Yuan, Wenxuan

Email: | wenxuan.yuan24@imperial.ac.uk
https://wenxuan52.github.io/

Seeking PhD opportunities in trustworthy machine learning, with a particular interest in embedding interpretable structures that enable prediction, explanation, and intervention. Passionate about developing effective and transparent learning algorithms to address key scientific and engineering challenges.

Education Experience

Imperial College London Sep 2024 - Sep 2025

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

- ***Degree***: Distinction
- ***Key Courses***: Computational Mathematics (A*), Machine Learning (A*), Fluid Dynamics (A*), Deep Learning (A), Inversion & Optimisation (A) etc.

Taiyuan University of Technology Sep 2020 - Jun 2024

BSc | 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), abstract algebra (100) etc.
- ***Honorary Awards***: Outstanding Academic Award (2020-2024), Outstanding Research Award (2022-2024), etc.

Research Experience

Information Shapes Koopman Representation Jun 2025 - Sep 2025

Second Author

Outputs: Under Review at ICLR 2026, OpenReview link

- Examined the trade-off between **structural simplicity** and **expressive** in **Koopman** representations from an **information-theoretic** perspective.
- **Main contributions**: Implemented algorithms and conducted extensive experiments on physical simulation tasks; Produced illustrative figures of the proposed models; Polished and revised the manuscript.

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**.
- Developed structure-preserving neural networks, highlighting the integration of **physical priors** into **ML frameworks** for reliability and interpretability.

Publications

Preprints & Submissions

Xiaoyuan Cheng, **Wenxuan Yuan**, Yiming Yang, Yuanzhao Zhang, Sibo Cheng, Yi He, and Zhuo Sun. "*Information Shapes Koopman Representation".* Submitted to ICLR 2026 (under review). [OpenReview link].

Nov 2024

Wenxuan Yuan and Rui Guo, "*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

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

May 2023

Wenxuan Yuan, Rui Guo, and Yining Gao, "*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 Leader) 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 Leader) 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:** Koopman theory, Operator learning, Probabilistic modeling, Generative models.
- **Research Skills:** Mathematical modeling, Large-scale data analysis, Experimental design, Model optimization
- **Leadership & Communication:** Team management, Academic writing, Conference presentations