Wu Yiqian

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Peking University - School of Computer Science - Ph.D. Student

Research Interest

My research areas are software engineering and programming languages, with a focus on fault localization, automated program repair, probabilistic programming, and prompt engineering. Currently, I am working on a debugging system based on large language models with dynamic program analysis.

Education

- **Peking University** — **Beijing, China**
  Ph.D. in Computer Science — *Sep. 2021 – present*
- **Peking University** — **Beijing, China**
  B.S. in Computer Science, GPA 3.70/4.0, rank 34/232 — *Sep. 2016 – Jun. 2021*

Research & Development Experience

- **Huawei** — **Beijing, China**
  SDE intern — *Sep. 2025 – present*
  Projects: Lingxi Code Agent
- **Micro Trading** — **Beijing, China**
  Quantitative research intern — *June. 2025 – Aug. 2025*
  Projects: Quant Factor DSL Compiler Optimization
- **Peking University** — **Beijing, China**
  Ph.D student, supervised by Prof. Lu Zhang and Prof. Yingfei Xiong — *Sep. 2021 – present*
  Projects: Semantics Based Probabilistic Fault Localization, Belief Propagation with Local Structure, LLM Debugging Agent with Dynamic Analysis
- **Peking University** — **Beijing, China**
  Undergraduate research assistant in the group of Prof. Yingfei Xiong — *Feb. 2019 – Jun. 2021*
  Projects: Fault Localization via Probabilistic Inference

Publications

Journal and Conference

[1] Yiqian Wu, Yifan Chen, Yingfei Xiong, Xin Zhang. Belief Propagation with Local Structure and Its Applications in Program Analysis. ASE 2025, To Appear.

[2] Yiqian Wu, Yujie Liu, Yi Yin, Muhan Zeng, Zhentao Ye, Xin Zhang, Yingfei Xiong, and Lu Zhang. 2025. SmartFL: Semantics Based Probabilistic Fault Localization. IEEE Trans. Software Eng. 51, 7 (2025), 2161–2180. [Paper]

[3] Xin Zhang, Guancheng Wang, Yiqian Wu, Yifan Chen, Tianchi Li, Yifan Zhang, Yingfei Xiong. Bayesian Program Analysis. Acta Electronica Sinica, Vol. 52, No. 4, 2024. [Paper]

[4] Guancheng Wang, Yiqian Wu, Qihao Zhu, Yingfei Xiong, Xin Zhang, Lu Zhang. A Probabilistic Delta Debugging Approach for Abstract Syntax Trees. In 34th IEEE International Symposium on Software Reliability Engineering (ISSRE 2023), September 2023. [Paper]

[5] Muhan Zeng #, Yiqian Wu#, Zhentao Ye, Yingfei Xiong, Xin Zhang, Lu Zhang. Fault Localization via Efficient Probabilistic Modeling of Program Semantics. In 44th IEEE/ACM International Conference on Software Engineering (ICSE 2022), May 2022. [Paper]

Equal contributors are sorted alphabetically and marked with #.

Selected Projects

- **MetaFL**
  LLM Debugging Agent with Dynamic Analysis
  - Traces the dynamic call graph and runtime variable values of failing test.
  - Uses LLMs to navigate the project via dynamic information and find the faults.
  - Uses LLMs to generate patches for verification feedback.
- **Genetic Factor Language**
  Micro Trading Summer Intern Project
  - Genetic Factor Language (GFL) is a DSL for describing quant factor logic, the DSL framework can automatically generate C++ code for efficient computation.
  - For repeated structures in multiple factors, GFL uses a unified computation graph to reduce duplicate computation.
  - My project optimizes the compilation time of generated C++ code through separate compilation.
  - My project also performs graph partition for efficient parallel computation and operator fusion for memory access optimization
- **SmartFL: Semantics Based Probabilistic Fault Localization**
  Implementation of Publication [2] and [5]
  - Traces the bytecode execution trajectory of Java tests, applied adaptive folding and loop compression.
  - Builds the dynamic dependency graph from the traces, applied virtual call edge and exception handling.
  - Performs probabilistic modeling and inference, applied inference optimization.
- **Implementation of Belief Propagation with Local Structure**
  Implementation of Publication [1]
  - Implements loopy belief propagation for probabilistic Horn clauses.
- **A MiniC to RISC-V compiler**
  Compiler Design Course Lab
  - Includes a parser using lex/yacc for MiniC, a subset of C.
  - Optimizes with copy propagation, live variable analysis, and dead code elimination.
  - Uses linear scan to allocate registers.

Technical and Personal Skills

- **Programming Languages:** Proficient in: Java, Python, C, C++; Familiar with: Racket, JavaScript, OCaml
- **Languages:** Native in Chinese, High intermediate level of English, CET-6: 511

Awards and Scholarships

- Huawei Scholarship, Peking University 2025
- Merit Student, Peking University 2025
- Summer Intern MVP, Micro Trading 2025
- Youth Award for Athletics, Peking University 2024
- Award for Scientific Research, Peking University 2020, 2022, 2023
- Award for Academic Excellents, Peking University 2017, 2018, 2019
- May 4th Scholarship, Peking University 2018
- Champion of China University Chess Championship, Men's Untitled Division 2022, 2023, 2024