Haonan Wang

+1-443-854-0002 | hwang298@jh.edu | Personal website

Linkedin | Github

Baltimore, Maryland - 21218, USA

Research interest

Background: I have a solid foundation in **Multivariate Statistical Analysis**,**Machine Learning**, **Reinforcement Learning**, **Informatics Theory**, **Numerical Analysis**, and **Math Modeling and Optimization Algorithms**.
Current Interest: **Human-computer interaction(HCI)** and **large language models(LLMs) evaluation and application**, with an emphasis on their utility in real-world applications. Additionally, I am passionate about **text-game design and optimization**, aiming to simulate the world of interactive fiction environments, and purpose-built research environments, that help teach or measure an agent's ability to perform (for example) specific kinds of common-sense or scientific reasoning and to enhance user experience and interaction through intelligent systems.

Education

- **Johns Hopkins University** *Sep.2023 - Dec.2024*
  Master of Science in Engineering in Computer Science(M.S.E) Baltimore, Maryland
  - **Research Collaboration**: Ziang Xiao(Project Advisor),Jason Eisner(Faculty Advisor)
  - **Project**: *QuantifyEval: Measuring the Informativeness of Popular LLM Benchmarks on Downstream Utility*
  - **Main courses-GPA: 3.6/4.0**: NLP: Self-Supervised Models, Advanced Topics in Conversation User Interfaces, Introduction to Human Language Technology, Introduction to Human-Computer Interaction
- **Liaoning Technology University** *Sep.2019 - July.2023*
  Information and Computing Science(B.S.Degree) Fuxin, China
  - **Research Collaboration**: Wei Liu(Project Advisor | Institute of Mathematics and Systems Science),Yu Zhang(Project Advisor | Institute of Machine Learning and Data Mining)
  - **Dissertation-*Excellent score***: *Research on the application of human action recognition based on LSTM-CNN*
  - **Main courses - GPA: 3.42/4.5((Rank Top 1st))**: Numerical Analysis, Machel Learning, Mathematical Analysis, Information Theory, Data Mining, Data Structure, Databases,

Publications

J=Journal, P=Preprint, C=Conference,S=In Submission

[J.1] **Haonan Wang***. (2021). **Research status and prospects of machine learning algorithm in big data analysis**. *Journal of Network Computing and Applications*, Vol. 06, Issue 01, pp. 1-5. DOI: 10.23977/jnca.2021.060101

Description : *Explored the role of **machine learning algorithms**, including Naive Bayes, K-means, and SVM, in transforming traditional data analysis methods to enhance big data processing, and discussed future research trends in this evolving field.*

[J.2] Ruiyang Wang, **Haonan Wang***, Junfeng Sun, Mingjia Zhao, Meng Liu. (2022). **Research on geometric figure classification algorithm based on Deep Learning**. *Scientific Journal of Intelligent Systems Research* , Vol. 04, Issue 06, pp. 1-6. ISSN: 2664-9640

Description : *Developed a CNN-based geometric pattern recognition algorithm utilizing **LeNet-5 architecture** to enhance recognition accuracy and efficiency, leveraging shared weights and cross-entropy loss for improved model generalization and performance on large data sets.*

[P.1] Wei Liu*, Jiaxiang Wang, Guangwei Liu,**Haonan Wang**. (2023). **IM3HRL: Model-assisted Intrinsically Motivated Modular Hierarchical Reinforcement Learning**.*Scientific Reports*

Description : ***Proposed IM3HRL**, an intrinsically motivated, modular hierarchical reinforcement learning model for goal-conditioned tasks, enhancing learning speed and robustness by integrating modular goal representation, task prioritization, intrinsic rewards, and a future goal relabeling strategy, demonstrating a 15% improvement over baseline methods. .*

[S.1] Wei Liu*, Ruiyang Wang, **Haonan Wang**, Guangwei Liu.(2024) **Adaptive Path-Planning for Autonomous Robots: A UCH-Enhanced Q-Learning Approach**. Manuscript submitted for publication in *IEEE Transactions on Intelligent Vehicles*. June 2024

Description : ***Proposed an Improved Q-learning (IQL) framework*** for robot path planning, integrating the Path Adaptive Collaborative Optimization (PACO) for Q-table initialization and a Utility-Controlled Heuristic (UCH) to enhance reward accuracy. Experiments show IQL outperforms FIQL, PP-QL-based CPP, DFQL, and QMABC in path-planning effectiveness. .

[S.2] Wei Liu*, Ning Qian, Guangwei Liu.(2024)**Haonan Wang***, et al. (2024). **Unsupervised Feature Selection Algorithm Based on $L_{2,p}$-norm Feature Reconstruction**. Manuscript submitted for publication in *Plose one*.

Description : ***Proposed NFRFS***, a novel unsupervised feature selection method based on $l_{2,p}$-norm feature reconstruction, enhancing adaptability via flexible norm adjustment and integrating adaptive graph learning to preserve data structure. Numerical studies on 12 benchmark datasets show that NFRFS outperforms 8 other unsupervised methods in clustering performance. .

[S.3] Wei Liu*,Miao Zhong,Guangwei Liu, **Haonan Wang** et al. (2024). **DEMS-GlF: Detail-Enhanced Medical Image Segmentation Network Focusing on Global and Intermediate Features**. Manuscript submitted for publication in *IEEE Journals and Transactions*.

Description :***Developed DEMS-GlF***, a detail-enhanced medical image segmentation network using Transformer-Based Bridge Feature Fusion and reverse-attention upsampling to capture boundary details, achieving superior mIoU on CVC-ClinicDB, DDTI, and Kvasir-SEG datasets.

Software Patents

[P.1] **Haonan Wang**, Mingjia, Zhao, et al. (2022). **Artificial intelligence robot programming interactive control system**.PRC Software Copyright Patent, Patent No. 2022SR1053901.

[P.2] **Haonan Wang**, Junfeng, Sun, et al. (2022). **Image recognition processing operation platform**.PRC Software Copyright Patent, Patent No. 2022SR1052419.

[P.3] **Haonan Wang**, Chang, Liu, et al. (2022). **Artificial Intelligence Community Security Equipment Monitoring System**.PRC Software Copyright Patent, Patent No. 2022SR1052492.

[P.4] **Haonan Wang**, Meng, Liu, et al. (2022). **A network behavior analysis system based on machine learning**.PRC Software Copyright Patent, Patent No. 2022SR1049807.

[P.5] **Haonan Wang**, Chi, Li, et al. (2022). **Autonomous Driving Intelligent Dispatching Center Management System**.PRC Software Copyright Patent, Patent No. 2022SR1052526.

[P.6] **Haonan Wang**, Ruiyang, Wang, et al. (2022). **Unmanned shortest path planning system**.PRC Software Copyright Patent, Patent No.2022SR0935020.

[P.7] **Haonan Wang**, Junfeng Sun, et al. (2022). **Data operation analysis and collection system based on machine learning**.PRC Software Copyright Patent, Patent No. 2022SR1052428.

[P.8] Jiawei, Zhang, Pengyu, Cai, **Haonan Wang**, et al. (2021). **Staff check-in face recognition system**.PRC Software Copyright Patent, Patent No. 2021SR0699354.

Experience

- **ISLE Lab, Johns Hopkins University [🌐]** *Mar 2024 - in present*
  *Research Assistant,**Advisor:**Ziang Xiao* Baltimore, USA
  - **Description:** I contributed and led to the LLMs evaluation project QuantifyEval, and participated in research on human-computer interaction and text-based games, with related research articles set to be presented at upcoming conferences.

- **EACON,Beijing Easy control intelligent driving technology Co., LTD[🌐]** *Jul 2024 - Aug 2024*
  *Research Intern,**Leader:**Driverless center team* Beijing and Shanghai, China
  - **Description:** I support the development of an image-text interaction system for mining operations by contributing to code optimization for real-time image processing and improving system accuracy in visual data interpretation, Additionally, participated in the launch of the company's ZhuShan 2.0 model at WAIC 2024 in Shanghai.

- **Computational Cognition, Vision, and Learning Lab, Johns Hopkins University [🌐]** *Mar 2024 - Apr 2024*
  *Data Analysis Research Assistant,**Advisor:** Alan Yuille* Baltimore, USA
  - **Description:** I contributed to a computer vision project by performing data annotation on 3D and 2D images, ensuring dataset accuracy and completeness to support seamless project progression and reliable model training

- **Institute of Mathematics and Systems Science [🌐]** *Sep 2021 - Sep 2023*
  *Research Assistant,**Advisor:** Wei Liu, Yu Zhang* Fuxin, China
  - **Description:** I participated and led in projects on operational optimization algorithms, numerical analysis, and computer vision for autonomous driving, and successfully competed in multiple mathematical modeling and computer software competitions, consistently achieving outstanding scores.

- **Beijing Qianfeng Internet Technology Co., LTD [🌐]** *Aug 2022 - Oct 2022*
  *Research Intern,**Leader:** Qiangfeng Education research center team* Beijing,China
  - **Description:** I interned in the technical department at Qianfeng Research Center, focusing on Python-based system-database integration, server configuration, MySQL database testing, and human-computer interaction. Applied statistical methods, corpus processing, and big data techniques to enhance data handling, and integrated machine learning algorithms to improve the data analysis framework, gaining valuable insights into advanced tech operations

- **Liaoning Technology University [🌐]** *Sep 2021 - Sep 2023*
  Teaching Assistant Fuxin, China
  - **Course:** C++ Program Design, Mathematical Modeling, Numerical analysis, Data mining

Honors and Awards

- **China Nation Scholarship** *Oct 2022*
  Ministry of Education of the People's Republic of China [🌐]
  ◦ Awarded the highly competitive China National Scholarship, granted to the top 1% of students nationwide in recognition of outstanding academic performance, research excellence, and comprehensive personal development.
- **Outstanding Student Scholarship, Special Prize** *May 2023*
  Liaoning Technology [🌐]
  ◦ Awarded the Outstanding Student Scholarship (Special Prize) at LNTU in 2023, recognizing exceptional performance and contributions as an exemplary graduate, granted to the top 1% of students in the graduating class.
- **Outstanding Student Scholarship, First Prize** *May 2019,2020,2021,2022*
  Liaoning Technology [🌐]
  ◦ Awarded the Outstanding Special Student Scholarship (First Prize) at LNTU in 2020, recognizing distinguished academic performance and well-rounded qualities, awarded to the top 3% of students.

Competition Awards:

- **1st Place, 12th MathorCup College Mathematical Modeling Challenge** *2022*
  National-level award in China
- **1st Place, Liaoning Mathematical Modeling Contest** *2022*
  Provincial-level award in China
- **1st Place, 7th Shuwei Mathematical Modeling Challenge for College Students** *2022*
  National-level award in China
- **1st Place, 12th MathorCup College Mathematical Modeling Challenge** *2022*
  National-level award in China
- **3rd Place, Liaoning Province "Shuo Ri Cup" College Student Computer Design** *2022*
  Provincial-level award in China
- **3rd Place, Northeast Three Provinces Mathematical Modeling Competition** *2022*
  Provincial-level award in China
- **2nd Place, American Mathematical Contest in Modeling** *2022*
  International award
- **3rd Place, 14th National Undergraduate Computer Design Competition** *2021*
  National-level award in China
- **3rd Place, 11th Mathor Cup University Mathematical Modeling Challenge** *2021*
  National-level award in China
- **2nd Place, National College Students "Hua Shu Cup" Mathematical Modeling** *2021*
  National-level award in China
- **1st Place, Liaoning Province "Shuo Ri Cup" College Student Computer Design** *2021*
  Provincial-level award in China,
- **1st Place, Liaoning AgricuLNTUral Economic Modeling Competition** *2021*
  Provincial-level award in China
- **1st Place, Outstanding Scholarship of the Faculty of Science, LNTU** *2021*
  School-level award in China
- **1st Place, Career Planning Competition of the Faculty of Science, LNTU** *2021*
  School-level award in China
- **Academic Achievement Award of the School of Science, LNTU** *2021*
  School-level award in China
- **2nd Place, Liaoning Mathematical Modeling Contest** *2021*
  Provincial-level award for China

Skills

- **Programming Languages:** Python, Pytorch, MATLAB, C#
- **Database Systems:** Database, MySQL
- **Data Science & Machine Learning:** multivariate statistical analysis methods, clustering algorithms, and other traditional machine learning algorithms
- **Mathematical & Statistical Tools:** Multivariate Statistical Analysis, Regression Techniques, Clustering Algorithms, Dimensionality Reduction, Optimization Techniques
- **Research Skills:** Research Paper Writing & Presentation, Data Collection & Cleaning, Quantitative Analysis, Statistical Modeling, Algorithm Development, Programming & Scripting

Additional Information

Languages: English (Proficiency level), Chinese (Proficiency level),
Interests: Driving, Fitness,Sing