

# Zelong Li

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## EDUCATION

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**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

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**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

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

## PROFESSIONAL SKILLS

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

## PUBLICATIONS

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### **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 33<sup>rd</sup> 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 45<sup>th</sup> 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 47<sup>th</sup> 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 46<sup>th</sup> 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 37<sup>th</sup> 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 16<sup>th</sup> 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 45<sup>th</sup> 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 44<sup>th</sup> 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, Jiaying 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

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### **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**

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

## **TEACHING EXPERIENCE**

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### *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