Yan HUANG

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RESEARCH INTERESTS

Numerical PDE, Machine Learning in Scientific Computing, Data-driven Modeling.

EDUCATION

Southern University of Science and Technology (SUSTech), Shenzhen, China
B.S. Mathematics and Applied Mathematics, with Honor — Expected Jun. 2023

SELECTED COURSES

- **Undergraduate Courses**: Mathematical Analysis, Complex Analysis, Real Analysis, Functional Analysis, ODE, PDE; Linear Algebra, Abstract Algebra, Elementary Number Theory; Topology, Differential Geometry; Mathematical Statistics; Probability Theory, Applied Stochastic Processes; Operations Research, Introduction to Theoretical and Practical Data Science, Numerical Analysis, Numerical Solutions of PDE
- **Graduate Courses**: Advanced Probability Theory, Algorithms for Convex Optimization, PDE, Methods of Applied Math, Computational Fluid Dynamics and Deep Learning (auditor)

FELLOWSHIPS & AWARDS

- *First Class Award* of the Chinese Undergraduate Mathematics Competitions in Guangdong Province division — Nov. 2021
- *SUSTech Second Class Scholarship for Outstanding Students* — Sept. 2021
- *Successful Participant in Mathematical Contest in Modeling* — Feb. 2021
- *SUSTech Third Class Scholarship for Outstanding Students* — Sept. 2020
- *SUSTech Freshman Scholarship* — Nov. 2019

TEACHING EXPERIENCE

- Department of Mathematics, SUSTech — Feb. - Jun. 2022
  Held office hours to help with student homework and quiz for Differential Geometry.

ACADEMIC EXPERIENCE

Acceleration of Variable Frequency Fourier Transform Jul. 2022 - Present

- Joined in Prof. Zhen Zhang's group in the department of mathematics at SUSTech to complete research on the acceleration of variable frequency Fourier transform.
- Accomplished a part of theoretical deduction and Python (MATLAB) programs of the acceleration algorithm; achieved a faster performance than the baseline algorithm.

Programming Project of Diagnosing and Forecasting Beijing PM2.5 May. 2022

- Wrote a Python program to diagnose and forecast Beijing pm2.5 data.
- Preprocessed the hourly data between 2010 and 2014, used XGBoost to fit the training data, and achieved $R^2 = 0.71$ on the test data; did feature selection and dimension reduction; classified the pm2.5 data into three classes. Completed a 50-page slide and successfully passed the defense.

Prediction of Decomposition Rates and Interspecific Interactions of Fungi
Feb. 2021

- Built mathematical models and wrote a MATLAB program to quantify the decomposition rates and the interspecific interactions of fungi in different climate conditions.
- Used the Gaussian curves to fit the data of hyphal extension rate of different kinds of fungi and water potential (temperature) and used the Lotka-Volterra model to quantify the fungal interspecific interactions on their hyphal length in different climate conditions; found that increasing biodiversity in the tropical rainforest can double the decomposition rate after 4 days.
- Entered the Mathematical Contest in Modeling and completed a 21-page paper.

Regarding Neural Networks as Gaussian Processes Jun. 2022

- Studied the literature on viewing infinitely wide neural networks as Gaussian processes; Completed a 7-page literature review.

Checkers Programming Project Jun. 2020

- Wrote a Java program to implement the checkers game.
- The game supports multiplayer and man-machine games. We archived game progresses, enabled built-in sound effects and other features, and designed and implemented a GUI (graphical user interface) for visualization. Presented a 10-page slide report and successfully passed the defense.

SEMINARS & CONFERENCES ATTENDED

The Symposium on Statistics and Data Science May. 2022

- Attended the symposium on statistics and data science held by the Department of Statistics and Data Science of SUSTech.
- Learned frontier research on Federated Learning, Random Forests, and Deep Learning Theory.

Neural Differential Equations Seminar Mar. - May. 2022

- Studied Patrick Kidger's thesis *On Neural Differential Equations* and other papers on data-driven and deep learning methods.
- Presented and led the discussion on Chapter 5.3 ("Numerical solvers") of *On Neural Differential Equations* at the seminar and learned to understand neural networks from ODE, CDE, and SDE; learned some data-driven and deep learning methods like PINN, DeepRitz, DeepONet, FNO, and SINDy.

Statistical Learning Seminar Jul. - Aug. 2021

- Studied Trevor Hastie et al.'s book *The Element of Statistical Learning* and Shai Shalev-Shwartz et al.'s book *Understanding Machine Learning*.
- Led the discussion on Chapter 3 ("Linear methods for regression") and learned basic PAC learning theory like VC-dimension and Rademacher Complexity.

Fourier Analysis Seminar Jul. 2021

- Studied *Fourier Analysis* by Elias M. Stein et al. and led the discussion on Chapter 3 ("Convergence of Fourier series") and Chapter 6 ("Fourier transforms of d-dimensional Euclidean spaces").

COMPUTER SKILLS

Python, MATLAB, Java, LaTeX, Microsoft Office suite