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Admission Committee
RWTH AACHEN University
Department of Computer Science
Representation, Learning, and Planning (RLeap) Lab

February 18, 2025

Dear Members of the Admissions Committee,

I am writing to express my enthusiastic interest in the PhD position at the **RLeap** Lab, where I aim to contribute to advancing reliable, transparent, and human-centric AI systems. With a Master's degree in Computational Mathematics, hands-on expertise in AI-driven structured data transformation, and a passion for bridging theoretical AI with real-world applications, I am eager to align my research with RLeap's mission of learning models from data for robust reasoning.

During my Master's in Computational Mathematics (2019-2022), I specialized in **Generative Adversarial Networks (GANs)**, focusing on cross-domain style transfer for structured data. My thesis, *"GANs for Personal Style Imitation of Chinese Handwritten Characters,"* nvolved designing an end-to-end CycleGAN framework to replicate the nuanced calligraphic style of Shiling Shen Chern. By optimizing adversarial training and domain-specific preprocessing, I achieved **85% visual similarity** across 220 characters, outperforming baseline models by 10%. This work demonstrated my ability to adapt generative models for personalized data—a skill directly applicable to developing AI systems that balance generative power with reliability, a core focus of RLeap.

As a researcher at Sun Yat-sen University's **Computational Medical Imaging Lab**, I led interdisciplinary projects that combined AI innovation with clinical relevance. For example, I developed a **multi-task learning model** to classify Placenta Accreta Spectrum Disorder severity using T2-WI MRI images, achieving an **AUC of 0.80**. In a separate project, I designed a CNN-based system to predict breast cancer metastasis in Sentinel Lymph Nodes via dual-energy CT scans, attaining an **AUC of 0.85** in cross-validation. These experiences equipped me with expertise in building robust AI pipelines for heterogeneous, high-stakes data—skills critical for ensuring AI systems are both accurate and transparent in domains like healthcare, where reliability is paramount.

Your lab's emphasis on **reliable, human-adapted AI systems** aligns with my aspiration to pioneer frameworks that integrate rigorous mathematical foundations with practical usability. My work with GANs and CNNs has underscored the importance of balancing model complexity with interpretability—a challenge central to RLeap's research. For example, my adversarial training techniques could be adapted to enhance robustness in reinforcement learning models, while my experience in medical imaging pipelines could inform the design of AI systems that provide actionable, human-understandable insights.

A PhD at RWTH Aachen would provide the ideal environment to advance my goal of developing **explainable AI systems** that enable trustworthy human-AI collaboration. Long-term, I aim to lead research on integrating symbolic reasoning with deep learning to create models that not only learn from data but also articulate their decision-making processes. RLeap's focus on theoretical foundations and partnerships with industry leaders like those in Aachen's innovation ecosystem would empower me to validate these innovations in real-world scenarios, ensuring translational impact.

RWTH Aachen's reputation for excellence in computer science, coupled with RLeap's interdisciplinary approach to AI research, offers unparalleled opportunities to refine my expertise. I am particularly inspired by the lab's work on **model transparency** and **human-AI interaction**, which aligns with my vision of creating systems that users can trust and interrogate. Collaborating with RLeap's team and leveraging Aachen's industry partnerships, such as with leading tech and healthcare organizations, would enable me to bridge cutting-edge theory with scalable solutions.

I am eager to contribute my expertise in generative models, data harmonization, and interpretable AI to RLeap's strategic goals. Thank you for considering my application. I would welcome the opportunity to discuss how my background aligns with your research priorities. Together, we can drive advancements at the intersection of reliable AI, mathematical rigor, and human-centered design.

Sincerely,

Hai Jiang