

Zhenjiang Zhao

PH.D. STUDENT

The University of Electro-Communications, Tokyo, Japan

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Research Interest

I am deeply interested in Boolean satisfiability problem (SAT) and algorithmic fairness. In previous years, I focused on the speed-up of SAT solvers. More recently, I am working on applications of SAT in the realm of algorithmic fairness. Specifically, I've been developing an efficient and diversity-aware approach for the fairness testing of machine learning, leveraging sampling techniques from the SAT domain.

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'24). 2024. (📄 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. (📄 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. (📄 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. (📄 Paper Link)

NON-PEER REVIEWED

- Zhenjiang Zhao**, and Takahisa Toda. 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 Japanese). In Proceedings of the Annual Conference of Japanese Society for Artificial Intelligence. 2022. (📄 Paper Link)

Research Experience

- Reviewer** Review activity for journal, Expert Systems with Applications (IF: 7.5) – 11 reivews. 2024
- Reviewer** Review activity for journal, Information and Software Technology (IF: 3.8) – 1 reivew. 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

Poster Presentations

** presenting author*

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, Nov 2024 .

Zhenjiang Zhao*. Presentation at IPSJ/SIGSE Software Engineering Symposium (SES2024), Invited for The Paper "Diversity-aware Fairness Testing of Machine Learning Classifiers through Hashing-based Sampling" Published in IST. In IPSJ/SIGSE Software Engineering Symposium, Sep 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, Sep 2024.

Zhenjiang Zhao*. Presentation in the Top Conference Section at Forum on Information Technology, Invited for The Paper "Diversity-aware Fairness Testing of Machine Learning Classifiers through Hashing-based Sampling" Published in IST. In Forum on Information Technology, 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, 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, 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, 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, Nov 2022.

Teaching Experience

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.