

Fan Nie

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Education

Shanghai Jiao Tong University

Sep 2020 – Jun 2024 (Expected)

B.Eng in Computer Science and Technology (IEEE Honor Class)

Shanghai, China

- GPA 93.41/100, Rank 2/122 (the last two years 1/122)
- A+ Courses: Computer Architecture, Computer Networks, Artificial Intelligence, NLP and 19 others
- served as a reviewer for ICRA'24.

École Polytechnique Fédérale de Lausanne(EPFL)

Feb 2023 – Jul 2023

Exchange Student of Computer Science

Lausanne, Switzerland

- Courses: Database System(6.0/6.0), Machine Learning(6.0/6.0), Data Visualization(6.0/6.0)

Publication

(* means equal contribution)

1. Z. Li*, **Fan Nie***, Q. Sun, F. Da, H. Zhao. **Uncertainty-Aware Decision Transformer for Stochastic Driving Environments**. *arXiv preprint arXiv:2309.16397, 2023. (Under Review at ICLR'24)*
2. Z. Li*, **Fan Nie***, Q. Sun, F. Da, H. Zhao. **Boosting Offline Reinforcement Learning for Autonomous Driving with Hierarchical Latent Skills**. *arXiv preprint arXiv:2309.13614. (Under Review at ICRA'24)*
3. Q. Wu, **Fan Nie**, C. Yang, T. Bao, J. Yan. **GraphSHINE: Training Shift-Robust Graph Neural Networks with Environment Inference**. *(Under Review at WWW'24)*
4. Q. Wu, C. Yang, K. Zeng, **F. Nie**, M. Bronstein, J. Yan. **Advective diffusion transformers for topological generalization in graph learning**. *arXiv preprint arXiv:2306.10759. (Under Review at ICLR'24)*
5. Q. Wu, W. Zhao, C. Yang, H. Zhang, **F. Nie**, H. Jiang, Y. Bian, and J. Yan. **Simplifying and Empowering Transformers for Large-graph Representations**. *In Advances in Neural Information Processing Systems (NeurIPS 2023)*.
6. Z. Li, Q. Wu, **F. Nie**, and J. Yan. **Graphde: A Generative Framework for Debaised Learning and Out-of-distribution Detection on Graphs**. *In Advances in Neural Information Processing Systems (NeurIPS 2022)*.

Research Experience

Uncertainty-Aware Decision Transformer

Mar 2023 - Nov 2023

Submission to ICLR 2024; the Co-First Author

MARSLab, THU

- Presented an uncertainty-aware decision transformer (DT) for a stochastic driving environment; estimated state uncertainties by the conditional mutual information and learned to perform aggressively or cautiously based on uncertainty levels.
- Designed, developed, and experimented with the models and training pipelines; conducted 15+ experiments and visualized robust and exceptional performance of UNREST across diverse driving scenarios; Paper writing.
- Outperformed state-of-the-art baseline(SPLT) by 11.5% in terms of driving score.

Skill-Based Offline Motion Planning

Dec 2022 - Sep 2023

Submission to ICRA 2024; the Co-First Author

MARSLab, THU

- Introduces a hierarchical skill-based framework enhancing offline RL to overcome the challenge of long-horizon planning in driving environments.
- Employed a two-branch VAE to extract driving skills and visualized them by T-SNE to prove the effectiveness; Conducted motion planning in the CARLA simulator; Created the demo video to showcase the key ideas and model performance.
- Outperformed state-of-the-art baseline(OPAL) by 11.4% in terms of driving score.

Training Shift-Robust GNNs with Environment Inference.

Oct 2022 - May 2023

Submission to NeurIPS 2023(Average rating:5.6), WWW 2024; the Second Author

Thinklab, SJTU

- Proposed a novel approach with an environment estimator and a mixture-of-expert GNN predictor to train robust GNNs under node-level distribution shifts.
- Designed and built GNN-based models and training pipelines; conducted 90+ experiments on six datasets to prove the efficacy.
- Outperformed state-of-the-art models by 12.9%, showing strong capabilities to generalize results on challenging tasks with significant dataset shift (e.g. node property prediction tasks).

Simplifying Transformers for Large-Graph Representations.

July 2022 - Apr 2023

full paper accepted by NeurIPS 2023; the Fifth Author

Thinklab, SJTU

- Introduced Simplified Graph Transformers (SGFormer) as a powerful and scalable encoder for large graphs; reduced the complexity of Graph Transformer to linear; innovative combined feature propagation and global attention in design.
- Built graph transformer baselines and conducted extensive experiments and visualizations to show the model performance over the SOTA model.
- Outperformed SOTA Transformers up to 25.9% with great efficiency improvement (141x inference acceleration).

Debiased Learning and Out-of-Distribution Detection on Graph Data.

Mar 2022 - Sep 2022

full paper accepted by NeurIPS 2022; the Third Author

Thinklab, SJTU

- Addressed out-of-distribution challenges in graph data by integrating a unified probabilistic model. Automated outlier identifications during training, and concurrently induced a detector for out-of-distribution detection during testing.
- Conducted 15+ experiments and visualized results to show the model performance and robustness against baselines.
- Outperformed SOTA results with a great edge. E.g. outperforms by 9.31% on MNIST-75sp in the OOD detection task.

Internship Experience

Shanghai Qizhi Institute.

July 2023 – Dec 2023

Research Intern, Supervised by Prof. Hang Zhao

Shanghai, China

- Led advanced research on autonomous driving prediction and planning tasks. Designed model optimization strategies and adjustments and implemented codebase on Carla simulator and nuPlan dataset.
- Explored the reasoning ability of VLMs/LLMs to guide multi-agent interaction prediction in autonomous driving. Designed prompts and combined vectorized and rasterized inputs with texts for better encoding.

Biomap, Inc.

July 2022 – Dec 2022

Algorithm R&D Intern

Beijing, China


- Set up the DeepCellState baseline and different types of Attention Free models to predict changes in gene expression levels after drug interference using PyTorch, and tested their performance on large-scale datasets.
- Implemented discretization techniques such as equal frequency binning and custom binning to minimize data loss. Finetuned the pretrained model and raise the F1 Score by 6.2%.

Project Experience

Coffee Kingdom Visualization.

Apr 2023 - June 2023

Course Project for Data Visualization

 [fannie1208/project-2023-kingdom_of_kaffa](https://github.com/fannie1208/project-2023-kingdom_of_kaffa)

- Designed and implemented an interactive visualization website to assist those coffee lovers in finding the perfect package of freshly roasted coffee. (Got full marks for this course)

Graph Neural Networks for Scalable Combinatorial Optimization.

Mar 2023 - June 2023

Research Project in LIONS, EPFL

- Speeded up the decoding process of solving CO problems with a GNN by directly sampling from the learned probabilities and employed a STE to guide the network in making accurate discrete decisions.
- Code; Experiment; Paper Writing.

PLI-Python-based-Lambda-Interpreter

Dec 2022 - Jan 2023

Course Project for Programming Language

 [FKCSP/PLI-Python-based-Lambda-Interpreter](#)

- Designed and implemented a lambda interpreter based on Python that supports arithmetic operations, size comparisons, conditional branches, and recursive functions. (Got full marks for this course)

Extracurricular Activities

Youth Volunteer Team

Mar 2021 - Dec 2022

Minister of Planning

SJTU, Shanghai

- Planned and organized various volunteer activities such as Shanghai Marathon volunteers, etc.; Wrote planning cases and communicated with different departments.

Skills

Programming Languages: Python, C++, JavaScript, HTML, CSS

Tech Skills: MySQL, PyTorch, Data Visualization, Web Development, Web Crawler