Yi Ding

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EDUCATION

Tianjin University, Tianjin, China   **Sep. 2021 - Expected Jun. 2025**

- **Major & School:** Data Science and Big Data Technology, School of Mathematics   Cumulative GPA: 87.36/100, 3.5/4, Rank: 6/32
- **Mathematical courses:** *Mathematical Analysis (98), Theory of Probability (92), Real Variable Function (98), Mathematical Models (97), Complex Function (94), Topology (90)*
- **Computer Science courses:** *Algorithm Design & Analysis (95), Machine Learning (95), Programming Language (92), Data Structure (94), Deep Learning (93)*

PUBLICATION

* indicates author with equal contribution. † indicates corresponding authors.

[1] Predictive Dynamic Fusion

Bing Cao, Yinan Xia, **Yi Ding***, Changqing Zhang†, Qinghua Hu†*   **ICML 2024**

[2] Test-Time Dynamic Image Fusion

Bing Cao, Yinan Xia, **Yi Ding***, Changqing Zhang†, Qinghua Hu†*   **Submitted to NeurIPS 2024**

RESEARCH EXPERIENCE

Research assistant, **Multi-modal Vision Project, Machine Learning & Data Mining Team, Tianjin University**   **Jul. 2023 - Present**

Advisor: Dr. Bing Cao & Prof. Qinghua Hu, School of Artificial Intelligence, Tianjin University

- Provided an intuitive and rigorous multimodal fusion paradigm from the perspective of generalization error theory and derived a new Predictive Dynamic Fusion (PDF) framework based on the covariance of the fusion weight and loss function.
- Transformed the loss prediction to a more robust Collaborative Belief prediction, which naturally satisfies the covariance relationship to reduce the upper bound of generalization error without additional computational cost, and significantly enhance the prediction stability.
- Developed a relative calibration strategy to calibrate the potential prediction uncertainty and reveal the relative dominance in dynamic multimodal systems.
- Proved the superiority of dynamic image fusion over static image fusion and provides the generalization error upper bound of image fusion by decomposing the fusion image into uni-source components provably.
- Proposed a simple but effective test-time adaptation fusion paradigm based on the generalization theory.
- Conducted extensive experiments on multi-modal, multi-exposure, and multi-focus datasets, and additional exploration of gradient in constructing fusion weight demonstrates the reasonability of our theory and its expandability.

Research assistant, RZ Lab, Purdue University   **May. 2024 - Present**

Advisor: Dr. Ruqi Zhang, Department of Computer Science, Purdue University

- Developed an reliable and fairness alignment framework of vision-language models (VLM).

Research assistant, **UNITES Lab, The University of North Carolina at Chapel Hill**   **Mar. 2024 - May. 2024**

Advisor: Dr. Tianlong Chen, Computer Science, The University of North Carolina at Chapel Hill

- Developed an efficient fine-tuning system for time series foundation models (EFT-TSFM) to achieve parameter-efficiency, and memory-efficiency.
- Decomposed network weight update space to enable parameter-efficient fine-tuning of FMs on the target application via low rank decomposition.
- Utilized zero-order optimization substantially reduces the memory consumption constant even with longer the sequence length.

Group leader, **Research on Pre-training Consistency Model of Data Augmentation, National Innovation Project**   **May. 2023 - Present**

Advisor: Prof. Ou Wu, Center of Applied Mathematics of Tianjin University

- Organized two members to conduct this national project

- Solved PF ODE equitation by consistency model, conducted comprehensive pre-training ideas to optimize the robustness of the model
- Enhanced data augmentation by employing the optimized consistency model and producing immense realistic data including image

SELECTED AWARDS

•	***Trio-Excellent Student Award,*** Tianjin University	**Oct. 2023**
•	***Honor Award,*** US Mathematical Contest In Modeling in 2023	**May. 2023**
•	***Star of Hope Scholarship***, Tianjin University	**May. 2023**
•	***Scholarship of Outstanding Student Cadre,*** Tianjin University	**Feb. 2023**
•	***"Beiyang Qihang" Independent Award,*** Tianjin University	**Sep. 2021**

SKILLS

- **Computer programming:** Python (Proficient), MATLAB (Proficient)
- **Deep learning skills:** PyTorch (Proficient)

OTHERS

- **Mathematics proficiency:** Strong foundation in mathematics major courses with outstanding grades
- **Computer proficiency:** *Programming Languages* (92), *Data Structures* (94), *Algorithm Design and Analysis* (95), *Machine Learning* (95)
- **English proficiency:** TOEFL (102)
- **Hobbies:** Film & Photo Photography, Coffee Extraction, Mixing & Mastering Music