Yichen Wang

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🎓 EDUCATION

Shanghai Jiao Tong University **Shanghai, CHN**

Bachelor of Science, Department of Automation 2021.9 - 2025.6 (expected)

University of Warwick **Coventry, UK**

Visiting Student, Department of Computer Science 2024.9 - 2024.12

- under the supervision of Prof. Fanghui Liu

💡 RESEARCH INTEREST

My research interest currently lies in statistical learning theory, focuses on developing a theoretical understanding of modern machine learning systems, using tools from high-dimensional statistics.

ℹ PUBLICATIONS

- **Yichen Wang**, Yudong Chen, Lorenzo Rosasco and Fanghui Liu. **The Shape of Generalization through the Lens of Norm-based Capacity Control.** *Preprint, 2025.*
- **Yichen Wang**, Qiming Liu, Zhe Liu, and Hesheng Wang. **Enhancing Exploratory Capability in Visual Navigation using Uncertainty of Implicit Scene Representations.** *37th IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2024. (Oral)

👥 RESEARCH EXPERIENCE

Statistical learning theory Advisor: Prof. Fanghui Liu, Prof. Yudong Chen. 2024.4 - 2025.1

- Derived deterministic equivalents for the ℓ_2 norm of the estimator in well-specified ridge regression and random feature ridge regression through random matrix theory and high dimensional statistics.
- Studied the relationship between test risk and the ℓ_2 norm of the estimator in the above two models and provided an affirmative answer to the existence of double descent, theoretically and empirically. Reshaped the corresponding scaling laws under norm-based capacity.
- Proposed a rethinking of the data-parameter paradigm, shifting the focus from parameter count to the norms (weights), and examining the transition from under-parameterized to over-parameterized regimes.
- This work has led to one publication: **Re-examining Double Descent and Scaling Laws under Norm-based Capacity via Deterministic Equivalence.**

Robot visual navigation Advisor: Prof. Hesheng Wang. 2022.9 – 2023.11

- Conducted research on uncertainty estimation and computational cost reduction in NeRF, designing algorithms to minimize computational overhead.
- Researched robot navigation based on memory mechanisms, enhancing visuomotor robot navigation performance through reinforcement learning and imitation learning.
- Designed an end-to-end visual navigation framework utilizing NeRF as a memory mechanism, extending NeRF's efficient and compact scene representation from the perception domain to the control domain, and bridging the gap between exploration and navigation through uncertainty estimation.
- This work has led to one publication on IROS'24 (oral presentation).

♡ AWARDS & HONORS

- **National First Prize**, "TI Cup" China Undergraduate Electronics Design Contest. (Top1%) 2023
- **Shanghai Outstanding Graduate.** (Top5%) 2025
- **Second Price**, Academic Scholarship of Shanghai Jiao Tong University 2023, 2024

References

- **Yudong Chen**
  - Associate Professor at Department of Computer Sciences, UW-Madison, USA.
  - ✉ yudong.chen@wisc.edu
- **Fanghui Liu**
  - Assistant Professor at Department of Computer Science, University of Warwick, UK.
  - ✉ fanghui.liu@warwick.ac.uk
- **Xiaolin Huang**
  - Full Professor of Department of Automation, Shanghai Jiao Tong University, China.
  - ✉ xiaolinhuang@sjtu.edu.cn