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Motivation Letter November 5, 2024

To whom it may concern,

I am writing to express my interest in the PhD position at your university, specializing in Computer Vision within Artificial Intelligence (AI). With a solid foundation in Deep Learning and a genuine passion for advancing AI research, I am confident that my academic background and research experience uniquely position me to contribute to and thrive within your esteemed research group.

Driven by a deep-seated interest in Computer Science and Mathematics, I pursued my studies in Computational Mathematics in 2019 after completing a Bachelor's degree in Information Security in China. During my Master's program, I focused on Deep Learning, particularly within the context of style imitation in handwriting. I contributed to a project aimed at replicating individual handwriting styles, specifically emulating the Chinese handwritten characters of Shiing Shen Chern from a set of approximately 220 characters. This project provided me with hands-on experience in Generative Adversarial Networks (GANs), manuscript research, data preprocessing, and code replication, culminating in my Master's thesis titled, *"GANs based Personal style imitation of Chinese handwritten characters."*

Following this, I had the opportunity to work on the Compressed Sensing MRI ADMM-Net project, which integrated Deep Learning with numerical approximation theory. Traditional algorithms often struggle with complex images, losing intricate details after multiple iterations. By leveraging Convolutional Neural Networks (CNNs), our team explored how Deep Learning could dynamically adjust parameters during iterations to preserve these details. Through this project, I gained valuable insights into convergent algorithm theory, proof construction, and the synergy between theory and practical application. This experience deepened my understanding of algorithmic approaches and refined my programming skills.

After earning my Master's degree in Computational Mathematics, I joined a research group at Sun Yat-sen University focused on Computer-Assisted Diagnosis, where I served as a Research Assistant. My responsibilities included contributing to a successful proposal for a key Science and Technology program in China (2023YFE0204300), preparing progress and completion reports for projects funded by the National Natural Science Foundation of China (Grants 81971691 and 12126610), and drafting technical specifications for a patent and a medical device application. In particular, I participated in three significant research projects addressing medical challenges such as diagnosing Placenta Accreta Spectrum Disorders, predicting metastasis in Axillary Sentinel Lymph Nodes, and assessing responses to Neoadjuvant Chemotherapy via MRI. Although the first two projects achieved strong experimental results, they highlighted areas where further technological innovation could be explored. Through these experiences, I honed my skills in programming languages such as Python, PyTorch, and TensorFlow, as well as in manuscript research.

My long-term goal is to pursue a career in academia, where I can contribute meaningfully to the advancement of knowledge in Computer Science and AI. Your research group's work aligns closely with my own academic and professional ambitions, making this PhD position an ideal step toward my aspirations. I am eager to join an environment that provides both the intellectual rigor and resources essential to achieving my goals.

I am enthusiastic about the possibility of joining your research community, where I hope to contribute actively while further developing my expertise. Thank you for considering my application. I look forward to the opportunity to discuss 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 2.95/4.00

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 II, Sun Yat-sen University

11.2022–07.2024 **Research Assistant**, *Computational Medical Imaging Laboratory*
School of Computer Science and Engineering

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

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."*

Research Experience I, Nankai University

01.2022–06.2022 **Research Student**, *Image Analysis Team*
School of Mathematical Sciences

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

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

Specification

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

Teaching Assistant

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

Language Proficiency

Mandarin	Native Speaker
English	IELTS 6.5; CET6 476/710; CET4 544/710; Fluent(speaking, reading, writing).
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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