Ruizhen Hu

+86-188-1033-6220 | hrz24@mails.tsinghua.edu.cn
Ruizhen Hu | ascklasn
Shenzhen, Guangdong - 518000, China

PROFILE

I am a Master's student in Artificial Intelligence at Tsinghua University (SIGS), focused on developing robust and interpretable AI models for real-world medical applications. Passionate about advancing multimodal machine learning approaches to improve diagnostic accuracy and support clinical decision-making, with a long-term interest in contributing to precision medicine. Looking forward, I aim to explore the integration of large language models and autonomous agents into healthcare, with the goal of building clinically valuable systems that augment physician decision-making and benefit patient care at scale.

EDUCATION

- **Tsinghua University** *Shenzhen, China*
  Master of Engineering in Artificial Intelligence Sep. 2024 – Present
  - GPA: **3.98**/4.00
  - Core Modules: Introduction to Statistical Learning Theory (4.0), Artificial Neural Network (4.0), The Advanced technology and industrial application of artificial intelligence (4.0) Selected Topics on Intelligent Information Processing (4.0)
- **Beijing University of Chemical Technology** *Beijing, China*
  Bachelor of Engineering in Automation Sep. 2019 – Jun. 2023
  - GPA: 3.30/4.33, **84.51**/100
  - Core Modules: Principle of Automatic Control (4.33), Digital Electronic Technology (4.33), Advanced Mathematics (4.0), Complex Functions and Integral Transforms (4.0)
- **National University of Singapore** *Singapore, Singapore*
  Visiting Student Jun. 2021 – Aug. 2021

SELECTED HONORS

National Encouragement Scholarship	Top 10%	*Oct. 2023*
First Prize of the People's Scholarship	Top 10%	*Sep. 2022*

RESEARCH EXPERIENCE

- **Toward Precision Neuroblastoma Care: A Unified Vision-Language Model for Diagnosis, Biomarker Prediction, and Prognosis. (*Co-first author, Nature Cancer under external review*)** *Sep. 2024 – Jun. 2025*
  Supervisors: Dr. Jinxi Xiang and Prof. Yi Li [GitHub]
  - Developed **NEVA, the first vision–language foundation model for neuroblastoma**, which integrates histopathology images and clinical reports to support diagnosis, biomarker prediction, and survival analysis across **11 clinically essential tasks**, demonstrating strong performance and highlighting its robust clinical utility in multi-task pathology applications.
  - Leveraged the **largest multi-institutional neuroblastoma cohort** to date ($n = 1{,}070$) to systematically evaluate NEVA, demonstrating its superior performance, robustness, and multimodal integration capabilities across five medical centers.
  - Leveraged routinely available modalities to develop a **scalable and cost-efficient decision-support** tool, enhancing diagnostic accuracy and accessibility in resource-constrained settings, and laying the groundwork for clinically deployable AI systems and multi-modal foundation models in rare, complex diseases.
  - Designed a multimodal interpretability module to generate **attention-based heatmaps** for both histopathology images and pathology reports, revealing biologically meaningful patterns—such as clinically critical cells in high-risk regions—and aligning model focus with expert pathological knowledge.
- **Cell-Level Representation Learning for Cancer Histopathology: Towards Fine-Grained and Explainable Computational Pathology** *Jun. 2025 – Present*
  Supervisors: Dr. Jinxi Xiang and Prof. Yi Li
  - Conducted an extensive literature review identifying a critical gap in current WSI-based computational pathology: most existing approaches rely on patch-level representations and overlook **microscopic cellular variations**—including morphology, spatial organization, and microenvironment features—essential for accurate cancer diagnosis.
  - Developing a **self-supervised, cell-level pretraining framework** for computational pathology, which learns cell-level representations from whole-slide images without manual annotations, and captures fine-grained histological features.
  - Evaluating the proposed framework on public histopathology datasets for **cell classification and nucleus segmentation**, to demonstrate its potential for enhancing interpretability and clinical reliability in AI-driven diagnostics.

SKILLS

- **Computational Pathology:** Experienced in processing and analyzing various WSI formats (e.g., SVS, TIFF, MRXS, KFB); proficient in WSI parsing, patch extraction, and high-throughput histology preprocessing. Familiar with key diagnostic/prognostic evaluation metrics including AUROC, Kaplan–Meier analysis, and Multivariate Cox Regression analyses.
- **Technical Proficiency:** Skilled in Python and PyTorch for deep learning; proficient with Git, Docker, and Linux for version control, containerized deployment, and server-side development. Experienced in maintaining well-documented, modular codebases for collaborative and reproducible research.
- **Scientific Writing & Illustration:** Proficient in LaTeX and Markdown for academic writing and documentation; experienced in designing scientific illustrations using *Adobe Illustrator* for publication-quality figures. Solid foundation in literature review with extensive reading across Nature, JAMA, MIA, and other top-tier journals.
- **Web and Front-End Tools:** Familiar with HTML5 and static site generation using *Hugo*; capable of building and customizing academic personal websites.