Miao Miao

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RESEARCH INTERESTS

My research interest lies in program analysis and fuzz testing, and their applications in software reliability and security. I focus on enhancing the reliability and usability of static analysis tools by automatically detecting bugs and diagnosing their root causes. I also work on improving the fuzz testing evaluation process by developing benchmarks that integrate program characteristics, aiming for a more comprehensive and accurate assessment of fuzzing tools.

EDUCATION

Doctor of Philosophy, Software Engineering *Jan 2023 - present*
The University of Texas at Dallas, Richardson, Texas, USA
Advisor: Dr. Shiyi Wei

Master of Science, Software Engineering *Aug 2021 - Dec 2022*
The University of Texas at Dallas, Richardson, Texas, USA GPA: 3.97

Bachelor of Engineering, Computer Science and Technology *Sep 2014 - June 2018*
The Xi'an University of Finance and Economics, Xi'an, China GPA: 3.59

AWARDS

- The Jonsson School Best Teaching Assistant Award in 2024.
- The ACM SIGSOFT CAPS Travel Award for ICSE 2025.

PUBLICATIONS

** ICSE and ISSTA are top-tier conferences in Software Engineering, while TOSEM and EMSE are among the field's leading journals.*

- **Program Feature-based Benchmarking for Fuzz Testing**
Miao Miao, Sriteja Kummita, Eric Bodden, and Shiyi Wei.
In the 34th ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA), 2025.

- **An Extensive Empirical Study of Nondeterministic Behavior in Static Analysis Tools**
Miao Miao, Austin Mordahl, Dakota Soles, Alice Beideck, and Shiyi Wei.
In the 47th IEEE/ACM International Conference on Software Engineering (ICSE), 2025.

- **Program Feature-based Fuzzing Benchmarking**
Miao Miao.
In the 47th IEEE/ACM International Conference on Software Engineering, ACM Student Research Competition (ICSE-SRC), 2025.

- **Visualization Task Taxonomy to Understand the Fuzzing Internals (Registered Report)**
Kummita Sriteja, **Miao Miao**, Bodden Eric, and Shiyi Wei.
In the Proceedings of the 3rd ACM International Fuzzing Workshop (FUZZING), 2024.

- **ECSTATIC: Automatic Configuration-Aware Testing and Debugging of Static Analysis Tools**
Austin Mordahl, Dakota Soles, **Miao Miao**, Zenong Zhang, and Shiyi Wei.
In the 47th IEEE/ACM International Conference on Software Engineering (ICSE), 2025.

Papers Under Review

- **Visualization Task Taxonomy to Understand the Fuzzing Internals**
Kummita Sriteja, **Miao Miao**, Bodden Eric, and Shiyi Wei.
Under review at ACM Transactions on Software Engineering and Methodology Journal, 2025.

- **Towards Automated Identification of Data Constraints in Software Documentation**
Ying Zhou, **Miao Miao**, Vlad Birsan, Oscar Chaparro, Shiyi Wei, and Andrian Marcus.

Under review at Empirical Software Engineering Journal, 2025.

RESEARCH EXPERIENCE

Fuzzing Bottleneck Localization *Jan 2025 – Present*

- Conduct experiments to identify fuzzing blockers across different fuzzers (e.g., AFL++, LibFuzzer, Honggfuzz) using Fuzz-Introspector.
- Analyze the impact of various factors on fuzzing blocker detection, including branch side hit frequency, number of trials, and runtime.
- Investigate and localize the root causes of fuzzing blockers specific to each fuzzer.
- Perform differential testing to evaluate how fuzzer design influences fuzzing blockers.

Program Feature-based Benchmarking for Fuzz Testing *May 2024 – Nov 2024*

- Performed a literature review of 25 recent grey-box fuzzing papers to extract fine-grained program features from their claimed improvements.
- Created the first feature-based benchmark that defines 10 configurable parameters for the extracted program features with 153 generated programs.
- Evaluated 11 popular fuzzers to understand fuzzer behaviors and the impact of each program parameter on their performance.

Visualization Task Taxonomy to Understand the Fuzzing Internals *May 2024 – Nov 2024*

- Conducted semi-structured interviews with fuzzing experts.
- Systematically extracted the task taxonomy from the interview data through qualitative data analysis.
- Evaluated the support of existing visualization tools for fuzzing through the lens of our taxonomy.

An Extensive Empirical Study of Nondeterministic Behavior in Static Analysis Tools *June 2023 – Aug 2024*

- Performed qualitative analysis of the repositories of 11 popular static analysis tools that shows common nondeterministic issues and categorizes their root causes.
- Constructed an experiment framework and conducted empirical study that detects previously unknown nondeterministic behaviors in tools such as SOOT, WALA, DOOP, FlowDroid, PyCG and Infer.
- Debugged root causes of discovered nondeterministic bugs and reported them to tool developers.

Towards Automated Identification of Data Constraints in Software Documentation *Sep 2022 – Dec 2023*

- Identified and validated the data constraints in requirements documentation which specify allowed data values in software systems.
- Identified 15 discourse patterns, commonly used to describe data constraints in natural language.
- Debugged and evaluated an NLP-based automated splitter which breaks down a sentence to fragments based on the developed discourse patterns. These patterns are used as features for machine learning.
- Trained and evaluated 5 machine learning classifiers for automatically extracting data constraints.

INDUSTRY EXPERIENCE

iOS Engineering Intern, Tinder Inc. *May 2022 – Aug 2022*

iOS Developer, LotusFlare Inc. *Aug 2019 – June 2021*

Junior Software Engineer, KA Software *Apr 2018 – Apr 2019*

TEACHING EXPERIENCE

Teaching Assistant

** Contributed to curriculum development and design of projects and assignments; Provided video and in-class tutorials to guide students through project implementation.*

- CS/SE 6356: Software Maintenance Evolution and Re-Engineering (Spring 2023)
- CS 4386: Compiler Design (Fall 2023)

- CS 6353: Compiler Construction (Spring 2024)

SERVICES

- Artifact Evaluation Committee member: the 46th ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2025).
- Junior Program Committee member: the 22nd International Conference on Mining Software Repositories (MSR 2025).
- Mentored four high school students and three undergraduate students in the UTD K-12 Summer Research Program and Clarks Summer Research Program (Summer 2023, Summer 2024).
- Student Volunteer: the 47th IEEE/ACM International Conference on Software Engineering (ICSE 2025).
- Student Volunteer: the 32nd ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2023).
- Sub-review: CCS2025, USENIX2025, ISSTA2025, ICSE2025, FSE2025, USENIX2024, MSR2025, ISSTA2024, ICSE2024, FSE2024, ASE2024, FSE 2023, ISSTA 2023, SecDev 2023, ICSE 2023.