Zhenjiang **Zhao**

Ph.D. Student

The University of Electro-Communications, Tokyo, Japan

zhenjiang@disc.lab.uec.ac.jp | zhenjiang-zhao.github.io | zhenjiang-zhao | 0000-0002-5965-5832 |
Google Scholar | DBLP

Research Interest

I am interested in **Boolean satisfiability (SAT)** and **trustworthy AI**. Recent advancements in SAT solvers and encoding techniques have significantly broadened its applicability. My current research focuses on leveraging SAT to verify whether an AI system meets the safety-critical properties such as **robustness** and **fairness**.

Education

Ph.D. The University of Electro-Communications, Tokyo, Japan. *2023 - pres.*

M.Eng. The University of Electro-Communications, Tokyo, Japan. *2021 - 2023*

B.Math. The School of Mathematical and Computational Science, Xiangtan University, Xiangtan, China. *2014 - 2018*

Publications

Peer Reviewed

Zhenjiang Zhao, Takahisa Toda, and Takashi Kitamura. Approximation-guided Fairness Testing through Discriminatory Space Analysis. In Proceedings of the 39th IEEE/ACM International Conference on Automated Software Engineering (ASE). 2024. (CORE A*, Paper Link, Code Link)

Zhenjiang Zhao, Takahisa Toda, and Takashi Kitamura. Diversity-aware fairness testing of machine learning classifiers through hashing-based sampling. Information and Software Technology. 2023. (a top-tier journal in SE with IF: 3.8, Paper Link, Code Link)

Zhenjiang Zhao, Takahisa Toda, and Takashi Kitamura. Efficient Fairness Testing Through Hash-Based Sampling. In Proceedings of Search-Based Software Engineering 2022. (CORE B, Paper Link)

Takashi Kitamura, **Zhenjiang Zhao**, and Takahisa Toda. Applying Combinatorial Testing to Verification-Based Fairness Testing. In Proceedings of Search-Based Software Engineering 2022. (CORE B, Paper Link)

Non-Peer Reviewed

Zhenjiang Zhao, Takahisa Toda, and Takashi Kitamura. Toward Individual Fairness Testing for XGBoost Classifier through Formal Verification. In Proceedings of the Annual Conference of Japanese Society for Artificial Intelligence. 2024. (Paper Link)

Zhenjiang Zhao, and Takahisa Toda. Note on CDCL Inference with Similar Learnt Clauses. In Proceedings of the Annual Conference of Japanese Society for Artificial Intelligence. 2022. (In Japanese, Paper Link)

Research Experience

Reviewer	Review activity for journal, Expert Systems with Applications (IF: 7.5) – 19 reviews.	*2024 - 2025*
Reviewer	Review activity for journal, Information and Software Technology (IF: 3.8) – 1 review.	*2024*
Research Assistant	Research and development on verification testing of machine learning systems and cyber-physical systems, the National Institute of Advanced Industrial Science and Technology.	*2022 - pres.*
Research Intern	Research on modeling the function of air traffic control, the Electronic Navigation Research Institute.	*Sept. 2021*

Awards, Fellowships, & Grants

2023 - 2026	**The Next Generation Researcher Challenge Research Program of the University of Electro-Communications**, the Japan Science and Technology Agency.	*183,750 yen / month*
2024	**Travel Expense Support for Students Presenting at International Conferences through the Graduate School Dean's Discretionary Fund**, the University of Electro-Communications.	*90,000 yen*
2024	**Support for Student English Presentations: Conference Participation Fee Assistance through the Meguro-kai and the University of Electro-Communications Fund Grant Program**, the University of Electro-Communications.	*50,000 yen*
2022	**Scholarship for international student**, the Japan Educational Exchanges and Services.	*100,000 yen*
2021	**MEXT Honors Scholarship**, the Japan Student Services Organization.	*48,000 yen*

Invited Presentations

** presenting author*

Zhenjiang Zhao*. Presentation at IPSJ/SIGSE Software Engineering Symposium (SES2025), Invited to present the paper "Approximation guided Fairness Testing through Discriminatory Space Analysis" published in ASE. In IPSJ/SIGSE Software Engineering Symposium (SES), Sep 2025.

Zhenjiang Zhao*. Presentation in the Top Conference Section at Forum on Information Technology, Invited to present the paper "Approximation guided Fairness Testing through Discriminatory Space Analysis" published in ASE. In Forum on Information Technology (FIT), Sep 2025.

Zhenjiang Zhao*. Presentation at IPSJ/SIGSE Software Engineering Symposium (SES2024), Invited to present the paper "Diversity-aware Fairness Testing of Machine Learning Classifiers through Hashing-based Sampling" published in IST. In IPSJ/SIGSE Software Engineering Symposium (SES), Sep 2024.

Zhenjiang Zhao*. Presentation in the Top Conference Section at Forum on Information Technology, Invited to present the paper "Diversity-aware Fairness Testing of Machine Learning Classifiers through Hashing-based Sampling" published in IST. In Forum on Information Technology (FIT), Sep 2024.

Oral & Poster Presentations

** presenting author*

Zhenjiang Zhao*, Takahisa Toda, and Takashi Kitamura. Considerations on the Quantitative Verification of Fairness in Machine Learning Models. In Special Interest Group on Machine Learning Systems Engineering (MLSE), Jul 2025.

Zhenjiang Zhao*, Takahisa Toda, and Takashi Kitamura. Considerations on the Approximate Performance of Verification-Based Fairness Testing Techniques. In Workshop of Fundamentals of Software Engineering (FOSE), Nov 2024.

Zhenjiang Zhao*, Takahisa Toda, and Takashi Kitamura. Consideration of a Verification-Based Fairness Testing Technique Without Constraint Solving. In Workshop of Information-Based Induction Sciences (IBIS), Nov 2024.

Zhenjiang Zhao*. Trends in Techniques for Individual Fairness Testing of Machine Learning Models. In Workshop on Algorithmic Fairness and Software Engineering at IPSJ/SIGSE Software Engineering Symposium (SES), Sep 2024.

Zhenjiang Zhao*, Takahisa Toda, and Takashi Kitamura. Consideration of Fairness Testing Method Based on a Complete Search for Paths in Decision Tree. In Special Interest Group on Machine Learning Systems Engineering (MLSE), Jun 2023.

Zhenjiang Zhao*, Takahisa Toda, and Takashi Kitamura. A Diversity-Aware Fairness Testing Technique and Considerations of Its Diversity. In Workshop of Fundamentals of Software Engineering (FOSE), May 2023.

Zhenjiang Zhao*, Takahisa Toda, and Takashi Kitamura. Fairness Testing of Machine Learning Model. In Programming Symposium, Information Processing Society of Japan, Jan 2023.

Zhenjiang Zhao*. Paper Introduction: Efficient Fairness Testing Through Hash-Based Sampling (SSBSE2022). In IPSJ/SIGSE Winter Workshop, Jan 2023.

Zhenjiang Zhao*, Takahisa Toda, and Takashi Kitamura. Fairness Testing Method 'VBT-X' and Its Future Challenges. In Workshop of Information-Based Induction Sciences (IBIS), Nov 2022.

Zhenjiang Zhao*, Takahisa Toda, and Takashi Kitamura. VBT-X: A Fairness Testing Method of Machine Learning Model. In Workshop of Fundamentals of Software Engineering (FOSE), Nov 2022.

Teaching Experience

Fall 2025 **Complex Analysis**, Teaching Assistant.
Fall 2024 **Complex Analysis**, Teaching Assistant.
Fall 2023 **Complex Analysis**, Teaching Assistant.
Fall 2022 **Computer Literacy**, Teaching Assistant.
Fall 2022 **Complex Analysis**, Teaching Assistant.
Spring 2022 **Fundamental Programming**, Teaching Assistant.

Competition Experience

2022 **SAT Competition**, 3rd on the CaDiCaL Hacks Track.
2021 **Yamato Transport 5 Days data competition**, Victory.
2021 **Yamato Transport Hackathon: the SDGs Challenge**, Victory.
2017 **Contemporary Undergraduate Mathematical Contest in Modeling**, Second Prize.
2016 **Contemporary Undergraduate Mathematical Contest in Modeling**, Second Prize.