Zhelin Sheng

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Education

University of Rochester	Rochester, NY
B.S. in Applied Mathematics, B.A. in Computer Science	Aug 2020 – May 2024

- GPA: 3.88

Research and teaching experience

VC-dimension and neural networks   Sept 2021 – 2022

University of Rochester, Math department   Rochester, NY

- Assisted in the development of a new tool, discrete s-energy that identifies the salient underlying fractal features of the data set.
- Implemented the new tool outperforming PCA in accessing fractional dimensional phenomena in large data sets with Python.

Neural networks, approximation, and geometric measure theory   2022 – 2023

University of Rochester, Data Science department, NSF Tripods REU/STEM for All   Rochester, NY

- Applied neural network models on recognizing fractal behavior.
- Provided a deliberate construction of n-dimensional cantor sets which can be reduced to dimension one, with code implementation on testing the neural network's ability to retrieve the original data.
- Explored several quantities that potentially determine the quality of neural network's prediction on time series data.

Fractal structures in large data sets   2023 – Present

University of Rochester, Data Science department, NSF Tripods REU/STEM for All   Rochester, NY

- Extended and validated the discrete s-energy's function in identifying the data sets' complexity, which is associated with the neural network models' accuracy in forecasting.

Project Advisor   June 2023 – Present

Project Advisor at Nanjing Forestry University   China

- Provided technical support for COVID-19 epidemic trend Prediction models.
- Analyzed the one-on-one relationship among energy consumption, carbon emissions, GDP, and forest cover rate in China with both OLS-based and LSTM-based Deep Learning models.

Teaching Assistant   Aug 2022 – Dec 2022

University of Rochester, CS department. CSC242, Artificial Intelligence   Rochester, NY

- Assisted in teaching data structures and algorithms (adversarial search, Bayesian network, multilayer perceptron) in Java.

Schwartz Discover Scholar Showcase   Oct 2023

poster fair for University of Rochester 2023 Schwartz Discover scholars   Rochester, NY

- Presented the joint summer research group works with the poster entitled "A Novel Approach for Assessing the Predictability of Time-Series."

Research Paper and Preprints

Mengmeng Kong, Huilian Xu, Qurban Ali, Hairong Jing, **Zhelin Sheng**, Fuli Wang, Lixin Zhang, and Yu Shen. "Epidemic Prediction and Analysis of Novel Coronavirus Pneumonia COVID-19." Submitted to Journal of Global Antimicrobial Resistance (2023).

Livia Betti, Ivan Chio, Julie Fleischman, Alex Iosevich, Filippo Iulianelli, Scott Kirila, Michele Martino, Azita Mayeli, Svetlana Pack, **Zhelin Sheng**, Conor Taliancic, Andrew M. Thomas, Nathan Whybra, Emmett Wyman, Ustun Yildirim, and Kaiyuan Zhao. "Fractal dimension, approximation, and data sets." Submitted to CANT 2022 conference proceedings. arXiv:2209.12079 (2022).

Awards and Honors

Dean's List
University of Rochester   2021 – 2023
SOUTHBURY MIDDLEBURY SCHOLARSHIP
SMSF grants, $3000 per year   2020 & 2022

Conference and Seminars attended

ag-conference Topics in microlocal analysis, harmonic analysis, and inverse problems, August 15-17, 2022

Skills

Programming Languages: Python, Java, R, Kotlin, JavaScript, HTML/CSS, PHP
Tools and Framework: LaTeX, Tensorflow, Pytorch

Sample course work

Including ongoing course: Discrete Mathematics, The Mathematical Experience (Putnam competition training course), Intro to Probability, Numerical Analysis, Intro to Complex Var With App (Complex Analysis), Functions of Real Variable (Real Analysis),
Combinatorial Analysis, Honors sequence Math: Honors Calculus I, II, III and IV,
Data Structures & Algorithms, Artificial Intelligence, Machine Learning, Computer Models of Perception & Cognition, Design & Analysis Efficient Algorithms.