

Zelong Li

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EDUCATION

Department of Computer Science, Rutgers University – New Brunswick

May 2024

Ph.D. in Computer Science

- GPA: 4.00/4.00

Department of Computer Science and Technology (CST), Tsinghua University

Jul 2019

B.E. in Computer Science and Technology

- Major GPA: 3.73/4.00

WORK EXPERIENCES

Product Semantics Team, Amazon P13N, Amazon, Seattle, WA

May 2024 - Now

Applied Scientist II

Enriched Embedding with Attribute Features for Product Retrieval in Recommendation Systems

Product Semantics Team, Amazon P13N, Amazon, Seattle, WA

May 2023 – Aug 2023

Applied Scientist Intern

Large Language Model (LLM) for Coherent and Explainable Complement Recommendation

- Defined and proposed the concept and criteria of coherent complement recommendation products.
- Used few-shot learning on off-the-shelf LLM and regex matching to build coherent complement datasets.
- Design an LLM-compatible item indexing algorithm for LLM to use text features and user behavior information.
- Fine-tuned LLM on downstream datasets with multiple tasks, outperforming baselines on this problem.

Product Semantics Team, Amazon P13N, Amazon, Seattle, WA

May 2022 – Aug 2022

Applied Scientist Intern

Shopping Objective Detection and Inference

- Defined the concept and problem of shopping objectives through search log and category name at Amazon.
- Designed crowdsourcing task on MTurk to gather real-world users' feedback on objective detection as datasets.
- Fine-tuned an LLM to solve the shopping objective detection and inference tasks simultaneously.
- Contributed to approximately \$64 million in increased revenue for Amazon.

AWARDS

- Alexa Prize Academic Research Sponsorship, 2023
- SIGIR Student Travel Grant, 2022
- The Web Conference Student Scholarship, 2021
- 1st in Selection Contest for the 31st National Olympiad in Informatics in Fujian Province (2014) (top 0.03%)
- 2nd Prize in the 7th Asia and Pacific Informatics Olympiad 2014 (APIO 2014) (top 0.06%)
- 3rd Prize in the 31st National Olympiad in Informatics (NOI 2014) (top 0.23%)

PROFESSIONAL SKILLS

- Programming Languages and Tools: Python (including PyTorch and Scikit-Learn), C/C++

PUBLICATIONS

Explainable and Coherent Complement Recommendation Based on Large Language Models

Zelong Li, Yan Liang, Ming Wang, Sungro Yoon, Jiaying Shi, Xin Shen, Xiang He, Chenwei Zhang, Wenyi Wu, Hanbo Wang, Jin Li, Jim Chan and Yongfeng Zhang. In Proceedings of the 33rd ACM International Conference on Information and Knowledge Management (**CIKM 2024**), October 21 - 25, 2024, Boise, ID, USA.

AutoLossGen: Automatic Loss Function Generation for Recommender Systems

Zelong Li, Jianchao Ji, Yingqiang Ge and Yongfeng Zhang. In Proceedings of the 45th International ACM SIGIR Conference on Research and Development in Information Retrieval (**SIGIR 2022**), July 11 - 15, 2022, Madrid, Spain.

From Kepler to Newton: Explainable AI for Science Discovery

Zelong Li, Jianchao Ji and Yongfeng Zhang. **ICML-AI4Science 2022.**

Efficient Non-Sampling Knowledge Graph Embedding

Zelong Li, Jianchao Ji, Zuohui Fu, Yingqiang Ge, Shuyuan Xu, Chong Chen and Yongfeng Zhang. In Proceedings of the Web Conference 2021 (**WWW 2021**), April 19 - 23, 2021, Ljubljana, Slovenia.

IDGenRec: LLM-RecSys Alignment with Textual ID Learning

Juntao Tan, Shuyuan Xu, Wenyue Hua, Yingqiang Ge, Zelong Li and Yongfeng Zhang. In Proceedings of the 47th International ACM SIGIR Conference on Research and Development in Information Retrieval (**SIGIR 2024**), July 14 - 18, 2024, Washington D.C., USA.

GenRec: Large Language Model for Generative Recommendation

Jianchao Ji, Zelong Li, Shuyuan Xu, Wenyue Hua, Yingqiang Ge, Juntao Tan and Yongfeng Zhang. In Proceedings of the 46th European Conference on Information Retrieval (**ECIR 2024**), March 24 - 28, 2024, Glasgow, Scotland.

OpenAGI: When LLM Meets Domain Expert

Yingqiang Ge, Wenyue Hua, Kai Mei, Jianchao Ji, Juntao Tan, Shuyuan Xu, Zelong Li and Yongfeng Zhang. In the Proceedings of the 37th Conference on Neural Information Processing Systems (**NeurIPS 2023**), December 10 – 16, New Orleans, Louisiana, US.

Counterfactual Collaborative Reasoning

Jianchao Ji, Zelong Li, Shuyuan Xu, Max Xiong, Juntao Tan, Yingqiang Ge, Hao Wang and Yongfeng Zhang. In Proceedings of the 16th ACM International Conference on Web Search and Data Mining (**WSDM 2023**), February 27 - March 3, 2023, Singapore.

Efficient Non-Sampling Graph Neural Networks

Jianchao Ji, Zelong Li, Shuyuan Xu, Yingqiang Ge, Juntao Tan and Yongfeng Zhang. **Information 2023.**

A Survey on Trustworthy Recommender Systems

Yingqiang Ge, Shuchang Liu, Zuohui Fu, Juntao Tan, Zelong Li, Shuyuan Xu, Yunqi Li, Yikun Xian and Yongfeng Zhang. In ACM Transactions on Recommender Systems (**TORS**).

Explainable Fairness in Recommendation

Yingqiang Ge, Juntao Tan, Yan Zhu, Yinglong Xia, Jiebo Luo, Shuchang Liu, Zuohui Fu, Shijie Geng, Zelong Li and Yongfeng Zhang. In Proceedings of the 45th International ACM SIGIR Conference on Research and Development in Information Retrieval (**SIGIR 2022**), July 11 - 15, 2022, Madrid, Spain.

HOOPS: Human-in-the-Loop Graph Reasoning for Conversational Recommendation

Zuohui Fu, Yikun Xian, Yaxin Zhu, Shuyuan Xu, Zelong Li, Gerard de Melo and Yongfeng Zhang. In Proceedings of the 44th International ACM SIGIR Conference on Research and Development in Information Retrieval (**SIGIR 2021**), July 11 - 15, 2021, Virtual Event, Canada.

DiWBot: A Cooking and DIY Conversation Guidance System

Richard Magnotti, Denson George, Zelong Li, Jianchao Ji, Hyungjung Joo, Jiaxing Yu, Ramitha Ravishankar, Lina Moe, Baber Khalid, Yongfeng Zhang and Matthew Stone. Alexa Prize TaskBot Challenge 2 Proceedings.

AutoFlow: Automated Workflow Generation for Large Language Model Agents

Zelong Li, Shuyuan Xu, Kai Mei, Wenyue Hua, Balaji Rama, Om Raheja, Hao Wang, He Zhu and Yongfeng Zhang. arXiv:2407.12821.

Formal-LLM: Integrating Formal Language and Natural Language for Controllable LLM-based Agents
Zelong Li, Wenyue Hua, Hao Wang, He Zhu and Yongfeng Zhang. arXiv:2402.00798.

PAP-REC: Personalized Automatic Prompt for Recommendation Language Model
Zelong Li, Jianchao Ji, Yingqiang Ge, Wenyue Hua and Yongfeng Zhang. arXiv:2402.00284.

Disentangling Logic: The Role of Context in Large Language Model Reasoning Capabilities
Wenyue Hua, Kaijie Zhu, Lingyao Li, Lizhou Fan, Shuhang Lin, Mingyu Jin, Haochen Xue, Zelong Li, JinDong Wang and Yongfeng Zhang. arXiv:2406.02787.

AIOS: LLM Agent Operating System
Kai Mei, Zelong Li, Shuyuan Xu, Ruosong Ye, Yingqiang Ge and Yongfeng Zhang. arXiv:2403.16971.

CoRE: LLM as Interpreter for Natural Language Programming, Pseudo-Code Programming, and Flow Programming of AI Agents
Shuyuan Xu, Zelong Li, Kai Mei and Yongfeng Zhang. arXiv:2405.06907.

TrustAgent: Towards Safe and Trustworthy LLM-based Agents through Agent Constitution
Wenyue Hua, Xianjun Yang, Zelong Li, Cheng Wei and Yongfeng Zhang. arXiv:2402.01586.

Counterfactual Evaluation for Explainable AI
Yingqiang Ge, Shuchang Liu, Zelong Li, Shuyuan Xu, Shijie Geng, Yunqi Li, Juntao Tan, Fei Sun and Yongfeng Zhang. arXiv:2109.01962.

PROJECTS

Web Intelligent Systems and Economics Lab, Department of Computer Science, Rutgers University

Advisor: Yongfeng Zhang, Assistant Professor, Department of Computer Science.

LLM as Interpreter for Natural Language Programming, and Auto generation framework Feb 2024 – May 2024

- Designed a CoRE language unifying natural language / pseudo-code / flow programming with syntax grammar.
- Proposed the CoRE system utilizing LLM as an interpreter to interpret and execute natural language programs.
- Developed a framework to automatically generate natural language program and verify on benchmark datasets.

Integrate Formal Language and Natural Language for Controllable LLM-based Agents Sep 2023 – Jan 2024

- Proposed a framework to introduce formal language and automaton to control the LLM-based agents' planning.
- Designed context-free grammar for the benchmark tasks to ensure the validity of the generated plans.
- Conducted experiments on benchmark and real-life practical tasks to verify the effectiveness of the framework.

Automatic Personalized Prompt Generation for Recommendation Foundation Models Sep 2022 – May 2023

- Proposed a framework to generate personalized prompts for recommendation foundation models automatically.
- Developed surrogate metrics to generate effective automated personalized prompts efficiently.
- Designed an iterative and alternative token update schedule to solve the inflating search space.

Automatic Loss Function Generation for Recommender Systems Jun 2021 – Jan 2022

- Designed the efficient nested loss function search framework for recommender systems with basic operators.
- Used reinforcement learning to search and construct high-quality loss functions for given data and metrics.
- Developed proxy test and reward filtering mechanism to speed up the loss generation process.

Explainable AI in Science Discovery Sep 2020 – May 2021

- Used Explainable AI, including neural networks and symbolic regression, to rediscover Kepler's and Newton's laws on Tycho Brahe's astronomical observation data.
- Compared Explainable AI and black-box AI for future science discovery by using AI.
- Proposed a solution to augment limited observation data by neural networks with PyTorch.

Efficient Non-Sampling Knowledge Graph Embedding

Sep 2019 – Aug 2020

- Designed non-sampling frameworks for knowledge graph embedding applicable to several existing models.
- Derived an efficient method to mitigate the time and space bottlenecks caused by the non-sampling strategy.
- Conducted comprehensive experiments with PyTorch to show that the framework increases both accuracy and efficiency for knowledge graph embedding.

Knowledge Extraction for Explanation Generation on Recommender Systems

Aug 2018 – Sep 2018

- Designed and implemented the algorithm with Python to calculate all paths under a certain length between two designated nodes on a knowledge graph.
- Constructed knowledge graphs from reviews on Amazon and heterogeneous information about products.
- Composed datasets on knowledge graphs from heterogeneous information for explainable recommender systems.

Information Retrieval Group, Department of CST, Tsinghua University

Dec 2017 – Jul 2019

Advisor: Yiqun Liu, Associate Professor, Information Retrieval Group.

Chinese Query Categorization

- Devised algorithms to categorize Chinese queries based on domains retrieved from search engines.
- Applied the categories to a small part of datasets for verifying effectiveness manually.
- Established datasets of categorized queries on a commercial search engine for task division during a session.

Database Research Group, Department of CST, Tsinghua University

Nov 2016 – Aug 2017

Advisor: Guoliang Li, Associate Professor, Database Research Group.

Road Network Matching

- Implemented ST-Matching algorithm designed for matching trajectories with road networks on a digital map.
- Utilized public road network and GPS trajectories for testing and verifying the effectiveness of the algorithm.

ACADEMIC SERVICES

- PC member: AAAI 2025, TheWebConf 2025, Recsys 2024, KDD 2024, ICLR 2024, SDM 2024, CIKM 2024, SDM 2024, AAAI 2024, IEEE BigData 2024, KDD 2023, AAAI 2023, CIKM 2023
- Reviewer: NAACL 2025, ACL ARR 2024, NeurIPS 2024, SIGIR 2024, SIGIR 2024, TheWebConf 2024, Recsys 2023, SIGIR 2023, TheWebConf 2023, NCIT 2022, TOIS 2022, CIKM 2021, NeurIPS 2020

TEACHING EXPERIENCE

Teaching Assistant

- Fall 2021 & Fall 2020 & Fall 2019: CS344: Design and Analysis of Algorithms
- Summer 2021: CS211: Computer Architecture
- Spring 2021: CS419: Computer Security
- Summer 2020: CS 205: Introduction to Discrete Structures I
- Spring 2020: CS323: Numerical Analysis and Computing