Haolun Wu

Ph.D. cand., Computer Science, McGill University, Mila - Quebec AI Institute
Visiting Scholar, Computer Science, Stanford University
Borealis AI Fellowship, FRQNT PhD Fellowship

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Room - 305, Mcconnell Engineering Building
School of Computer Science, McGill University
(+1) 650-521-6179
✉ haolunwu@stanford.edu; haolun.wu@mail.mcgill.ca
🖥 http://haolun-wu.github.io/

Research Interests

Areas: Learning from Human Feedback, Knowledge Representation, Information Retrieval, AI Alignment

My research centers on learning from human feedback using ML techniques to align AI towards human needs. My work spans both *micro-level* aspects (such as data values and personalization) as well as *macro-level* goals (such as responsibility, trustworthiness, social norms, and educational impact). My research is supported by multiple fellowships and has been published at top venues including NeurIPS, ICLR, ICML, The WebConf, SIGIR, KDD, EMNLP, CHI, and recognized through internships and collaborations at Google Research, Google DeepMind, and Microsoft Research.

Academic Training

Oct. 2024-present	**Stanford University**, *STAIR Lab*, Palo Alto, USA. Visiting Student Researcher, Department of Computer Science. Supervisor: Sanmi Koyejo
Feb. 2021-present	**Mila & McGill University**, *Montreal, Canada*. Ph.D., School of Computer Science. Supervisory committee: Steve Liu, Joëlle Pineau, Laurent Charlin, Fernando Diaz
Sep. 2019-Jun. 2021	**Mila & McGill University**, *Montreal, Canada*. M.Sc., School of Computer Science. Thesis: *Balancing Fairness in Multi-stakeholder Recommendation via Multi-objective Optimization* Published at ACM Transactions on Information Systems (TOIS).
Spring 2018	**University of California, San Diego (UCSD)**, *La Jolla, USA*. Undergraduate Exchange.
Sep. 2015-Jun. 2019	**Northeastern University**, *Shenyang, China*. B.E. Computer Science and Engineering. Outstanding Graduation Thesis (top 1%). Outstanding Student for all years.

Relevant Industrial Experience

Feb. 2023-Aug. 2024	**Microsoft Research**, *Cambridge, UK*. **Student Researcher**, Alexandria Team. Manager: John Winn. Project mentor: Bhaskar Mitra. ○ Focus on information extraction, joint text and knowledge base (KB) masked modeling.
Aug. 2023-Feb. 2024	**Google Research / Google DeepMind**, *Mountain View, USA*. **Student Researcher**.

Project mentor: Cicero Nogueira dos Santos.

○ Knowledge localization in LLMs and Mixture-of-Experts (MoEs).

Nov. 2022- **Google Research**, *Mountain View, USA*.

Feb. 2023 **Research Intern**.

Manager / mentor: Craig Boutilier.

○ Propose density-based user representation (DUR) through Gaussian Process Regression, for better personalized multi-interest retrieval.

Sep. 2020- **Microsoft Research**, *Montreal, Canada*.

Jun. 2021 **Student Researcher**, **FATE** (*Fairness, Accountability, Transparency, and Ethics*) Team.

Manager / mentor: Fernando Diaz.

○ Propose a multi-objective optimization framework for fairness-aware recommendation, Multi-FR, that adaptively balances accuracy and fairness for various stakeholders with Pareto optimality guarantee.

Publications - Full list on my Google Scholar profile.

In under four years of Ph.D. study, I have published around 25 peer-reviewed papers—including 10 as (co-)first author—at top-tier venues (e.g., NeurIPS, ICML, ICLR, TKDE, TOIS, SIGIR, KDD, WWW, EMNLP, CHI, AIED). My work has received over 1,000 citations with an h-index of 14 on Google Scholar by Oct 2025.

arXiv Qiyuan Zhang, Fuyuan Lyu, Zexu Sun, Lei Wang, Weixu Zhang, Wenyue Hua, **Haolun Wu**, Zhihan Guo, Yufei Wang, Niklas Muennighoff, Irwin King, Xue Liu, Chen Ma. "*A Survey on Test-Time Scaling in Large Language Models: What, How, Where, and How Well*". arXiv preprint arXiv:2503.24235.

arXiv Shangyu Wu, Ying Xiong, Yufei Cui, **Haolun Wu**, Can Chen, Ye Yuan, Lianming Huang, Xue Liu, Tei-Wei Kuo, Nan Guan, Chun Jason Xue. "*Retrieval-Augmented Generation for Natural Language Processing: A Survey*". arXiv preprint arXiv:2407.13193.

arXiv Fuyuan Lyu, Xing Tang, Dugang Liu, **Haolun Wu**, Chen Ma, Xiuqiang He, and Xue Liu. "*Feature Representation Learning for Click-through Rate Prediction: A Review and New Perspectives*". arXiv preprint arXiv:2302.02241.

arXiv Chengming Hu, Xuan Li, Dan Liu, **Haolun Wu**, Ju Wang, and Xi Chen. "*Teacher-Student Architecture for Knowledge Learning: A Survey*". arXiv preprint arXiv:2210.17332.

Journal Articles

J5 Ye Yuan, Youyuan Zhang, Can Chen, **Haolun Wu**, Zixuan Li, Jianmo Li, James J. Clark, and Xue Liu.

TMLR "*Design Editing for Offline Model-based Optimization* ". Transactions on Machine Learning Research, 2025.

J4 Hao Zhou, Chengming Hu, Ye Yuan, Yufei Cui, Yili Jin, Can Chen, **Haolun Wu**, Dun Yuan, Li Jiang,

IEEE Commun. Di Wu, Xue Liu, Charlie Zhang, Xianbin Wang, and Jiangchuan Liu. "*Large Language Model (LLM)*

Surv. Tutor. *for Telecommunications: A Comprehensive Survey on Principles, Key Techniques, and Opportunities* ".

IF: 35.6 Communications Surveys and Tutorials, 2024.

J3 **Haolun Wu***, Yansen Zhang*, Chen Ma, Fuyuan Lyu, Bhaskar Mitra, and Xue Liu. "*Result Diversification*

TKDE *in Search and Recommendation: A Survey*". IEEE Transactions on Knowledge and Data Engineering, 2024.

IF: 8.9

J2 Chang Meng, Ziqi Zhao, Wei Guo, Yingxue Zhang, **Haolun Wu**, Chen Gao, Dong Li, Xiu Li, Ruim-

TOIS ing Tang. "*Coarse-to-Fine Knowledge-Enhanced Multi-Interest Learning Framework for Multi-Behavior*

IF: 7.1 *Recommendation*". ACM Transactions on Information Systems, 2023.

J1
TOIS
IF: 7.1

Haolun Wu, Chen Ma, Bhaskar Mitra, Fernando Diaz, and Xue Liu. *"A Multi-objective Optimization Framework for Multi-stakeholder Fairness-aware Recommendation"*. ACM Transactions on Information Systems, 2022.

Conference Proceedings

C20
NeurIPS

Xiangwen Wang, Yibo Jacky Zhang, Zhoujie Ding, Katherine Tsai, **Haolun Wu**, Sanmi Koyejo. *"Aligning Compound AI Systems via System-level DPO"*. In the 39th Annual Conference on Neural Information Processing Systems (NeurIPS). San Diego, USA. Dec. 2025.

C19
ECML PKDD

Yansen Zhang, Bowei He, Xiaokun Zhang, **Haolun Wu**, Zexu Sun, Chen Ma. *"Counterfactual Multi-player Bandits for Explainable Recommendation Diversification"*. In the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases. Porto, Portugal. Sep. 2025.

C18
KDD

Fuyuan Lyu, Linfeng Du, Yunpeng Weng, Qiufang Ying, Zhiyan Xu, Wen Zou, **Haolun Wu**, xiuqiang He, Xing Tang. *"Timing is important: Risk-aware Fund Allocation based on Time-Series Forcasting"*. In the 31st ACM SIGKDD Conference on Knowledge Discovery and Data Mining. Toronto, Canada. Aug. 2025.

C17
ICML
Poster, 26.9%

Gaurush Hiranandani, **Haolun Wu***, Subhojyoti Mukherjee, and Sanmi Koyejo. *"Logits are All We Need to Adapt Closed Models"*. In the 42nd International Conference on Machine Learning (ICML). Vancouver, Canada. Jul. 2025.

C16
AIED
Oral, 24.2%

Xiaoshan Huang, Jie Gao, **Haolun Wu**. *"SSRLBot: Designing and Developing an LLM-based Agent using Socially Shared Regulated Learning"*. In the 26th International Conference on Artificial Intelligence in Education (AIED). Palermo, Italy. Jul. 2025.

C15
AIED
Oral, 24.2%

Xiaoshan Huang, **Haolun Wu**, Xue Liu, Susanne Lajoie. *"What Makes Teamwork Work? A Multimodal Case Study on Emotions and Diagnostic Expertise in an Intelligent Tutoring System"*. In the 26th International Conference on Artificial Intelligence in Education (AIED). Palermo, Italy. Jul. 2025.

C14
The WebConf
Poster, 19.8%

Emiliano Penaloza, Olivier Gouvert, **Haolun Wu**, Laurent Charlin. *"Text Representations for Scrutable Recommendations"*. In the 34th Web Conference (WWW). Sydney, Australia. Apr. 2025.

C13
NeurIPS
Poster, 25.8%

Haolun Wu, Ofer Meshi, Masrour Zoghi, Fernando Diaz, Xue Liu, Craig Boutilier, and Maryam Karimzadehgan. *"Density-based User Representation through Gaussian Process Regression for Multi-interest Personalized Retrieval "*. In the 38th Annual Conference on Neural Information Processing Systems (NeurIPS). Vancouver, Canada. Dec. 2024.

C12
EMNLP
Oral, top 3%

Haolun Wu*, Ye Yuan*, Liana Mikaelyan, Alexander Meulemans, Xue Liu, James Hensman, and Bhaskar Mitra. *"Learning to Extract Structured Entities Using Language Models"*. In the 19th Conference on Empirical Methods in Natural Language Processing. Miami, Florida, USA. Nov. 2024.

C11
CIKM
Oral, 23.0%

Ziqiang Cui, **Haolun Wu**, Bowei He, Ji Cheng, Kede Ma, Chen Ma. *"Diffusion-based Contrastive Learning for Sequential Recommendation"*. In the 33rd ACM International Conference on Information and Knowledge Management. Boise, Idaho, USA. Oct. 2024.

C10
SIGIR ICTIR
Oral, 41.0%

Haolun Wu, Bhaskar Mitra, Nick Craswell. *"Towards Group-aware Search Success"*. In the 10th ACM SIGIR / the 14th International Conference on the Theory of Information Retrieval. Washington DC, USA. Jul. 2024.

C9
CHI
Oral, 26.4%

Xiaoshan Huang*, **Haolun Wu***, Xue Liu, and Susanne Lajoie. *"Examining the Role of Peer Acknowledgements on Social Annotations: Unraveling the Psychological Underpinnings"*. In the 41st ACM Conference on Human Factors in Computing Systems. Honolulu, USA. May. 2024.

C8
ICLR
Poster, 30.8%

Haolun Wu*, Chengming Hu*, Xuan Li, Chen Ma, Xi Chen, Boyu Wang, Jun Yan, and Xue Liu. *"Less or More from Teacher: Exploiting Trilateral Geometry for Knowledge Distillation"*. In the 12th International Conference on Learning Representations. Vienna, Austria. May. 2024.

C7 ICDE Oral, 30.6%	**Haolun Wu**, Chen Ma, Yingxue Zhang, Xue Liu, and Mark Coates. *"Self-supervised Contrastive Alignment for Tag-enhanced Recommendation"*. For the 39th IEEE International Conference on Data Engineering. Anaheim, USA. Apr. 2023.
C6 CIKM Oral, 21.3%	**Haolun Wu**, Chen Ma, Yingxue Zhang, Xue Liu, and Mark Coates. *"Adapting Triplet Importance of Implicit Feedback for Personalized Recommendation"*. In the 31st ACM International Conference on Information and Knowledge Management. Atlanta, USA. Oct. 2022.
C5 SIGIR Oral, 20.3%	**Haolun Wu***, Bhaskar Mitra*, Chen Ma, Fernando Diaz, and Xue Liu. *"Joint Multisided Exposure Fairness for Recommendation"*. In the 45th International ACM SIGIR Conference on Research and Development in Information Retrieval. Madrid, Spain. Jul. 2022.
C4 AAAI Oral, 21.4%	Chen Ma, Liheng Ma, Yingxue Zhang, **Haolun Wu**, Xue Liu, and Mark Coates. *"Knowledge-Enhanced Top-K Recommendation in Poincaré Ball"*. In the 35th AAAI Conference on Artificial Intelligence. Virtual. Feb. 2021.
C3 AUTEEE	**Haolun Wu**, Yunfei Feng. *"A Pioneering Scalable Self-driving Car Simulation Platform"*. In the IEEE 2nd International Conference on Automation, Electronics and Electrical Engineering. Shenyang, China. Nov. 2019.
C2 SMC	Chong Fu, Yufu Shan, Muyang He, Ziyuan Yu, and **Haolun Wu**. *"A New Medical Image Encryption Algorithm Using Multiple 1-D Chaotic Maps"*. In the IEEE International Conference on Systems, Man, and Cybernetics. Miyazaki, Japan. Oct. 2018.
C1 ICCAIRO	Yufu Shan, Muyang He, Ziyuan Yu, and **Haolun Wu**. *"Pixel Level Image Encryption Based on Semantic Segmentation"*. In the IEEE International Conference on Control, Artificial Intelligence, Robotics and Optimization. Prague, Czech Republic. May. 2018.

Workshops

W3 ICLR workshop	Ye Yuan, Youyuan Zhang, Can Chen, **Haolun Wu**, Melody Zixuan Li, Jianmo Li, James J. Clark, Xue Liu. *"Design Editing for Offline Model-based Optimization"*. In ICLR 2025 Workshop on Deep Generative Model in Machine Learning: Theory, Principle and Efficacy.
W2 ICLR workshop	Fuyuan Lyu, Linfeng Du, Yunpeng Weng, Qiufang Ying, Zhiyan Xu, wenzou, **Haolun Wu**, Xiuqiang He, Xing Tang. *"Timing is important: Risk-aware Fund Allocation based on Time-Series Forcasting"*. In ICLR 2025 Workshop on Financial AI.
W1 WSDM workshop	**Haolun Wu**, Ofer Meshi, Masrour Zoghi, Fernando Diaz, Xue Liu, Craig Boutilier, and Maryam Karimzadehgan. *"Density-based User Representation through Gaussian Process Regression for Multi-interest Personalized Retrieval"*. In WSDM 2024 Workshop on Learning Representation and Clustering.

Patents

P3	**Haolun Wu**, Chen Ma, Yingxue Zhang, and Mark Coates. *"Recommendation System With Adaptive Thresholds for Neighborhood Selection"*. US 2022/0253722 A1. Patent US 2022.
P2	**Haolun Wu**, Chen Ma, and Yingxue Zhang. *"Recommendation System with Adaptive Weighted Bayesian Personalized Ranking Loss"*. US 2022/0253688 A1. Patent US 2022.
P1	**Haolun Wu**, Haodong Lai, Yutao Liu, Wentao Zhou, and Qinlai Li. *"A Method For Real-Time Image Style Transfer Based On Conditional Generative Adversarial Networks "*. AU2017101166A4. IP Australia 2017.

Grants & Fellowships

Total funding: $279,334. Total share of funding: $173,834.

2024	Fonds de recherche du Québec FRQNT Ph.D. Fellowship *($58,334, share 100%)* (rank 1st-place)

2023 Borealis AI Fellowship *($10,000, share 100%)* (1 of the 10 recipients in Canada)

2022 MSR-Mila Collaboration Grant *($66,000, share 50%)*

Lead PI: Xue (Steve) Liu; Industrial Mentor: Bhaskar Mitra, John Winn

Title: SNAKE: Structured Neural Attention over Knowledge base Entities

Funding Body: Microsoft Research

2022 MITACS Accelerate Fellowship *($90,000, share 50%)*

Lead PI: Xue (Steve) Liu; Industrial Mentor: Shuo Wang

Title: Fairness-aware Matching for Dynamic Predictive Behavior Matching

Funding Body: Bell Canada, MITACS

2020 MSR-Mila Collaboration Grant *($55,000, share 50%)*

Lead PI: Xue (Steve) Liu; Industrial Mentor: Fernando Diaz

Title: Two-sided Recommendation with Fairness

Funding Body: Microsoft Research

Honors & Awards

Total award amount: $51,300.

2024 Student Travel Grant *($3,000)*, *Neural Information Processing Systems (NeurIPS)*

2024 Grad Excellence Award *($6,000)*, *McGill University*

2024 Student Travel Award *($1,000)*, *International Conference on Learning Representations (ICLR)*

2023 Grad Excellence Award *($6,000)*, *McGill University*

2023 Graduate Stimulus and Financial Supplement *($1,750+$1,500+$850)*, *McGill University*

2022 Grad Excellence Award *($7,000+$1,000)*, *McGill University*

2022 SIGIR Student Travel Grant. *($1,350+$850)*

2021 Apple Scholars PhD Fellowship Nominee (1 out of 3 students at *McGill University*)

2021 Grad Excellence Award *($5,000)*, *McGill University*

2020 Grad Excellence Award *($12,600)*, *McGill University*

2019 Excellent Graduation Thesis, *Northeastern University*

2016-2019 Outstanding Student *($2,400)*, *Northeastern University*

2017 First Prize, *CUMCM (Contemporary Undergraduate Mathematical Contest in Modelling)*

2017 MCM/ICM Meritorious Winner, *COMAP (Consortium for Mathematics and Its Application)*

2016 Yao Tianshun Scholarship *($1,000, 2 out of 250 students)*, *Northeastern University*

2014 First Prize (rank 18th in Sichuan Province), *CMS (Chinese Mathematical Association)*

Media

2023 McGill PhD Candidates Earn Borealis AI Fellowships. McGill Reporter.

Community & Leadership

○ **Mila Lab Representatives**

- I am honored to have been elected and to serve as one of the lab representatives (11 out of 1000+ students) for 2023-24 at *Mila - Quebec AI Institute*, where I proudly represent the McGill PhD cohort. The Mila LabReps act as a bridge between students and the various members of Mila's ecosystem. I am actively involved in organizing student assemblies, writing newsletters, managing finances, and facilitating communication among students, professors, and staff.

○ **Founder, Organizer, Core Contributor**

- I am a **co-founder and organizer** of the DEFirst reading group at *Mila* and the *Vector Institute* to build an interdisciplinary forum of researchers across both industry and academia, who work at the intersection of Information Retrieval, Fairness, Generative Model, and Trustworthy AI. Past talks are on our YouTube: https://www.youtube.com/@defirstreadinggroup-milaxv8747/videos.
- I am one of the **organizers** of the OracleLLM: Empowering LLM with Self-Feedback community. OracleLLM refers to replacing human-generated golden references with the output and feedback produced by LLMs, treating them as authoritative benchmarks and learning signals for various tasks and applications.
- I am one of the **significant contributors** to the Test-Time Scaling (TTS) survey and community, a collaborative effort to understand and push the boundaries of how LLMs can adapt and improve at inference time.

○ **Participant**
- Summer School in Responsible Artificial Intelligence (AI) and Human Rights hosted by Mila and University of Montreal (selected as 1 of the 40 global participants).

○ **Session Chair**
- SIGIR 2022 (Session: Collaborative Filtering)

○ **PC member / Reviewer**

- ACL 2025	- KDD 2024
- NeurIPS 2024	- AAAI 2022
- ICLR 2024	- SIGIR 2022/2023/2024/2025
- ICML 2024/2025	- TKDD 2022

Talk, Lecture & Mentorship

○ **Talk and Lecture**
- **Talk**: *"Two Pathways to Trustworthy AI: Transparent Representations and Robust Adaptation"*, MBZUAI.
  (Rising-star Talk at International Symposium on Trustworthy Foundation Models 2025)
  General Chair: Kun Zhang, Tongliang Liu. May 2025.
- **Talk**: *"Two Pathways to Trustworthy AI: Transparent Representations and Robust Adaptation"*, Google Research.
  Head: Craig Boutilier. May 2025.
- **Talk**: *"Human-Centric Alignment through Multilevel Feedback Integration"*, Stanford University.
  Head: Sanmi Koyejo. Mar. 2025.
- **Teach**: *"Applications of Machine Learning in Real World Systems"* (COMP 597 & 598).
  Head: Xue (Steve) Liu. McGill University. Winter 2021 & 2022.
- **Talk**: *"Multi-FR: A Multi-Objective Optimization Method for Achieving Two-sided Fairness in E-commerce Recommendation"*, Microsoft Bing.
  Head: Nick Craswell. Oct. 2021.
- **Talk**: *"Joint Multisided Exposure Fairness for Search and Recommendation"*.
  (selected as 1 of the 6 contributed Talks at Montreal AI Symposium 2022)
  Microsoft Bing. Apr. 2022; Bell Canada. Aug. 2022; Mila. Sep. 2022.

○ **Mentored** and collaborated with several undergraduate and junior graduate students. (2022-)
The following mentorship leads to papers accepted to EMNLP 2025 and The WebConf 2025, and helps one student get an offer from the Master of Science in Applied Computing (MScAC) degree program at University of Toronto.

- Hillary Tao (McGill)	- Evelyn Cao (U of Toronto)	- Linfeng Du (McGill)
- Yansen Zhang (CityU of Hong Kong)	- Ye Yuan (McGill)	- Zipeng Sun (McGill)
- Rui Song (McGill)	- Weixu Zhang (McGill)	

Coding Skills

Python, Pytorch, Tensorflow, Jax.

Extracurricular Activities

- I am a certificated **clarinet player**. I was a member of Musicians Association of Sichuan, China. My advisor was Yi Zhu, who is now a Deputy Director of the Music Department of Sichuan University.
- I am also a master in **Chinese Calligraphy**. My advisor was Jialin Zheng, who is now a Vice Chairman of Sichuan Calligraphers Association and Vice Chairman of Chengdu Calligraphers Association.