Ningzhi Tang

Curriculum Vitae

Department of Computer Science and Engineering
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Research Interests

Human Aspects in Software Engineering, Human-Computer Interaction, Human-AI Interaction, Programming Tools, Artificial Intelligence for Software Engineering, Computer Science Education

Education

University of Notre Dame 2023 – Present
Ph.D. Student in Computer Science and Engineering *Notre Dame, IN, USA*
Advisor: Toby Jia-Jun Li
GPA: 4.0/4.0

Southern University of Science and Technology 2019 – 2023
B.E. in Computer Science and Engineering *Shenzhen, Guangdong, China*
Advisor: Yuhui Shi
GPA: 3.93/4.0, *Ranking*: 1/207

Selected Honors and Awards

VL/HCC 2024 Doctoral Consortium Grant ($2700)	2024
Graduate School Professional Development Awards, Notre Dame ($1250)	2024
Distinguished Undergraduate Thesis of SUSTech (Top 4.8%)	2023
Excellent Graduate in the SUSTech, CSE Department, and Zhiren College	2023
1st Class of the Merit Student Scholarship of SUSTech (Top 5.6%, ¥18000)	2020, 2021, 2022
Outstanding Student Leaders of SUSTech	2021
1st Prize in Undergraduate Mathematical Modeling Contest, China (Top 0.68%)	2021
1st Prize in Chinese Mathematics Competitions, Guangdong Province (Top 7.8%)	2021

Major Refereed Conference and Journal Papers

[1] **Enabling On-Device Learning via Experience Replay with Efficient Dataset Condensation**
Gelei Xu, Ningzhi Tang, Jun Xia, Ruiyang Qin, Wei Jin, and Yiyu Shi
Proceedings of the 2024 Design, Automation & Test in Europe Conference & Exhibition (DATE 2024)

[2] **Developer Behaviors in Validating and Repairing LLM-Generated Code Using IDE and Eye Tracking**
Ningzhi Tang*, Meng Chen*, Zheng Ning, Aakash Bansal, Yu Huang, Collin McMillan, and Toby Jia-Jun Li
Proceedings of the 2024 IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC 2024)

[3] **CodeGRITS: A Research Toolkit for Developer Behavior and Eye Tracking in IDE**
Ningzhi Tang*, Junwen An*, Meng Chen, Aakash Bansal, Yu Huang, Collin McMillan, and Toby Jia-Jun Li
Proceedings of the 2024 IEEE/ACM 46th International Conference on Software Engineering (ICSE 2024): Demonstrations Track

[4] **Semi-decentralized Federated Ego Graph Learning for Recommendation**
Liang Qu*, Ningzhi Tang*, Ruiqi Zheng, Quoc Viet Hung Nguyen, Zi Huang, Yuhui Shi, and Hongzhi Yin
Proceedings of the ACM Web Conference 2023 (WWW 2023)

[5] **Single-shot Embedding Dimension Search in Recommender System**
Liang Qu*, Yonghong Ye*, Ningzhi Tang, Lixin Zhang, Yuhui Shi, and Hongzhi Yin
Proceedings of the 45th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR 2022)

Lightly Reviewed Posters, Extended Abstracts, and Workshop Papers

[1] **Towards Effective Validation and Integration of LLM-Generated Code**
Ningzhi Tang
2024 IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC 2024): Graduate Consortium

[2] **An Empirical Study of Developer Behaviors for Validating and Repairing AI-Generated Code**
Ningzhi Tang*, Meng Chen*, Zheng Ning, Aakash Bansal, Yu Huang, Collin McMillan, and Toby Jia-Jun Li
The 13th Annual Workshop on the Intersection of HCI and PL (PLATEAU 2023)

Papers Under Review

[1] **Programmer Visual Attention During Context-Aware Code Summarization**
Aakash Bansal, Robert Wallace, Zachary Karas, Ningzhi Tang, Yu Huang, Toby Jia-Jun Li, and Collin McMillan
arXiv preprint arXiv:2405.18573

Open-Source Softwares

[1] **CodeGRITS: A Research Toolkit for Developer Behavior and Eye Tracking in IDE**
[Website] [GitHub] [Javadoc] [Video]

[2] **WebSight: Web-based Eye Tracking Code Editor for Software Engineering Studies**
[GitHub] [Demo]

[3] **WritePolisherX: A Browser-Based Toolkit for Enhancing English Writing Quality**

[GitHub]

Research Experience

Human-AI System for Validating and Integrating LLM-Generated Code 2024 – Present
Lead Researcher *University of Notre Dame*

- Designed a human-AI collaborative system to help developers understand and modify LLM-generated code to match their intentions by combining multi-level natural language explanations and further procedurally prompting the LLM for editing.
- Implemented a prototype using IntelliJ Platform Plugin SDK, React, and OpenAI API to evaluate the feasibility of the proposed approach.

Developer Behaviors for Validating and Repairing LLM-Generated Code 2022 – 2024
Lead Researcher, Paper Accepted at VL/HCC 2024 *University of Notre Dame*

- Designed an empirical study to investigate how developers validate and repair Copilot-generated code and examine the impact of code provenance awareness during these processes.
- Conducted lab studies with 28 participants, performing qualitative and quantitative analyses using IDE tracking, eye tracking, cognitive workload assessments, and semi-structured interviews.
- Published the preliminary findings at PLATEAU 2023 and a full paper at VL/HCC 2024.

A Research Toolkit for Developer Behavior and Eye Tracking in IDE 2022 – 2023
Lead Researcher, Paper Accepted at ICSE 2024 Demonstrations *University of Notre Dame*

- Developed CodeGRITS, a JetBrains plugin that simultaneously tracks developers' IDE interactions and eye movements to understand their behaviors.
- Offered wide compatibility across multiple IDEs and programming languages, with additional features (e.g., screen recorder, real-time API) to meet the needs of empirical SE researchers.
- Designed a website with comprehensive resources (e.g., usage guide, data format); open-sourced the code with Javadoc included, attracting multiple users for research and educational purposes.

Semi-decentralized Federated Ego Graph Learning for Recommendation 2022
Co-Lead Researcher, Paper Accepted at WWW 2023 *SUSTech*

- Proposed SemiDFEGL, a semi-decentralized federated ego graph learning framework for on-device, privacy-preserving recommendations.
- Implemented SemiDFEGL and reproduced approximately ten baselines to evaluate its performance for Top-*k* recommendations across three widely used public datasets.

Single-shot Embedding Dimension Search in Recommender System 2021 – 2022
Collaborator, Paper Accepted at SIGIR 2022 *SUSTech*

- Proposed SSEDS, a model-agnostic, single-shot embedding pruning method, which assigns dimensions to each feature field of embeddings while maintaining recommendation accuracy.
- Implemented SSEDS on classical deep-learning recommender systems, i.e., FM, DeepFM, Wide&Deep, and conducted CTR prediction experiments on two public datasets.

Selected Presentations

[1] **Developer Behaviors in Validating and Repairing LLM-Generated Code Using IDE and Eye Tracking**
Oral Presentation at VL/HCC 2024
Liverpool, UK. Sept. 2024

[2] **Towards Effective Validation and Integration of LLM-Generated Code**
Oral & Poster Presentation at VL/HCC 2024
Liverpool, UK. Sept. 2024

[3] **CodeGRITS: A Research Toolkit for Developer Behavior and Eye Tracking in IDE**
Oral Presentation at ICSE 2024
Lisbon, Portugal. Apr. 2024

[4] **Understanding Developer-AI Collaboration: A Behavioral and Cognitive Modeling Approach**
Poster Presentation at Lucy Institute for Data & Society 2022 Fall Symposium
Notre Dame, IN. Oct. 2022

Teaching Experience

Teaching Assistant, *CSE 30332 Programming Paradigms* Spring 2024
Department of Computer Science and Engineering, University of Notre Dame
Teaching Assistant, *CSE 30151 Theory of Computing* Fall 2023
Department of Computer Science and Engineering, University of Notre Dame

Professional Service

Student Volunteer, ACM UIST 2024
Student Organizer, Notre Dame Natural Language Processing Lunch Seminar (NL+), 2023 – 2024
Conference Reviewer, ACM CHI 2024 LBW

Languages

English – Proficient, **Chinese (Mandarin)** – Native

Technical Skills

Programming Skills: Java, Python, C/C++, SQL, React, PyTorch, JetBrains/VSCode Plugin
UX Skills: Qualitative Research, Quantitative Research, Experiment Design, Figma, PhotoShop
Keywords: Machine Learning, Deep Learning, Recommender System, Programming Tools