Yan Huang

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RESEARCH INTERESTS Numerical PDE, Applied Mathematics, Machine Learning, Data-driven Modeling.

EDUCATION **Southern University of Science and Technology (SUSTech)** Shenzhen, China
B.S. Mathematics and Applied Mathematics (Honor Program) Expected Jul. 2023
GPA: 3.79/4 (90.92/100), Ranking: 4/35

SELECTED COURSES

- **Undergraduate Courses**: Mathematical Analysis (Honor), Complex Analysis (Honor), Real Analysis (Honor), Functional Analysis, ODE (Honor), PDE (Honor), Advanced Linear Algebra, Abstract Algebra (Honor), Elementary Number Theory, Topology, Differential Geometry, Probability Theory, Applied Stochastic Processes, Mathematical Statistics, 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 I, Methods of Applied Math, Computational Fluid Dynamics and Deep Learning (auditor)

SCHOLARSHIPS & AWARDS

- SUSTech Second Class Scholarship for Outstanding Students Oct. 2022
- First Class Award of the 13th National College Students Mathematics Competition in Guangdong divison Nov. 2021
- SUSTech Second Class Scholarship for Outstanding Students Oct. 2021
- SUSTech Third Class Scholarship for Outstanding Students Oct. 2020
- SUSTech Third Class Scholarship for Freshman Nov. 2019

TEACHING EXPERIENCE **Department of Mathematics, SUSTech**
- Teaching Assistant, MA327, Differential Geometry Feb. - Jun. 2022

ACADEMIC EXPERIENCE **Acceleration of Variable Frequency Fourier Transform** Jul. 2022 - Present
- Worked with Prof. Zhen Zhang at SUSTech to complete a research project on the acceleration of variable frequency Fourier transform.
- Accomplished a part of theoretical deduction, MATLAB, and Python programs of the acceleration algorithm; achieved a faster performance than the baseline algorithm; trying to add parallel computing currently.

Regarding Neural Networks as Gaussian Processes Jun. 2022
- Studied the literature *Deep Neural Networks as Gaussian Processes* and completed a 7-page literature review as a course project for *Applied Stochastic Processes*.

Numerical Solutions of Allen-Cahn Equation May. 2022
- Wrote a MATLAB program to solve the Allen-Cahn equation subject to periodic boundary conditions and the random initial value as a course project for *Numerical Solutions of PDE*.
- Used semi-implicit Euler method with a stabilized term. Got a full mark.

Diagnosing and Forecasting Beijing PM2.5   May. 2022

- Wrote a Python program to diagnose and forecast Beijing PM2.5 as a course project for *Introduction to Theoretical and Practical Data Science.*

- Preprocessed the hourly data between year 2010 and 2014, used a machine learning algorithm (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 various environments.

- Used the Lotka-Volterra model to quantify the fungal interspecific interactions on their hyphal length in various environments; 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.

Checkers Programming Project   Jun. 2020

- Wrote a Java program to implement the checkers game as a course project for *Introduction to Computer Programming A*

- 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 for visualization. Presented a 10-page slide report and successfully passed the defense.

SEMINARS ATTENDED

Neural Differential Equations   Mar. - May. 2022

- Studied Patrick Kidger's doctoral thesis *On Neural Differential Equations* and other relevant publications.

- Presented and led the discussion on Numerical Solvers for Neural Differential Equations; studied ResNet, VAE, Variational Inference, GAN, W-GAN, Neural ODE, and Neural SDE.

Machine Learning for Differential Equations   Feb. 2022

- Studied literature on data-driven and deep learning methods for differential equations, including PINN, DeepRitz, DeepONet, FNO, and SINDy.

Statistical Learning   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*.

- Presented and led the discussion on Ridge Regression and Lasso; studied PAC learning theory covering VC-dimension, Rademacher Complexity, and convergence analysis of some machine learning algorithms.

Fourier Analysis   Jul. 2021

- Studied *Fourier Analysis* by Elias M. Stein et al.

- Presented and led the discussion on the Convergence of Fourier Series and Fourier Transforms of d-dimensional Euclidean Spaces.

SKILLS

- **Computer**: Python, MATLAB, Java, LaTeX, Microsoft Office suite, Origin

- **Language**: Chinese (native), TOEFL (reading: 28, listening: 25, writing: 23, speaking: 23)