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Motivation Letter   November 8, 2024

To whom it may concern,

I am writing to express my interest in the PhD position at your university, specializing in **AI-driven radiopathomics for molecular glioma subtyping**. My academic background and research experience have prepared me well for advanced study in this field, and I am highly motivated to contributed to cutting-edge research that combines AI with Medical Science.

My journey began with a strong foundation in Computer Science and Mathematics, leading me to pursue a Master's degree in Computational Mathematics in 2019, following a Bachelor's degree in Information Security in China. For my Master's project, I focused on Generative Adversarial Networks (GANs) of Deep Learning (DL), specifically for handwriting style imitation. In this project, I developed a GAN-based model to replicate individual handwriting styles, focusing on emulating the handwritten Chinese characters of Shiing Shen Chern from a dataset of around 220 characters. This experience provided me with hands-on expertise in GANs, data preprocessing, manuscript analysis, and code replication, culminating in my Master's thesis, *"GANs based Personal Style Imitation of Chinese Handwritten Characters."*

Following my Master's degree, I contributed to the Compressed Sensing MRI ADMM-Net project, which combined DL with numerical approximation theory. Traditional algorithms often lose image detail with repeated iterations, but by leveraging Convolutional Neural Networks (CNNs), our team demonstrated how DL can dynamically adjust parameters to preserve fine details. This project deepened my understanding of convergent algorithm theory, proof construction, and the balance between theoretical approaches and practical applications, while refining my programming and analytical skills.

After completing my degree, I joined a research group at Sun Yat-sen University focused on Computer-aided diagnosis, where I worked as a Research Assistant on several impactful projects. These included diagnosing Placenta Accreta Spectrum Disorders, predicting metastasis in Axillary Sentinel Lymph Nodes in breast cancer, and assessing responses to Neoadjuvant Chemotherapy via MRI. Through these projects, I gained further expertise in Python, PyTorch, and TensorFlow, along with experience in manuscript research and scientific writing.

I believe I am a strong candidate for this position within your research group. Your focus areas, such as medical image analysis, computer-aided diagnosis (CAD), and computer-assisted interventions (CAI), align closely with my research interests, particularly in advancing multi-modal data analysis and enhancing the molecular characterization of glioma subtypes. My interdisciplinary background, programming expertise, and research experience equip me well for the challenges and rigor of this PhD position.

My long-term goal is to establish a career in academia, where I can contribute to the fields of Computer Science and Mathematics through meaningful research and innovation. The interdisciplinary nature of your group, alongside the expertise and contributions of its members, closely matches my academic and professional aspirations, making this position an ideal next step. I am eager to join an environment that fosters intellectual rigor and collaboration, providing the resources essential to realizing my goals.

I am enthusiastic about the opportunity to join your research community and contribute actively while continuing to develop my expertise. Thank you for considering my application, and I look forward to discussing how my background, skills, and goals align with your program.

Sincerely,

Hai Jiang

Attached: curriculum vitæ

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Education

2019–2022	**Master of Science in Computational Mathematics**, *Nankai University*, **Tianjin, China**
Thesis	*GANs based Personal Style Imitation of Chinese Handwritten Characters.*
Advisors	Prof. Yunhua Xue, Prof. Chunlin Wu
Related Courses	Approximation Theory and Methods, Numerical Optimization, Convex Analysis, Variational Analysis, Real Analysis, Functional Analysis, Matrix Computation, Foundations of Measure Theory and Probability, Numerical Solutions of Partial Differential Equations, and more.
Cumulative GPA	3.06/4.00
2014–2018	**Bachelor of Engineering in Information Security**, *Lanzhou University*, **Lanzhou, China**
Thesis	*Improved Upper Bounds of Roman Domination Number in Maximal Outerplanar Graphs*
Advisor	Prof. Zepeng Li
Related Courses	Discrete Mathematics, Operating Systems, Data Structures, C and C++ Programming Lab, Java Programming Lab, Database Theory and Lab, Computer Organization and Design, and more.
Cumulative GPA	4.15/5.00

Research Experience

11.2022–07.2024	**Research Assistant**, *Computational Medical Imaging Laboratory*
	School of Computer Science and Engineering, Sun Yat-sen University, Guangzhou, China
Project	China Department of Science and Technology Key Grant, focused on Breast Cancer, aims to develop models with clinical interpretability and generalization.
Supervisors	Prof. Yao Lu, Dr. Ting Song
Task Focus	Placenta Accreta Spectrum Disorders, T2-WI MRI, Prenatal Diagnosis, Multi-class classification.
Experience and Skills	Literature research, data preprocessing, model building (programming), research paper writing.
Publication	Submitted to ISBI 2025; Under Review; *"Anatomy-guided Multitask Learning for MRI-based Classification of Placenta Accreta Spectrum and its Subtypes."*
12.2023–01.2024	**Research Assistant**, *Computational Medical Imaging Laboratory*
	School of Computer Science and Engineering, Sun Yat-sen University, Guangzhou, China
Project	National Natural Science Foundation of China, focused on Breast Cancer, aimed to develop a prediction model for the Chinese female population mainly with FFDM and US.
Supervisors	Prof. Yao Lu, Dr. Xiang Zhang
Task Focus	Breast Cancer, Dual-Energy CT, Sentinel Lymph Nodes, Metestatic status, Multi-class classification.
Experience and Skills	The first comprehensive research experience encompassed conducting literature reviews, designing experiments, writing research papers, and working with the TensorFlow framework.
Publication	Submitted to MICCAI2024; in Revising; *"Space-Squeeze Method for Multi-Class Classification of Metastatic Lymph Nodes in Breast Cancer."*
01.2022–06.2022	**Research Student**, *Image Analysis Team*
	School of Mathematical Sciences, Nankai University, Tianjin, China
Task	ADMM model from the manuscript "Deep ADMM-Net for Compressed-Sensing MRI."
Supervisors	Prof. Chunlin Wu, Prof. Yunhua Xue
Focus	Compressed-sensing Theory, Iterative Equations, Neural Networks, MRI reconstruction.
Experience and Skills	The second programming experience involved proving mathematical equations and applying Deep Learning techniques. I reproduced the iterative mathematical equations using C++, Python, and PyTorch.
01.2021–04.2021	**Research Student**, *Image Analysis Team*
	School of Mathematical Sciences, Nankai University, Tianjin, China

Task	ROF-model from the manuscript "Nonlinear Total Variation Based Noise Removal Algorithms."
Supervisor	Prof. Yunhua Xue
Focus	Image Restoration, Denoise, PDE, Total-Variation Penalty.
Experience and Skills	My initial project experience included proving mathematical equations and using both C++ and Python to develop the ROF model.

Other Work Experience

Funding

Proposal Writing	Accepted; China Department of Science and Technology Key Grant 2023YFE0204300.
Report Writing	Succeeded; Finished two Completion Reports and two Progress Reports; NSFC Grant 81971697, 12126610.

Specification

Patent	1 Patent Application Specification; under review.
Device	1 Medical Device Application Specification; under review.

Teaching Experience

Courses	Calculus; Mathematical Analysis
Thesis	*Breast Cancer Classification Method Based on Dual-Energy CT Images*

Language Proficiency

Mandarin	Native
English	Professional Level (IELTS 6.5); CET6 476/710; CET4 544/710.
Cantonese	Intermediate

Skills

Technical	Python, PyTorch, Tensorflow, C/C++, LaTeX, MATLAB, Mathematics
Other	Linux (Ubuntu), Microsoft Office, Adobe Photoshop

Interest

Artificial Intelligence, Mathematics, Physics

Awards

2014 – 2018	Four-time recipient of the Third-Class Merit Scholarship for Academic Excellence at Lanzhou University
2019 – 2022	Three-time recipient of the Third-Class Merit Scholarship for Academic Excellence at Nankai University

References

Prof. Zepeng Li

Associate Professor of Machine Learning at Lanzhou University

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Prof. Yunhua Xue

Associate Professor of Computational Mathematics at Nankai University

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