Yiran Huang, Ph.D.

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Biography

I'm Yiran Huang, a PhD candidate at the Karlsruhe Institute of Technology, where I blend Explainable Artificial Intelligence (XAI) with Data Mining to both illuminate the intricate workings of complex AI models and unravel rich insights from large datasets. My mission is to advance AI systems that are not only powerful but also transparent and understandable, ensuring that the intelligence behind decisions is accessible to all. Through my work, I aim to foster trust in AI by making both the models and their derived data insights interpretable and actionable.

Employment History

2019 – now **Research Associates,** Karlsruhe Institute of Technology.
I am actively involved in the Technology for Pervasive Computing research group, where I play a multifaceted role. My responsibilities include:

- supervising undergraduate (7) and master (5)'s students with their final projects,
- organizing both undergraduate and postgraduate seminars (2),
- coordinating internships for students (4),
- maintenaning IT software and hardware,
- contributing to several projects funded by Baden-Württemberg (8).

Education

2020 – 2024 **Ph.D., Karlsruhe Institute of Technology** in Informatik.
Thesis title: *Advancing Model Explainability in Time Series Domain: from Cognitive Block Structuring to Optimized Interpretable Model Training.*
Advisor: *Prof. Dr. Michael Beigl*

2015 – 2018 **M.Sc. Karlsruhe Institute of Technology** in Informatik.
Thesis title: *Measuring MT Quality using vector representations.*
Advisor: *Prof. Dr. Alexander Waibel, Prof. Dr. Tamin Asfour*

2009 – 2013 **B.Sc. ZhengZhou University** in Computer Science and Technology.

Research Publications

Journal Articles

1. Y. Huang, H. Zhao, Y. Zhou, T. Riedel, and M. Beigl, "Standardizing your training process for human activity recognition models: A comprehensive review in the tunable factors," *arXiv preprint arXiv:2401.05477*, 2024.
2. Y. Zhou, Z. Haibin, Y. Huang, T. Riedel, and M. Beigl, "Enhancing efficiency in har models: Nas meets pruning," 2024.

3. L. Fang, T. Müller, E. Pescara, N. Fischer, Y. Huang, and M. Beigl, "Investigating passive haptic learning of piano songs using three tactile sensations of vibration, stroking and tapping," *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, vol. 7, no. 3, pp. 1–19, 2023.
4. Y. Huang, Y. Zhou, T. Riedel, L. Fang, and M. Beigl, "Randomhar: Improving ensemble deep learners for human activity recognition with sensor selection and reinforcement learning," *arXiv preprint arXiv:2307.07770*, 2023.
5. E. Pescara, P. Tremper, J. Formanek, *et al.*, "Ubiquitäre systeme (seminar) und mobile computing (proseminar) ss 2019: Mobile und verteilte systeme ubiquitous computing. teil xix," 2020.

Conference Proceedings

1. Y. Huang, C. Li, H. Lu, T. Riedel, and M. Beigl, "State graph based explanation approach for black-box time series model," in *World Conference on Explainable Artificial Intelligence*, Springer, 2023, pp. 153–164.
2. Y. Huang, N. Schaal, M. Hefenbrock, Y. Zhou, T. Riedel, and M. Beigl, "Mcxai: Local model-agnostic explanation as two games," in *2023 International Joint Conference on Neural Networks (IJCNN)*, IEEE, 2023, pp. 01–08.
3. L. Fang, T. Zhu, E. Pescara, Y. Huang, Y. Zhou, and M. Beigl, "Dragtapvib: An on-skin electromagnetic drag, tap, and vibration actuator for wearable computing," in *Proceedings of the Augmented Humans International Conference 2022*, 2022, pp. 203–211.
4. Y. Huang, Y. Zhou, M. Hefenbrock, T. Riedel, L. Fang, and M. Beigl, "Automatic feature engineering through monte carlo tree search," in *Joint European Conference on Machine Learning and Knowledge Discovery in Databases*, Springer, 2022, pp. 581–598.
5. Y. Huang, Y. Zhou, M. Hefenbrock, T. Riedel, L. Fang, and M. Beigl, "Universal distributional decision-based black-box adversarial attack with reinforcement learning," in *International Conference on Neural Information Processing*, Springer, 2022, pp. 206–215.
6. Y. Zhou, H. Zhao, Y. Huang, T. Riedel, M. Hefenbrock, and M. Beigl, "Tinyhar: A lightweight deep learning model designed for human activity recognition," in *Proceedings of the 2022 ACM International Symposium on Wearable Computers*, 2022, pp. 89–93.
7. Y. Zhou, M. Hefenbrock, Y. Huang, T. Riedel, and M. Beigl, "Automatic remaining useful life estimation framework with embedded convolutional lstm as the backbone," in *Machine Learning and Knowledge Discovery in Databases: Applied Data Science Track: European Conference, ECML PKDD 2020, Ghent, Belgium, September 14–18, 2020, Proceedings, Part IV*, Springer, 2021, pp. 461–477.
8. L. Wang, L. Sommer, T. Riedel, M. Beigl, Y. Zhou, and Y. Huang, "Neuralio: Indoor outdoor detection via multimodal sensor data fusion on smartphones," in *Science and Technologies for Smart Cities: 5th EAI International Summit, SmartCity360, Braga, Portugal, December 4-6, 2019, Proceedings*, Springer, 2020, pp. 127–138.

Skills

Languages	Strong reading, writing and speaking competencies for English, German, Mandarin Chinese.
Coding	Python, R, SQL, XML/XSL, LaTeX, …
Databases	MySQL, PostgreSQL, SQLite, LotusNotes.
Web Dev	HTML, CSS, JavaScript, Python dash.
Misc.	Academic research, teaching, training, consultation.

Project Experience

Smart Data Innovation Lab

2024 **Disy - Local LLM for nature language SQL**, focused on building native large-scale language models for databases to be accessed through natural language.

Smart Data Solution Center Baden-Wuerttemberg

2023 **HighQ - Analyzing the hazard potential of cycle paths with the help of AI algorithms**, focused on route planning for bike riding.

Schloetter - Predict sales volumes intelligently, tried to optimise the prediction of the sales volume with the help of machine learning.

VAF - A machine learning approach for the most important factors that influence production time, focused on pre-processing the data. This includes analysing the data distribution, correcting erroneous data, processing "character type" data and, through research, constructing new attributes based on the original attributes using mathematical operators.

2022 **PriceIntelligent - With the SDSC-BW, products find their suitable place**, analysed the PIM system and the supplier data in detail. The focus of the analysis was on identifying textual information with significant information content and its occurrence and weighting.

2021 **Artiminds - Find a better starting position**, analysed the starting position of the robot arm, the exploration position and the search results - with the aim of determining the search path of the robot arm and the distribution of the target points. By optimising the starting position and the search path, the average search time of the robot arm is reduced.

European Federation of Data Driven Innovation Hubs

2023 **AdQuiver - Data driven hotel experiment**, centred on the transformational changes experienced by the Hotel as it moves from a reactive to a predictive approach of data exploitation through the development of use cases with the capacity to be productive in a data space environment.

2022 **ARCTUS – Monitoring refrigerator condensing units**, developed machine learning (ML) models to monitor refrigerator condensing units (RCU). Such ML models can bring significant value since they provide information on upcoming malfunctions that could stop the operation of an RCU and also predict future energy consumption. For this project we use public datasets as well as data provided by our collaborator Klimamichaniki from Greece.