Yong Zhuang

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Research Interests

Artificial Intelligence, Machine Learning, Big Data Analysis, Feature Selection on Big Data, Spatio-temporal Data Analysis, Time Series Prediction

Education

University of Massachusetts Boston, Boston, MA

Ph.D., Computer Science — Sep. 2016 - Dec. 2021

M.S., Computer Science — Sep. 2014 - Aug. 2016

Harbin Engineering University, Harbin, China

B.E., Computer Science — Sep. 2001 - Jul. 2005

Work Experiences

Grand Valley State University - College of Computing — Allendale, MI
Assistant Professor of Computer Science (Tenure-track) — 2023 — Present

University of Massachusetts Amherst — Amherst, MA
Research Fellow — Summer 2023

Constant Contact — Waltham, MA
Senior Machine Learning Engineer — 2022 - 2023

University of Massachusetts Boston — Boston, MA
Visiting Research Scientist — Summer 2022

University of Massachusetts Boston — Boston, MA
Research & Teaching Assistant — 2015 - 2021

Radial Analytics — Concord, MA
Machine Learning Researcher, NSF Intern — 2019

Selected Research Experiences

Feature Selection on Big Spatio-temporal Data

Given a large-scale Spatio-temporal database, effectively and efficiently identifying strongly related features and removing the irrelevant or less important features with respect to a target variable is a critical and challenging issue in many fields. In this work, I collaborated with scientists in climate science and water diplomacy at Tufts University to design a multi-Markov-blankets-based ensemble model "Galaxy" to identify precursors to heavy precipitation event clusters. "Galaxy" identified the cold surges along the coast of Asia as an essential precursor to the surface weather over the United States, which was confirmed by climate experts.

Deep Learning on Big Spatio-temporal Data

As the number, volume, and resolution of spatio-temporal datasets increase rapidly, Spatio-temporal dependencies of features become highly complex and hard to capture. With its strong hierarchical feature learning capabilities in both the spatial and temporal domains, deep learning has emerged as a promising method to address this challenge. In this study, I collaborated with scientists in the School of Criminology and Justice Studies at UMass Lowell to integrate Convolutional Neural Networks and Recurrent Neural Networks to capture latent spatio-temporal features for predicting crime hotspots, resulting in a 21% improvement in F1-score.

Predicting the Long-Term Behavior of Chaotic Systems
Chaotic behavior is present in many nonlinear dynamical systems, including climate dynamics, weather prediction, and the Spatio-temporal dynamics of virus spread. To provide a reliable solution for these systems, it is necessary to handle their complex Spatio-temporal dynamics and their sensitive dependence on initial conditions. In this study, I collaborated with a research team at Tufts University to propose the Lyapunov Horizon loss, which measures how the error divergence of a forecasting sequence evolves in a chaotic system. We optimized this loss function using a new approach called "Horizon Forcing" on a recurrent "tower" architecture known as "Error Trajectory Tracing." This approach improves the predictive range of sequences in chaotic systems by over 20%.

Teaching Experience

At Grand Valley State University

CIS 635: Knowledge Discovery and Data Mining	2023, 2024, 2025
CIS 371: Web Application Programming	2023, 2024, 2025

At UMass Boston

CS Seminar (Instructor)	Fall 2017, Spring, Summer, and Fall 2018
CS187: Science Gateway Seminar (Mentor)	Spring 2017
CS110: Introduction to Computing (Teaching Assistant)	Fall 2021
CS670: Artificial intelligence (Teaching Assistant)	Fall 2017, Spring 2019
CS697: Big data analysis (Teaching Assistant)	Fall 2016, Spring 2018

Grant Writing Experience

Have experience writing federal agency grants projects with my advisor,
Total Amount: $355,581

Selected Peer Reviewed Publications

1. Munmi Thakuria, **Yong Zhuang**. "Deep Learning Models for Diabetic Retinopathy Detection: A Comparative Study"
   Workshop on Big Data and AI for Healthcare at IEEE Big Data 2024 Conference, Washington DC, Dec, 2024
2. **Yong Zhuang**, Matthew Almeida, Wei Ding, Patrick Flynn, Shafiqul Islam, Zihan Li, and Ping Chen. "Horizon Forcing: Improving the Recurrent Forecasting of Chaotic Systems"
   Transactions on Intelligent Systems and Technology (TIST)
3. **Yong Zhuang**, David Small, Patrick Flynn, Wahid Palash, Shafiqul Islam, Ping Chen, Wei Ding. "CASTLE: A Cascaded Spatio-Temporal Approach for Long-lead Streamflow Forecasting"
   IEEE International Conference on Big Data (IEEE BigData 2023), Sorrento, Italy, Dec, 2023
4. **Yong Zhuang**, Matthew Almeida, Wei Ding, Patrick Flynn, Shafiqul Islam, and Ping Chen. "Widening the Time Horizon: Predicting the Long-Term Behavior of Chaotic Systems."
   The IEEE International Conference on Data Mining (ICDM), Orlando, Florida, Nov. 2022
5. **Yong Zhuang**, David Small, Xin Shu, Kui Yu, Shafiqul Islam, and Wei Ding. "Galaxy: Towards Scalable and Interpretable Explanation on High-dimensional and Spatio-Temporal Correlated Climate Data"
   IEEE International Conference on Big Knowledge (ICBK), Singapore, Nov. 2018
6. **Yong Zhuang**, Matthew Almeida, Melissa Morabito, and Wei Ding. "Crime Hot Spot Forecasting: A Recurrent model with Spatial and Temporal Information"
   IEEE International Conference on Big Knowledge (ICBK), Hefei, China, Aug. 2017

7. **Yong Zhuang**, Kui Yu, Dawei Wang, and Wei Ding. "An evaluation of big data analytics in feature selection for long-lead extreme floods forecasting"
   IEEE International Conference on Networking, Sensing, and Control (ICNSC), Mexico City, Mexico, Apr. 2016

8. **Yong Zhuang**, and Wei Ding. "Long-lead prediction of extreme precipitation cluster via a spatio-temporal convolutional neural network"
   International Workshop on Climate Informatics(CI), Boulder, Colorado, Oct. 2016

9. Matthew Almeida, **Yong Zhuang**, Wei Ding, Scott Crouter, and Ping Chen. "Mitigating Class-Boundary Label Uncertainty to Reduce Both Model Bias and Variance"
   ACM Transactions on Knowledge Discovery from Data(TKDD) 15.2 (2021): 1-18

Industry Experience

Senior Machine Learning Engineer Aug. 2022 - Apr. 2023
Constant Contact *Waltham, MA*
Used Python, and AWS to build a machine learning system to estimate customer lifetime value (CLV) to help marketing teams develop marketing strategies.

- Conducted RFM analysis on eCommerce data to estimate future purchases and the average purchase value of customers..
- Developed and evaluated CLV using machine learning and statistical modeling techniques on RFM analysis results.
- Segmented customers based on CLV to support more personalized and effective marketing strategies.

Research Scientist, National Science Foundation Intern Jun. 2019 - Nov. 2019
Radial Analytics *Concord, MA*
Used Python, Tensorflow, and AWS to design a machine learning system to help hospital systems and physician networks provide patients with more effective care to meet their individual needs.

- Built a machine learning pipeline leveraging NLP and causal-based feature selection to identify key health indicators.
- Developed deep neural networks to categorize patients by health levels, improving prediction accuracy by 17%.
- Employed model and feature selection to determine the optimal predictive solutions for patient outcome assessments.

Lead Software Engineer Mar. 2008 - Mar. 2013
Liaoning Triexcel Co., Ltd. *Anshan, China*
Led multi-disciplinary teams in developing robust software solutions across several key industries, driving innovation and enhancing operational efficiency.

- Spearheaded the development of a GIS-based Geological Hazard Management System (GHMS) that optimized risk assessment, data collection, and investigation planning for geological hazards.
- Led front- and backend development teams to create an after-sales service management platform, improving the efficiency of after-sales processes and enhancing customer satisfaction by automating workflows and reducing service response times.
- Directed the design and deployment of a secure remote control system for banking terminals, enabling seamless web-based management and system updates for the Bank of Anshan.

Mentoring

Graduate Students

- Laxmi Sowjanya Doddi, GVSU 2025
- Nathan Katzman, GVSU 2025
- Jyotshna Nallabothula, GVSU 2025

- Brahmaiah Boyalla, GVSU 2025
- Bharath Reddy Jakkidi, GVSU 2025
- Rama Brahmam Botla, GVSU 2024
- Vinod Kumar Bodeppagari, GVSU 2024
- Zhen Lu, GVSU 2024
- Venkateswarlu Ravulapalli, GVSU 2024
- Sri Ram Charan Thummala, GVSU 2024

Undergraduate and Pre-College Students

- John Cambi, Undergraduate at UMass Amherst 2023
- Everest Yang, Pre-college student at UMass Boston 2022
- Charlotte Yang, Pre-college student at UMass Boston 2020

Professional Services

Grant Proposal/Fellowship Review

- National Science Foundation Reviewer and Panelist 2022, 2024

Chair / Co-Chair

- Student Travel Award Co-Chair (ICDM). 2025
- Student Travel Award Co-Chair (IEEE BigData). 2024
- Program Chair (IEEE BigData Workshop on Big Data and AI for Healthcare). 2024

Program Committee Member

- SIGKDD Conference on Knowledge Discovery and Data Mining (KDD) 2022
- SIAM International Conference on Data Mining (SDM), 2022
- AAAI Conference on Artificial Intelligenceg (AAAI), 2021, 2022
- Conference on Information and Knowledge Management (CIKM), 2019, 2023, 2024
- The Technical Symposium on Computer Science Education (SIGCSE TS) 2024
- IEEE International Conference on Big Data (IEEE BigData 2024) 2024

Reviewer for Journal Manuscript Submissions

- Knowledge and Information Systems (KAIS), 2015 - 2017, 2023
- Journal of Big Data, 2023
- Transactions on Intelligent Systems and Technology (TIST), 2023

Reviewer for Conference Manuscript Submissions

- SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), 2021
- Conference on Information and Knowledge Management (CIKM), 2020

University Services

The College of Science and Mathematics(CSM) Faculty Senate

Assistant UMass Boston, Fall 2016

- Design a web application for CSM faculties to manage meeting agendas and minutes, proposals, and documents.

AI Association

Co-organizer UMass Boston, Fall 2019

- Hold talks, seminars, workshops, and fun activities in AI.
- Web page: https://ai-umb.github.io/

Tech-writing Seminar

Organizer UMass Boston, Fall 2021

- A seminar where students share good sentences from essays or articles, practice, and improve scientific writing skills.
- Web page: https://yong-zhuang.github.io/tech-writing

Activities

Summer Engineering Institute(SENGI)

Core Member & Instructor Amherst, MA, Jul 2023

- Showcased the intriguing world of Brain-Machine Interfaces, providing insight into the fundamentals of mind reading and mind control technologies to pre-college students.
- Utilized Manipulatives Kits for a hands-on learning experience, facilitating students to practically explore and comprehend human muscle control mechanisms.
- Stimulated intellectual discussions on potential future ramifications and opportunities associated with breakthrough technologies like Brain-Machine Interfaces.

Tech Savvy
Core Member & Instructor — Boston, MA, Jun 2016, 2017
- Worked with Boston University, Harvard, MIT, etc. to organize a one-week Tech-Savvy camp to prompt STEM education among Boston intermediate school students.
- Organized interactive games and lectures to stimulate interest in machine learning among high school girls.

Microsoft's AI for Earth Summit
Member — Redmond, WA, Oct 2016

The Eighth Annual "Science Engineering Technology in the CITY"
instructor — Boston, MA, Apr 2016
- Give two demonstrations, "Image Printing" (a program that allows computers to copy paintings) and "Style Transfer" (a program that can convert photos into paintings)

Honors

Honors and Awards
- Oracle Doctoral Research Fellowship Award from the Collage of Science and Mathematics at UMass Boston, Jun. 2016, 2018
- The Randall Gates Malbone Fellowship in Mathematics and Computer Science, May 2019
- National Science Foundation (NSF) Graduate Research Internship Program, Jun. 2019
- Microsoft's AI for Earth summit Travel Grant, Redmond, WA, Sep., 2018
- Climate Informatics Workshop Travel Grant, Boulder, Colorado, Aug. 2016

Technical Skills

- **Language:** Python, MATLAB, R, C#, Java, PHP, JavaScript, TypeScript, HTML, CSS, SQL, ASP.NET
- **Machine Learning Libraries:**, Tensorflow, Keras, Pytorch, Matplotlib, Pandas, Numpy, scikit-learn, seaborn
- **Database:** Oracle, Access, Microsoft SQL Server, MySQL
- **ArcGIS:** Map, Server, SDE and Desktop
- **Developer Tools:** Git, Docker, AWS, VS Code
- **Advanced Skills** OOP, Design Patterns, MVC, Jquery, AJAX, Vue.js