

# FUYUAN LYU

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## SUMMARY

I'm currently a Ph.D. candidate at McGill University & MILA, fortunate to be advised by *Prof Jin L.C. Guo* and *Prof Xue Liu*. My research interest lies in **Automated Feature Engineering for effectiveness, efficiency, and explainability**. I am also actively working on its application in various domains, including recommender systems, financial estimation, and software engineering. I work closely with industrial researchers from Microsoft, Tencent, etc. I am thrilled that my research has successfully transformed into product-line algorithms and made a difference in the world!

Before joining McGill, I got my bachelor's degree in Computer Science with *Zhiyuan Honour Degree in Engineering* from Shanghai Jiao Tong University(SJTU). I was advised by *Prof Li Jiang* for my thesis and worked with *Prof Xiaokang Yang*. I also had a great time at Nanyang Technological University(NTU), researching with *Prof Weichen Liu*.

## EDUCATION

- PhD, Computer Science, McGill University, 2019-2024(exp.)
- BEng, Computer Science, Shanghai Jiao Tong University, 2015-2019
- Zhiyuan Honor Degree for BEng, Shanghai Jiao Tong University, 2015-2019

## SELECTED PUBLICATIONS

### Conference:

- c10 Qiyuan Zhang, **Fuyuan Lyu**<sup>†</sup>, Xue Liu, Chen Ma<sup>†</sup>, "Collaborative Performance Prediction for Large Language Models", *In Proceedings of the 2024 Conference on Empirical Methods in Natural Language Processing*
- c9 Xing Tang\*, Qiao Yang\*, **Fuyuan Lyu**\*, Dugang Liu, Xiuqiang He, "Touch the Core: Exploring Task Dependence Among Hybrid Targets for Recommendation", *In Proceedings of the 18th ACM Conference on Recommender Systems (Recsys 2024)*
- c8 Yunpeng Weng, Xing Tang, Zhenhao Xu, **Fuyuan Lyu**, Dugang Liu, Zexu Sun, Xiuqiang He, "OptDist: Learning Optimal Distribution for Customer Lifetime Value Prediction", *In Proceedings of the 33rd ACM International Conference on Information and Knowledge (CIKM 2024)*
- c7 Dugang Liu, Chaohua Yang, Xing Tang, Yejing Wang, **Fuyuan Lyu**, Weihong Luo, Xiuqiang He, Zhong Ming, Xiangyu Zhao, "MultiFS: Automated Multi-Scenario Feature Selection in Deep Recommender Systems", *In Proceedings of the 17th ACM International Conference Web Search and Data Mining (WSDM 2024)*
- c6 **Fuyuan Lyu**, Xing Tang, Dugang Liu, Chen Ma, Weilong Luo, Xiuqiang He, Xue Liu, "Towards Hybrid-grained Feature Interaction Selection for Deep Sparse Network", *In Proceedings of the 37th Conference on Neural Information Processing Systems (NeurIPS 2023)*
- c5 Xing Tang, Yang Qiao, Yuwen Fu, **Fuyuan Lyu**, Dugang Liu, Xiuqiang He, "OptMSM: Optimizing Multi-Scenario Modeling for Click-Through Rate Prediction", *In Proceedings of Machine Learning and Knowledge Discovery in Databases: Applied Data Science and Demo Track 2023 (ECML-PKDD 2023)*
- c4 Dugang Liu, Xing Tang, Han Gao, **Fuyuan Lyu**, Xiuqiang He, "Explicit Feature Interaction-aware Uplift Network for Online Marketing", *In Proceedings of The 29th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD 2023)*
- c3 **Fuyuan Lyu**\*, Xing Tang\*, Dugang Liu, Chen Liang, Xiuqiang He, Xue Liu, "Optimizing Feature Set for Click-through Rate Prediction", *In Proceedings of The Web Conference 2023 (WWW 2023)*
- c2 **Fuyuan Lyu**\*, Xing Tang\*, Hong Zhu, Huifeng Guo, Yingxue Zhang, Ruiming Tang, Xue Liu, "OptEmbed: Learning Optimal Embedding Table for Click-through Rate Prediction", *In Proceedings of the 31st ACM International Conference on Information and Knowledge (CIKM 2022)*
- c1 **Fuyuan Lyu**\*, Xing Tang\*, Huifeng Guo, Ruiming Tang, Xiuqiang He, Rui Zhang, Xue Liu, "Memorize, Factorize, or be Naïve: Learning Optimal Feature Interaction Methods for CTR Prediction", *In Proceedings of the 38th IEEE International Conference on Data Engineering (ICDE 2022)*

### Journal:

- j1 Haolun Wu, Yansen Zhang, Chen Ma, **Fuyuan Lyu**, Bowei He, Bhaskar Mitra, Xue Liu, "Result Diversification in Search and Recommendation: A Survey", *IEEE Transactions on Knowledge and Data Engineering (2024)*

## RESEARCH EXPERIENCE

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### McGill University & MILA

Research Assistant

Sep 2019 to present

Advisor: [Prof. Jin L.C. Guo](#) & [Prof. Xue Liu](#)

- OptFusion: This paper studies the fusion mechanism in the CTR model. The paper is under-submission.
- SpecB-FNO: We analyze the Fourier Neural Operator(FNO) from the spectral perspective and propose SpecB-FNO to alleviate the Fourier-parameterization bias. The paper is under-submission.
- OptFeature: Propose to select feature interaction at different granularity in deep sparse network. The paper is accepted in NeurIPS 2023.
- OptFS: Jointly consider the influence of selecting feature and feature interaction in CTR Prediction and propose an automated method to select. The paper is accepted in WWW 2023. It has been utilized on the Tencent FIT platform with millions of annual revenue increase.

### City University of Hong Kong

Research Assistant

Mar 2024 to Sep 2024

Advisor: [Prof. Chen Ma](#)

- CPP4LLM-Eval: We propose a Collaborative Performance Prediction framework for LLM Evaluation. This project revisit the scaling law from the collaborative perspective. The paper is under-submission.
- OptNum: This paper studies the numerical modeling in tabular prediction tasks. The paper is under-submission.

### Huawei Noah's Ark Lab, Montreal

Research Intern

Nov 2021 to Jun 2023

Advisor: [Yingxue Zhang](#)

- Towards Automated Negative Sampling for Implicit Recommendation: In this project, we challenge the common belief in the negative sampling community that a "best" negative sampler exists. Instead, we hypothesize that the negative sampler is model&data-dependent and propose an efficient selection algorithm. The paper is under-submission.
- OptEmbed: Study the influence of the size of the embedding table in CTR Prediction. Propose a unified framework to optimize the size of the embedding table and model parameters automatically. The paper is accepted in CIKM 2022.

### Huawei Noah's Ark Lab

Research Intern

Mar 2021 to Aug 2021

Advisor: [Dr. Xing Tang](#)

- OptInter: Study the influence of modeling methods for feature interaction. Propose a novel deep CTR prediction framework including various modeling methods and a two-stage learning algorithm to select the optimal for each feature interaction automatically. The paper is accepted in ICDE 2022.

### Shanghai Jiao Tong University

Research Assistant

Feb 2019 to Aug 2019

Advisor: [Prof. Li Jiang](#)

- Dual-flow Training Framework to Exploit Structured Sparsity: Support structured sparsity from framework level. Propose a flexible dual-flow mechanism to decouple the non-zero data and the sparse network structure. Integrate the dual-flow mechanism into the deep learning compiler stack built on TVM.

### Nanyang Technological University

Research Assistant

Aug 2018 to Feb 2019

Advisor: [Prof. Weichen Liu](#)

- Cross-filter Compression: Address the conflict between uniform quantization and compact network design when speedup CNN. Explored CNN spatial-adjunct layer property and proposed cross-filter compression method.

### Shanghai Jiao Tong University

Research Assistant

Jun 2017 to Feb 2018

Advisor: [Prof. Xiaokang Yang](#)

- Explored the possibility of more realistic cloth transfer by generating and transferring structure in 3D dimension.
- Designed a specific generative adversarial network to animate cartoon figures.

## TEACHING AND MENTORING EXPERIENCE

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### Teaching

- Teaching Assistant for COMP303: *Software Design*, 2020 Winter

### Mentoring:

- Carlone Scott on Automatic Data Labeling, 2024 Summer
- Qiyan Zhang on LLM Evaluation, 2024 Winter & Summer
- Kexin Zhang(now RA@UCSD) on Recommender System, 2024 Winter
- Tim Yang & Tom Yang on LLM-based Feature Selection, 2024
- Aasheesh Singh(now MLE@Vector) on Federated Prediction, 2023 Summer & Fall
- Shaoxiang Qin on Fourier Neural Operator, 2023-2024

## SELECTED AWARDS

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- National Award for Outstanding Oversea Student (Class A), 2023
- NeurIPS Scholar Award, 2023
- McGill GREAT Award for NeurIPS, 2023
- SIGIR Student Travel Grant for CIKM, 2022
- Grad Excellence Award of McGill University, 2019-2024
- Faculty of Science Graduate Supplement Award, 2022-2024
- Natural Sciences and Engineering Research Council of Canada, 2019-2020 & 2022-2024
- School of Computer Science Grad Stimulus Initiative Award, 2020-2021
- Wolfe Fellowship in Sci & Tech, 2019-2020
- Zhiyuan Honor Degree of Engineering of Shanghai Jiao Tong University(1%), 2019
- Zhiyuan Oversea Research Scholarship (1st class) of Shanghai Jiao Tong University, 2019
- Zhiyuan Outstanding Student Scholarship of Shanghai Jiao Tong University(5%), 2019
- Microsoft Intelligence Award , awarded to 4/438 participants in the 1st HACKxFDU Hackathon, 2016.