

Xiaotong CUI

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RESEARCH INTERESTS

Large language models (LLMs) and vision-language models (VLMs); **multimodal agents grounded in interactive environments**; evaluation and benchmarking of foundation models; efficient representation learning and retrieval (learned indexes, high-dimensional similarity search) for large-scale models.

EDUCATION

University of Southern California **08/2025-05/2027 (Expected)**

Degree: Master of Science, Computer Science **GPA:** 4.0/4.0

Courses: Deep Learning and Its Applications, Natural Language Processing, Analysis of Algorithms, Database Systems

Heilongjiang University

09/2021-06/2025

Degree: Bachelor of Engineering, Software Engineering **GPA:** 9/10 (Top 2%)

Thesis: "SCAD: A Lightweight Recommendation Model Based on Multiple Interests" (Outstanding Undergraduate Thesis)

PUBLICATIONS

[M1] D. Ashok, A. Shen[†], A. H. Feng[†], C. Khanna[†], J. R. Huang[†], R. Sarmukaddam[†], S. B. Natarajan[†], Xiaotong Cui[†], X. Zhang[†], T. Yen, H. Namkoong, J. May, J. Thomason. "GameBoyWorlds: A Testbed for Self-Improvement in Embodied Video Games." *Under review at ICLR 2027.*

link: <https://arxiv.org/abs/2609.32093> [†] Co-second author (equal contribution)

[P1] Xiaotong Cui, Shengli Qiu, Nan Wang, Yingli Zhong. "SCAD: A Lightweight Recommendation Model Based on Multi-Interest." Published in IEEE International Conference on High Performance Computing and Communications (HPCC), 2025.

link: <https://doi.org/10.1109/HPCC67675.2025.00024> *code:* <https://github.com/Denny-Cui/SCAD>

[P2] Yan Zhang, Xiaotong Cui, Nan Wang, Yingli Zhong. "ACNNS: A Multi-Interest Recommendation Model with Capsule Network." Published in IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing (CCGrid), 2026.

[P3] Lijin Mu, Nan Wang, Ziqi Liu, Xiaotong Cui, Jinbao Li. "Structural Hole-based Heterogeneous Hypergraph for Group Recommendation." Published in Expert Systems with Applications, Article 127996 (2025).

link: <https://doi.org/10.1016/j.eswa.2025.127996>

[P4] Lingli Li, Ao Han, Xiaotong Cui, Baohua Wu. "FLEX: A Fast and Light-weight Learned Index for kNN Search in High-Dimensional Space." Published in Information Sciences, Volume 669 (2024), Article 120546.

link: <https://doi.org/10.1016/j.ins.2024.120546> *code:* <https://github.com/HanaoFLEX/FLEX-index>

RESEARCH EXPERIENCE

Co-second Author, Benchmarking VLM Agents in Game Environments **2025-Present**
University of Southern California, PI: Prof. Jesse Thomason

- Co-developing a benchmark that evaluates how well VLM-based agents ground visual perception into decisions and actions in complex, interactive video-game environments
- Deployed the benchmark across multiple games using the PyBoy Game Boy emulator, enabling multimodal agents to be evaluated in diverse interactive game environments
- Collaborate with PhD researchers on task design, agent evaluation, and experiments; manuscript under review at ICLR 2027 [M1]

Relevant fields: VLM, Multimodal Agents, Benchmarking, Game Boy, PyBoy

First Author, Multi-Interest Sequential Recommendation

2024-2025

Heilongjiang University, Undergraduate Thesis Project

- Proposed SCAD, a lightweight model using capsule-network modules to dynamically extract multiple interest representations per user from behavior sequences [P1]; code released open-source
- Co-developed ACNNS, a unified multi-interest framework integrating neighbor-sequence enhancement with attention-based capsule networks to systematically improve multi-interest recommendation [P2]
- Thesis recognized as an Outstanding Undergraduate Thesis of Heilongjiang University

Relevant fields: Sequential Recommendation, Capsule Network, Attention Mechanism

Co-Author, FLEX: Learned Index for High-Dimensional kNN Search

2023-2024

Heilongjiang University

- Developed deep neural network (DNN) components that learn correlations in high-dimensional data to group similar objects, reducing the search cost of kNN and range queries [P4]
- Introduced a multi-module DNN framework that partitions learning across smaller modules, plus a linear-time data layout refinement algorithm that bounds candidate size, achieving superior time and space efficiency with high accuracy

Relevant fields: Learned Index, Similarity Search, kNN Search, Range Query

INTERNSHIP

Intern, Google Advertising (Shanghai) Co., Ltd.

05/2024-08/2024

- Analyzed large-scale advertising datasets with Python, PyTorch, TensorFlow and MySQL to identify patterns that improve campaign performance and client ROI
- Assisted in designing and implementing algorithms to improve ad targeting accuracy and user engagement
- Automated data preprocessing, report generation and campaign management workflows; built real-time KPI dashboards in Tableau and Google Data Studio

Skills: Machine Learning, Deep Learning, PyTorch, TensorFlow, Python

Backend Development Intern, Chongqing Huisi Hongyue Technology Co., Ltd.

01/2024-03/2024

- Designed and maintained server-side logic and RESTful APIs; resolved issues with cross-functional teams to improve system stability

Skills: C/C++, Java, MySQL

Software Development Intern, Guangzhou Pearl River Piano Group Co., Ltd.

07/2023-08/2023

- Built prototypes and proofs of concept, performed system testing and validation, and optimized database structures and queries

Skills: C/C++, Python, MySQL

HONORS & AWARDS

Honorary Bachelor's Degree, Heilongjiang University (HLJU)

06/2025

Outstanding Undergraduate Thesis, HLJU

06/2025

Third Prize (2 times), China Collegiate Programming Contest (CCPC) National Invitational

2024, 2023

Second Prize (2 times), Heilongjiang Provincial Collegiate Programming Contest

2023, 2022

Comprehensive Scholarship of HLJU (3 times)

2024, 2023, 2022

EXTRACURRICULAR ACTIVITIES

President, Society for Science, Technology and Innovation

05/2023-05/2024

- Organized programming competitions and exams, developed competition questions and led the assessment process; managed daily operations and built partnerships with other academic organizations

ADDITIONAL

- **ML / DL:** PyTorch, TensorFlow; Vision-Language Models, Multimodal Agents, NLP, Computer Vision, Recommender Systems, Similarity Search
- **Programming:** Python, C/C++, Java, MySQL; PyBoy, Tableau, Google Data Studio
- **Languages:** English, Mandarin (native), Cantonese (native)