Wanjun Ning

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Education

University of Texas 2023.08 – **2027.05**
Statistics and Data Science Track Ph.D. Department of Mathematics Arlington, USA

- **Principal supervisor**: Prof. Wang, Li
- **Co-supervisor**: Prof. Li, Rencang

Hong Kong Baptist University 2021.01 – 2023.06
Probability and Mathematical Statistics
Master of Philosophy, Faculty of Science and Technology Hong Kong

- **Principal supervisor**: Prof. Tong, Tiejun
- **Co-supervisor**: Prof. Wu, Jingjin
- **Graduation Thesis**: Analysis and Optimization of User Association in Wireless Networks

Hong Kong Baptist University 2016.09 – 2020.06
Financial Mathematics
Bachelor of Science (Honours), Faculty of Science and Technology Hong Kong

Research Interests

My research focuses on building scalable and efficient machine learning systems for high-dimensional, multimodal data under real-world constraints. I develop methods that integrate computational efficiency, robustness, and interpretability—including graph-regularized sparse learning, multimodal fusion across time series, spectra, text, and images, and attention-based neural networks for feature selection. Ultimately, I aim to design deployable, structure-aware models that advance domain applications and generalize to broader AI systems demanding resource-efficient, trustworthy, and adaptive learning.

Key Words: Multi-Modal Deep Learning; Optimization for ML; Applied Data Science (recommender systems with multimodal fusion, search/ranking feature selection, low-latency embeddings)

Publication

W. Ning, F. Saeed, H. Tang, H. Liu, and L. Wang. "Bridging Neural and Hemodynamic Pathways through EEG–bbNIRS Fusion for Early Alzheimer's Disease Classification." Under review, 2026.
Z. Xu, W. Tian, Y. Liu, **W. Ning** and J. Wu, "A Ring Topology-Based Communication-Efficient Scheme for D2D Wireless Federated Learning," *In 2023 IEEE Global Communications Conference*, 2023, pp. 2820-2825.

W. Ning, Z. Xu, J. Wu and T. Tong, "Sequence Q-Learning Algorithm for Optimal Mobility-Aware User Association," *In 2022 IEEE International Conference on Communications (ICC)*, 2022, pp. 726-732.

Skills

- Python, MATLAB, C++, R, EViews
- LaTeX, Markdown, Microsoft Word, Excel, PowerPoint

Research Experiences

Research Assistant 2024.02 – now
University of Texas Arlington, USA

- **Adaptive Multimodal Fusion Network for Hybrid EEG–bbNIRS Alzheimer's Screening**
  - Built a multimodal fusion framework integrating EEG and bbNIRS signals for early Alzheimer's screening.
  - Stabilized training with targeted augmentations, adaptive regularization, and learning-rate scheduling.
  - Analyzed modality contributions, highlighting complementary temporal and metabolic information.
  - **Performance:** Achieved 7-12% improvement in AUC over unimodal baselines with robust cross-validation.

- **Graph-Regularized Sparse Principal Component Analysis**
  - Proposed a unified framework that performs unsupervised dimensionality reduction, interpretable feature selection, and adaptive graph structure learning.
  - Formulated a joint optimization with $\ell_{2,1}$-norm sparsity and data-driven graph similarity; especially introduced graph ensembles to capture heterogeneous structures.
  - Designed efficient alternating minimization with closed-form updates and convergence guarantees.
  - **Performance:** Produced interpretable feature subsets with 3x faster runtime and stronger clustering or classification accuracy on high-dimensional datasets compared to existing methods.
- **Unrolled Attention-Based Neural Network for Efficient Unsupervised Feature Selection**
  - Modified attention-based neural networks with unrolling and new regularization strategies to improve feature selection in high-dimensional settings.
  - Integrated feature selection with dimensionality reduction across imaging and tabular biomarkers, validated by clinical experts for plausibility.
  - Improved stability and calibration via task-specific objectives and hyperparameter tuning.
  - **Performance:** Achieved 2.5x faster convergence and reduced computation cost compared to baseline feature selection methods, while preserving interpretability.

Research Assistant 2020.06 – 2020.12
Beijing Normal-Hong Kong Baptist University Zhuhai, China

- Investigated energy efficiency and Quality of Service (QoS) trade-offs in cellular networks by modeling Base Stations (BSs) as processor-sharing queues with vacations.
- Developed and analyzed three BS sleep schemes: isolated, cooperative, and hybrid.
- Proposed a scalable analytical method to evaluate QoS metrics and power consumption.
- Validated performance through simulations and experiments under diverse network conditions.
- Skills: MATLAB, Queueing Theory, Network Optimization, Power Efficiency, Simulation.

Business Analysis Intern 2019.06 – 2019.08
China Capital Management Company Beijing, China

- Analyzed a biotech’s Phase III oncology asset, synthesizing trial outcomes, market potential, competitive landscape, and strategic implications to inform go-to-market and investment decisions.
- Assessed drug efficacy and safety through clinical data, regulatory submissions, and scientific literature.
- Modeled market share and revenue projections based on disease prevalence and competitor analysis.
- Assisted project manager in presenting key findings and strategic recommendations to senior management.
- Skills: R Programming, Data Analysis, Market Research, Financial Modeling, Pharmaceutical Industry

Awards

Mathematics Academic Excellence Fund 2026
Student Travel Award, NSF-CBMS 2026 (Ypsilanti, MI) 2026.05
Student Travel Award, CBMS AMML 2025 (Houston, TX) 2025.12
Dr. Chien-Pai Han Memorial Scholarship 2025
Benny M. McCarley Scholarship 2024
Graduate Research Assistantship/Graduate Teaching Assistantship 2023.08 – now
Graduate Full Scholarship 2021.01 – 2022.12
University Merit Scholarship 2020
The American Mathematical Contest in Modelling (Honourable Mention) 2018

Professional Activity

Fusing EEG and bbNIRS for Alzheimer’s disease classification via data augmentation
Poster Presentation —AI for Biology & Medicine Symposium, University of North Texas 2025.10
Poster Presentation —CBMS AMML, University of Houston 2025.12
Recent Advances at the Interface of Applied Mathematics and Machine Learning
Invited Talk —Department of Mathematics, Hong Kong Baptist University 2025.06
Graph-Regularized Sparse Projections for Unsupervised DR and Adaptive Graph Learning
Poster Presentation —Discover 2025 Student Research Symposium 2025.04
Gene Classification with an OCCA-based Unsupervised Feature Selection Framework
Invited Paper Presentation —2024 International Chinese Statistical Association (ICSA) 2024.06