that the advisor-advisee relationship should be built on a foundation of mutual trust and respect, enabling us to collaborate and bolster each other in achieving our shared objectives and aspirations.

Teaching Course. I am deeply passionate about sharing my knowledge and expertise with undergraduate students, particularly in the realm of software verification and analysis. My primary objective is to guide students in delving into the intricacies of verification tools, empowering them to translate programs into logical formulas and harnessing the power of SAT and SMT solvers to solve these formulas effectively. I also aim to foster stimulating discussions and provide hands-on experiences with industry-standard verification tools like Dafny and SLAM. In my courses, students will anticipate engaging with practical projects that allow them to experiment with these concepts, reinforcing their understanding through real-world application.

In addition to software verification, I am equally enthusiastic about teaching undergraduate courses in cryptography and security. These courses will offer students a foundation in the fundamental principles of secure computation and zero-knowledge proofs. To enhance their learning experience, I plan to design projects that afford students opportunities to explore and apply these principles in practical contexts.

My research background, which seamlessly bridges theory and systems, equips me with the versatility to teach courses across a broad spectrum of topics. I am open to teaching undergraduate-level courses in computational complexity, optimization, and algorithms. Drawing from my diverse teaching experiences acquired throughout graduate school, I am confident in my ability to deliver engaging and comprehensive lectures on these subjects, enriching students' educational journeys and preparing them for success in the ever-evolving field of computer science.

Building Inclusive Curriculum. Being a woman in the field of computer science, I am dedicated to wholeheartedly championing the advancement and integration of not just females but also historically marginalized groups within my classroom and laboratory environments. I hold a steadfast conviction that diversity within the realm of computer science transcends mere notions of equity and social justice; it serves as a powerful catalyst for fostering innovation and nurturing creativity. In my capacity, I am committed to creating an atmosphere where every student, irrespective of their gender, race, or background, experiences a profound sense of worth and empowerment. This commitment is manifested through my provision of mentorship and guidance to female and underrepresented students, coupled with my unwavering effort to create a lab and classroom environment that is both inviting and secure.

References

- [1] Y. Cheng, N. Luo, J. Zhang, T. Antonopoulos, R. Piskac, and Q. Xiang. Looking for the maximum independent set: a new perspective on the stable path problem. In *IEEE INFOCOM 2021-IEEE Conference on Computer Communications*, pages 1–10. IEEE, 2021.