

Xin Huang

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👤 Biography

I am a third-year postgraduate from Beijing Institute of Technology, and expected to graduate in July 2025. My research interests include deep learning (DL) and natural language processing (NLP), and I have been working on log-based anomaly detection (NLP for software engineering), semantic communications (NLP for communications), and vulnerability detection based on large language models (NLP for security). Now, I am focusing on multimodal large language models (MLLMs) for solving mathematical problems at ByteDance.

🎓 Education

Beijing Institute of Technology (985, ARWU 101-150) **Sept. 2022 - Jun. 2025:** *M.Eng.*
Postgraduate Recommendation
Major in Network and Information Security

China Agricultural University (985, ARWU 201-300) **Sept. 2018 - Jun. 2022:** *B.Eng.*
Major in Computer Science and Technology
GPA: 3.66/4.0 (91.5/100)

📄 Papers

* and † denote corresponding and co-first authors, respectively.

MLLMs for Math **Jun. 2024 - Aug. 2024:** *Done at ByteDance*
[6] Wenwen Zhuang[†], **Xin Huang[†]**, Xiantao Zhang[†], and Jin Zeng. “Math-PUMA: Progressive Upward Multimodal Alignment to Enhance Mathematical Reasoning”, *AAAI Conference on Artificial Intelligence (AAAI)*, 2025. (**CCF-A, Under review**)

- We propose Math-PUMA, a methodology based on Progressive Upward Multimodal Alignment, which enhances mathematical reasoning in MLLMs through a three-stage process.
- We create a large-scale dataset, Math-PUMA-1M, which comprises 692K data pairs and 996K multimodal mathematical data.
- The MLLMs trained with Math-PUMA outperform most open-source MLLMs in MATHVERSE, MATHVISTA, and WE-MATH benchmarks.

Log-based Anomaly Detection **Sept. 2022 - Now:** *Cooperated with Peking University*
[5] **Xin Huang***, Ting Zhang, Wen Zhao, and Zhiqiang Zhang. “LogIRL: A Log-based Anomaly Detection Method through Inverse Reinforcement Learning and Large Language Models”, *AAAI Conference on Artificial Intelligence (AAAI)*, 2025. (**CCF-A, Under review**)

- We devise an interactive environment and propose LogIRL, the inaugural inverse reinforcement learning (IRL)-based method integrated with a large language model (LLM) for log-based anomaly detection. During the pretraining stage, LogIRL leverages IRL to directly learn a policy at sequential level from expert demonstrations. Compared to reinforcement learning (RL), LogIRL obviates the necessity for manually crafting a suboptimal reward function.

[4] Ting Zhang, **Xin Huang***, Wen Zhao, Guozhao Mo, and Shaohuang Bian. “LogContrast: A Weakly Supervised Anomaly Detection Method Leveraging Contrastive Learning”, *International Conference on Software Quality, Reliability, and Security (QRS)*, 2023. (**CCF-C, Oral**)

- We propose LogContrast, a log-based anomaly detection method that leverages weakly supervised contrastive learning to address the problems of scarce and erroneous log labels in reality. This

approach only uses a portion of the labels for supervised training, thus reducing the training bias caused by noisy log labels.

[3] Ting Zhang, **Xin Huang***, Wen Zhao, Shaohuang Bian, and Peng Du. “LogPrompt: A Log-based Anomaly Detection Framework Using Prompts”, *International Joint Conference on Neural Networks (IJCNN)*, 2023. (**CCF-C, Oral**)

- We propose a log-based anomaly detection method named LogPrompt, which leverages prompt tuning to enable pretrained language models (PLMs), such as BERT, RoBERTa and ALBERT, to learn more about the representations of logs.

Semantic Communications

Sept. 2022 - Now: *Research topic of graduating thesis*

[2] **Xin Huang**, Liang Zeng*, Yaojun Lu, and Jianping An. “Improving Autoencoder-Based Deep Joint Source-Channel Coding for Robust Text Transmission through Contrastive Learning”, *IEEE Journal on Selected Areas in Communications (JSAC)*, 2024. (**CCF-A, JCR-Q1, IF=16.4, Under review**)

- We introduce a deep JSCC system based on self-supervised contrastive learning for semantic communication in text transmission. Throughout contrastive learning, the model aligns similar samples closely and separates dissimilar ones, thereby fostering the encoder with robust noise resistance.

[1] Chang Li, Liang Zeng*, **Xin Huang**, Xiaqing Miao, and Shuai Wang. “Secure Semantic Communication Model for Black-Box Attack Challenge Under Metaverse”, *IEEE Wireless Communications*, 2023. (**JCR-Q1, IF=12.9**)

- We introduce the development prospects of semantic communication in the context of the metaverse, as well as three methods to ensure semantic communication security: (1) secure communication model based on semantic block; (2) secure communication model based on semantic variable coding; and (3) secure communication model based on hybrid channel with hidden task.

★ Honors and Awards

- National Encouragement Scholarship (**National, 2020**).
- “Optics Valley of China · Huawei Cup” The 19th China Post-Graduate Mathematical Contest in Modeling, **3rd Prize (National, 2023)**.
- Mathematical Contest in Modeling and Interdisciplinary Contest in Modeling (MCM/ICM), **Honorable Mention (International, 2020)**.
- The Chinese Mathematics Competitions (CMC), **3rd Prize (National, 2020)**.
- Contemporary Undergraduate Mathematical Contest in Modeling (CUMCM), **Beijing 2nd Prize, (National, 2019)**.

🏢 Work

ByteDance

Jun. 2024 - Sept. 2024: Gauth, AI Engineer (Intern)

A paper about multimodal alignment was produced and submitted to the AAAI conference.

Momenta

Oct. 2021 - Jan. 2022: Mpiot, R&D Engineer (Intern)

I developed performance analysis tools for vehicle systems based on Python and C++.

🗣️ Languages

🌐 Mandarin - Native.

🌐 English - CET-4: 564; CET-6: 490; TOEFL: 84 (R: 28, L: 18, S: 16, W: 22).