Yuan, Wenxuan

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Github | Linkedln | ResearchGate
Seeking PhD opportunities at the intersection of machine learning and physics-informed modeling, with focus on operator learning approaches and their applications to complex dynamical systems and environmental modeling.

Education Experience

Imperial College London Sep 2024 - Present

MSc | Applied Computational Science and Engineering | Department of Earth Sciences and Engineering

- ***Expected Degree***: Distinction
- ***Key Courses***: Computational Mathematics (A*), Machine Learning (A*), Fluid Dynamics (A*), Deep Learning (A) etc.
- Systematically master project version control and management, physical dynamics system mechanism, inversion and optimization, parallel computing, data analysis and machine learning methods, and deep learning techniques.

Taiyuan University of Technology Sep 2020 - Jun 2024

Undergraduate | Mathematics and Applied Mathematics | School of Mathematics

- ***GPA***:92/100
- ***Key Courses***: mathematical analysis (97), advanced algebra (98), probability theory and mathematical statistics (93), mathematical physics equations (97), numerical analysis (94), etc.
- ***Honorary Awards***: Academic Outstanding Individual (2020-2024), Academic Outstanding Individual (2022-2024), etc.
- Systematic mastery of mathematical theoretical basis and application methods, especially in numerical calculation and mathematical modeling with solid theoretical knowledge and practical ability.

Research Experience

Comparative Benchmarking of Reduced-Order Models for Data Assimilation Applications Jun 2025 - Present

MSc Independent Research Project

- Leading a comprehensive benchmarking study of CAE-based ***reduced-order models*** (CAE+DMD, CAE+LinearMLP, CAE+WeakLinearMLP) for ***data assimilation*** applications across diverse physical systems.
- Evaluating model performance and data assimilation effectiveness on ***computational fluid dynamics datasets*** (cylinder flow), ***turbulent flow systems*** (Kolmogorov flow), and real-world ***multi-physics atmospheric datasets***.
- Developing standardized ***evaluation frameworks*** to assess both reconstruction accuracy and assimilation quality of ***operator learning*** approaches in reduced-order modeling contexts.

Deep Learning-Based Simulation of Dispersion Shock Waves in Nonlinear PDE Systems Dec 2023 - Dec 2024

First Author, Research Project Leader

Outputs: Physical Review E, Github

- Led the ***full-cycle development*** of a research project, encompassing data preprocessing, model design, numerical experiments, and thesis writing.
- Developed the ***DPINN*** and ***DRKT*** modules based on the PINN framework and traditional Runge-Kutta methods, innovatively addressing dispersion shock wave phenomena in the ***Generalized Gardner equation***.
- Integrated the modules into the ***PgMSNN model*** using the multi-stage training strategy.

The 32nd International Joint Conference on Artificial Intelligence (IJCAI) Aug 2023

First Author, Research Team Leader

Outputs: IJCAI conference, Github

- Attend the ***IJCAI*** conference and ***oral presentation*** at MiGA workshop.

- Presented the technical report of the ***MSTCN-VAE model***, an unsupervised model based on skeletal data to effectively solve the micro-gesture classification problem.

Solving Nonlinear Partial Differential Equations Based on PINN Method Jul 2022 - Apr 2023

First Author

Outputs: Optik, Github

- Using the ***PINN*** method to simulate the wave solutions (solitons, breathers) of ***Modified Schrodinger equation***.
- Reproduce the PINN method in the ***Tensorflow*** and ***Pytorch***.
- Build a Physical-Informed Neural Network to process the ***complex number*** output.

Publications

Nov 2024

YUAN Wenxuan, GUO Rui, "*Physics-guided multistage neural network: A physically guided network for step initial values and dispersive shock wave phenomena* ", Physical Review E, Volume 110, Issue 6, Page 065307.

Aug 2023

YUAN Wenxuan, HE Shanchuan, DOU Jianwen, "*MSTCN-VAE: An unsupervised learning method for micro gesture recognition based on skeleton modality* ", International Joint Conference on Artificial Intelligence, August 2023.

May 2023

YUAN Wenxuan, GUO Rui, GAO Yining, "*Physics-informed Neural Network method for the Modified Nonlinear Schrödinger equation* ", Optik, Volume 279, Page 170739.

Competitions

FEMA Predicting the Unpredictable Challenge — Rank 1 Feb 2025

(Team Captain) Developed machine learning models for real-time lightning storm evolution prediction and location forecasting to support emergency response and infrastructure protection.

MiGA-IJCAI Challenge (Track1 Microgesture Classification) — Rank 12 Apr 2023 - Jun 2023

(Team Captain) Led the team to develop and optimize an unsupervised model for micro-gesture classification.

China Undergraduate Mathematical Contest in Modeling — National Second Prize Sep 2023

(Team Captain) Develop a mathematical model of a specified solar field and calculate energy efficiency.

ASC Student Supercomputer Challenge — Global Second Class Nov 2021 - Mar 2022

(Team member) Deploy the Yuan1.0 model in the HPC cluster for training and hyperparameter tuning.

Skills

- **Technical Skills:** Python (TensorFlow, PyTorch), Git, LaTeX, MATLAB, C++ (parallel computing)
- **Scientific Computing:** Physics-informed neural networks, Koopman operator methods, Data assimilation, Operator learning
- **Research Skills:** Mathematical modeling, Large-scale data analysis, Experimental design, Model optimization
- **Leadership & Communication::** Team management, Academic writing, Conference presentations