Xiaodong Tan

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EDUCATION

• **China University of Petroleum (East China)**   *Sep 2022 - Jun 2025 (Expected)*
Computer Science and Technology   Master of Science   Qingdao, China
  ◦ GPA: 3.95/4.0 (91.87/100)   Ranking: 1/44

• **Shandong University of Science and Technology**   *Sep 2018 - Jun 2022*
Computer Science and Technology   Bachelor of Engineering   Qingdao, China
  ◦ GPA: 3.74/4.0 (90.35/100)   Ranking: 6/175

PATENTS AND PUBLICATIONS

C=CONFERENCE, J=JOURNAL, P=PATENT, U=UNDERGOING REVIEW, *=CORRESPONDING AUTHOR

[J.1] **Xiaodong Tan**, Mingwen Shao*, Yuanjian Qiao, et al. (2024). **Low-Rank Prompt-Guided Transformer for Hyperspectral Image Denoising**. *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 62, pp. 1-15. DOI: 10.1109/TGRS.2024.3414956. (JCR Q1) [Link]

[J.2] Haonan Wang , Mingwen Shao*, **Xiaodong Tan**, et al. (2024). **Modal-aware prompt tuning with deep adaptive feature enhancement**. *Computers and Electrical Engineering*, Vol. 117, pp. 109270. DOI: 10.1016/j.compeleceng.2024.109270. (JCR Q1) [Link]

[J.3] Tiyao Liu, Shudong Wang, Yawu Zhao, **Xiaodong Tan**, et al. (2025). **MWMF-GLRW: Using Smart Model to Accurately Predict Noncoding RNA Interactions for Healthy Consumption**. *IEEE Transactions on Consumer Electronics.* DOI: 10.1109/TCE.2025.3526783. (JCR Q1) [Link]

[C.1] Yuanjian Qiao, Mingwen Shao*, **Xiaodong Tan**, et al. (2024). **Uncertainty-aware Diffusion model for Real-world Image Dehazing**. In proceedings of *International Conference on Machine Learning and Cybernetics*, September 2024, Miyazaki, Japan. [Link]

[P.1] Shudong Wang, Tiyao Liu, **Xiaodong Tan**, et al. (2023). **A method for predicting microbe-disease interactions based on a matrix decomposition algorithm**. Patent No. CN117954128A. Registration Date: 2023.12.04, Publication Date: 2024.04.30.

[U.1] Mingwen Shao[†], **Xiaodong Tan**[*†], Kai Shang, et al. (2024). ([†]: Co-first author.) **A Hybrid Model of State Space Model and Attention for Hyperspectral Image Denoising**. Undergoing review in *IEEE Transactions on Geoscience and Remote Sensing*. [Link]

[U.2] Tiyao Liu, Shudong Wang, Yuanyuan Zhang, Chuanru Ren, Yunyin Li, **Xiaodong Tan**, et al (2024). **Predicting small molecule-miRNA associations using matrix enhancement and collaborative double matrix completion**. Undergoing review in *Biomedical Signal Processing and Control.* [Link]

[U.3] Tiyao Liu, Shudong Wang, Shanchen Pang and **Xiaodong Tan**. (2024). **Truncated Arctangent Rank Minimization and Double-strategy Neighborhood Constraint Graph Inference for Drug-Disease Association prediction**. Undergoing review in *Journal of Biomedical Informatics*. [Link]

PROJECTS

• **Data Driven Approaches for Hyperspectral Images Denoising**   *Apr 2023 - Apr 2024*
Core Member
  ◦ Developed data driven denoising approaches for hyperspectral images based on deep learning
  ◦ Utilized the formal consistency between self-similarity and self-attention; adjusted features of self-attention output by low-rank modeling; increased the scope of self-similarity modeling through pixel interactions in horizontal-vertical cross-windows
  ◦ Exploited State Space Model to reduce GPU memory consumption while expanding self-similarity modeling; designed shift 3D window attention to complement local similarity modeling
  ◦ Accomplished two papers based on the results

• **In-vehicle Infrared Image Enhancement Solution under Bad Weather and Arbitrary Scale Super-Resolution**
Core Member   *Jun 2023 - May 2024*
  ◦ Found that infrared camera equipment in rainy and hazy weather suffered from degradation such as noise, blurring, and loss of contrast, which inhibited visualization and downstream tasks performance
  ◦ Collected paired infrared-RGB normal images using a dual-vision device
  ◦ Designed a degradation simulation process which involves multilevel Gaussian noise, strip noise and blurring, and a well-established depth estimation model to estimate depth in the RGB images for Atmospheric Scattering Modeling (ASM) of haze degradation

- Downsampled degraded infrared images to form a paired dataset with the original images, and then trained a large network (SwinIR) on the dataset to guarantee a better visual performance
- Designed a small network based on the computational capacity of the development platform and used knowledge distillation with the output generated by the large network
- Processed the image iteratively and used bilinear interpolation between the two super-resolution operations to achieve arbitrary scale super-resolution
- Designed efficient network models and deployed on the development platform with 2 TFLOPs computing capacity

- **Association Prediction for Bioinformatics** *Dec 2023 - Present*
  Coding Member
  - Developed association prediction algorithms for small molecule-RNA, RNA-disease and microbe-disease
  - Responsible for the code implementation of the matrix complementation algorithm based on low-rank factorization
  - Accomplished one patent and three papers based on the results

- **Tire X-Ray Image Defect Detection** *Jan 2022 - Apr 2022*
  Thesis for Bachelor Degree
  - Collected and manually annotateed the dataset
  - Improved the translation invariance of CNN by placing Gaussian blur kernel in the pooling layer to offset aliasing effect, which can lead to more robust detection of defects of similar patterns in different locations
  - Added Gabor Convolutional Kernel to makes CNN more sensitive to the defects with directional properties

RESEARCH EXPERIENCE

- **Co-Investigator, Innovation Team of Computer Vision and Intelligent Perception**
  Supervised by Prof. Mingwen Shao Aug 2022 - Present
  - Carried on the research on the integrated recovery method for degraded images under various severe weather conditions
  - Explored how various weather conditions affected image quality; introduced specific distortions (blurring, noise, color distortion, etc.) to simulate images under each type of weather, such as rain or fog; investigated existing methods for image recovery and their limitations under different weather scenarios
  - Developed an integrated recovery method that can handle multiple types of weather-related degradation; used deep learning models or traditional methods for image restoration; combined different recovery techniques (e.g., de-raining, dehazing) into a unified framework
  - Developed efficient denoising algorithms for remote sensing hyperspectral images
  - Accomplished two papers based on the results

- **Lab Computional Cluster Manager, Innovation Team of Computer Vision and Intelligent Perception**
  Supervised by Prof. Mingwen Shao Aug 2022 - Present
  - Responsible for training team members on server usage and answering questions
  - Engaged in routine hardware and software maintenance of servers

SERVICE

- **Biomedical Signal Processing and Control**
  Journal Reviewer

SELECTED HONORS AND AWARDS

- **The 12th National Chinese Mathematics Competitions (CMC)** *Dec 2020*
  Chinese Mathematical Society
  - National First Prize
  - A solid foundation of analytical math skills

- **The 10th China Software Cup** *Aug 2021*
  Ministry of Education, Ministry of Industry and Information Technology
  - National Third Prize
  - Implemented and compared time series forecasting models such as ARIMA and LSTM to forecast future data
  - Complete documentation generation system for automated data analysis reports

- **National Scholarship (Top 2%)** *Nov 2024*
  China University of Petroleum (East China)
- **Extraordinary Postgraduate Student (Top 10%)** *Oct 2023*
  China University of Petroleum (East China)
- **First-class Scholarship (Top 10%)** *Jun 2024*
  China University of Petroleum (East China)
- **First-class Scholarship (Top 5%, 3 times)** *Dec 2020*
  Shandong University of Science and Technology

SKILLS & HOBBIES

- **Programming Languages:** Python, C&C++
- **Machine Learning:** PyTorch, Numpy, Pandas, Scikit-learn