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

- *SUSTech Second Class Scholarship for Outstanding Students* — Oct. 2022
- *First Class Award* of the Chinese Undergraduate Mathematics Competitions in Guangdong Province division — Nov. 2021
- *SUSTech Second Class Scholarship for Outstanding Students* — Oct. 2021
- *SUSTech Third Class Scholarship for Outstanding Students* — Oct. 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*.
- 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.

Machine Learning for Solving and Learning Differential Equations Seminar
Feb. 2022

- Studied papers on data-driven and deep learning methods.
- Learned 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