Zishan Shao
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Education

Duke University, Durham, NC
M.S. in Statistics, Aug 2026

Wake Forest University, Winston-Salem, NC
B.S. in Computer Science (honored), May 2024
B.S. in Statistics, May 2024
Specialization: High-Performance Computing & Machine Learning
Dissertation: "Communication Avoiding Coordinate Descent Methods On Kernel And Regularized Linear Models"
Advisor: Dr. Aditya Devarakonda
GPA: 3.97 Summa Cum Laude

Research Interests

- Statistical & Machine Learning
- Communication-Efficient Algorithms
- High-Performance Computing
- Numerical Methods

Related Courseworks

Multivariable Calculus (MST 113), Discrete Mathematics (MST 117), Linear Algebra I (MST 121), Fundamentals of Computer Science (CSC 112), Data Structures & Algorithms I (CSC 201), Computer Systems I (CSC 250), Computer Systems II (CSC 251), Programming Languages (CSC 231), Probability (STA310), Introduction to Statistical Learning (STA 363), Multivariate Statistics (STA 362), Computer Vision (CSC 391), Statistical Inference (STA 311), Linear Models (STA 312), Algorithm Design and Analysis (CSC 301), Network Analysis (STA 352), Time Series Forecasting (STA 368)

Research Experience

Undergraduate Researcher, Department of Computer Science, Wake Forest University *Spring 2022 – Fall 2023*
Advisor: Dr. Aditya Devarakonda

- Led the development of communication-avoiding algorithms for Coordinate Descent algorithm variants in solving constrained convex problems (kernel ridge regression, support vector machine etc.), enhancing parallel computations via s-step optimization.
- Developed parallel computing applications using C and OpenMPI on high-performance clusters, optimizing computational efficiency.
- Conduct sparsity analysis and matrix operations with sparseblas and MKL, and executed model training using libsvm for improved dataset processing.

Undergraduate Researcher, Department of Computer Science, Wake Forest University *Spring 2022 – Present*
Advisor: Dr. Victor P. Pauca

- Conducted computer vision research for palm tree detection using Histogram of Gradients, SIFT filters, and SVM on orthomosaic plots from the Ecuadorian Rain Forest. Applied advanced deep learning methods like ResNet and Faster-R-CNN for object segmentation and classification.
- Utilized Python and libraries such as OpenCV, Scikit-image, and Scikit-learn for comprehensive image data processing and analysis.
- Assessed model performance using visualization tools like Seaborn and OpenCV; implemented statistical metrics including ROC, AUC curves, confusion matrix, and conducted sensitivity, specificity, and hyperparameter tuning.

Publications and Presentations

- 1st Author. Communication-Avoiding Dual Coordinate Descent Methods for Kernelized Machine Learning. *In-submission to 2024 International Conference on Parallel Processing (ICPP' 24)*.
- 2nd Author. PalmHeatNet: A Probabilistic Approach to Understanding Palm Distributions in Ecuadorian Tropical Forest via Transfer Learning. *Accepted to 2024 ACM-Southeast (ACM-SE' 24)*.

Laboratory and Computer Skills

- **Proficient:** Python, C, Java, R, pandas, numpy, scikit-learn, tensorflow, keras, seaborn, opencv.
- **Extensive project experience:** Exploratory Data Analysis (EDA), Unsupervised Learning (Clustering, Principal Component Analysis, P-norms), Missing Value Handling (Imputation, Complete Case Analysis), using tools such as Matlab, OpenMPI, cblas, mkl_lapacke, sparseblas.
- **Experienced with:** SQL, Dynamic Modeling, Linux, HTML, CSS, JavaScript, Excel.
- GitHub account: `https://github.com/Zishan-Shao`

Professional Memberships

- Phi Beta Kappa Honorary Society – Member.
- Upsilon Pi Epsilon Honorary Society – Member.

Honors

- 2022 COMAP's Interdisciplinary Contest in Modeling (ICM) – ***Meritorious Winner***
- Dean's List Scholar
- 2023 Wake Forest Research Fellowship (WFRF) – Awarded $4,000.
- George Washington Greene Scholarship – $350, awarded to one of seven recipients with either a 4.0 average or an average extremely close to 4.0.
- Upsilon Pi Epsilon Scholarship Nomination – Awarded $1,000.

Activities

Center for Learning, Access, and Student Success (CLASS)

Peer Tutor (Paid) **Winston-Salem, NC**

Oct. 14th, 2021 – Dec. 10th, 2023

- Provided on-site peer tutoring in computer science for the Center for Learning, Advising, and Student Success (CLASS) at Wake Forest University.