Wang Ma

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Summary

Ph.D. student specializing in **Uncertainty Quantification (UQ)** and **Bayesian Deep Learning**. Seeking a **Summer 2026 Research Internship** to apply expertise in Bayesian Modeling and **Generative AI** to solve challenging real-world problems. Proven experience in developing novel algorithms from theory to implementation in vision and language tasks.

Education

Rensselaer Polytechnic Institute (RPI) — Aug 2024 – Present
Ph.D. in Computer & System Engineering (Advisor: Prof. Qiang Ji) — *Troy, NY*
Research Interests: Uncertainty Quantification, Bayesian Deep Learning, Knowledge-augmented AI

Southern University of Science and Technology (SUSTech) — Aug 2020 – July 2024
B.S. in Data Science and Big Data Technology (Advisor: Prof. Chao Wang) — *Shenzhen, China*

University of California, Irvine (UCI) — Mar 2023 – July 2023
Exchange Student (ASAP Program) — *Irvine, CA*

Publications & Manuscripts

1. **Black-Box Uncertainty Quantification for Large Language Models via Ensemble-of-Ensembles**
Wang Ma, Debarun Bhattacharjya, Junkyu Lee, Nhan Pham, Harsha Kokel, Qiang Ji.
Accepted to AAAI 2026 Workshop on Assessing and Improving Reliability of Foundation Models in the Real World (AIR-FM).
2. **Towards Knowledge-augmented Bayesian Deep Learning For Computer Vision**
Wang Ma, Hanjing Wang, Yufei Zhang, Darsha Udayanga, Qiang Ji.
Submitted to IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2026.
3. **Causal Saliency Map For Post-hoc Model Explanation**
Hanjing Wang, **Wang Ma**, Naiyu Yin, Qiang Ji.
Submitted to IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2026.

Industrial Experience

IBM Research — **Yorktown Heights, NY**
Research Extern (Mentor: Dr. Debarun Bhattacharjya) — *May 2025 – Aug 2025*

- Developed a novel **perturbation-based framework** for UQ in **black-box LLMs**, enabling uncertainty decomposition without requiring access to model weights or intermediate results.
- Introduced an "ensemble-of-ensembles" method to disentangle **aleatoric and epistemic uncertainty**, using input perturbations as a proxy for parameter variability.
- **Outcome:** First-authored paper accepted to AAAI 2026 AIR-FM Workshop; currently extending for a main conference submission.

Academic Experience

Rensselaer Polytechnic Institute (RPI) — **Troy, NY**
Graduate Research Assistant (Advisor: Prof. Qiang Ji) — *Sept 2024 – Present*

- **Knowledge-Augmented Bayesian Deep Learning:** Proposed a two-stage framework that learns a **knowledge-induced prior** and an **adaptive knowledge likelihood**. Demonstrated superior accuracy, robustness, and **OOD detection** under domain shifts.
- **Causal Saliency Maps:** Led the implementation of core algorithms for a **Causal Markov Blanket (CMB)** detection method. Utilized label-wise mutual information to identify **causally relevant features**, effectively filtering out spurious correlations in vision models.
- **Semantic Uncertainty Disentanglement:** Developed a **contrastive learning framework** to disentangle semantic and nuisance uncertainties, achieving state-of-the-art performance on multiple benchmarks. (Technical Report)
- **Efficient Single-Model UQ:** Derived theoretical results from **NTK theory** to quantify regression uncertainty using only one auxiliary neural network. Implemented and advanced **credal interval-based methods** for practical uncertainty quantification. (Technical Report)

SUSTech — **Shenzhen, China**
Undergraduate Researcher (Advisor: Prof. Chao Wang) — *Mar 2024 – Aug 2024*

- **Hyperspectral Image Restoration:** Designed and implemented a self-supervised way using a novel combination of **Implicit Neural Representations (INR)** and **Diffusion Models**.
- **Unpaired Image Denoising:** Optimized a **VAE** from unpaired data, enhancing performance through Mutual Information maximization.

Technical Skills

- **Languages:** Python (PyTorch, NumPy, Pandas, Scikit-learn), Java, MATLAB, LaTeX
- **Developer Tools:** Git, Docker, Linux environment
- **Languages:** Mandarin Chinese (Native), English (Fluent), Japanese (Conversational)

Awards & Academic Engagement

- **SUSTech Excellent Undergraduate Graduation Project** (Thesis: End-to-end Unpaired Image Denoising) — June 2024
- **Seminar Organizer:** AI Optimization & Theory (SUSTech); led sessions on Bayesian Optimization & Bayesian Deep Learning — 2024
- Second Prize in Guangdong Province, Mathematical Contest in Modeling — 2021
- **Scholarships:** SUSTech Excellent Student Scholarship (2021, 2022)