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Jialu Zhang

Research interests

My research interests lie in programming languages and software engineering. I focus on automatically preventing, detecting, and repairing crucial errors in programs across different fields such as systems, software engineering and CS education.

Education

2023(Expected) **Ph.D.**, *Computer Science*, Yale University, New Haven, CT

Advisor Ruzica Piskac

2017 **B.S.**, *Information Engineering (IEEE Honor Class)*, Shanghai Jiao Tong University, Shanghai, China

Advisor Xinbing Wang

Publication

OOPSLA'21 **Jialu Zhang**, Ruzica Piskac, Ennan Zhai, Tianyin Xu: "Statically Detecting Silent Misconfigurations with Deep Interaction Analysis", *Proceedings of the 36th ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications*

ASE'22 **Jialu Zhang**, De Li, John Kolesar, Hanyuan Shi , Ruzica Piskac: "Automated Feedback Generation for Competition-Level Code", *The 37th IEEE/ACM International Conference on Automated Software Engineering*

ISSTA'22 **Jialu Zhang**, Todd Mytkowicz, Mike Kaufman, Ruzica Piskac and Shuvendu Lahiri: "Using Pre-trained Language Models to Resolve Textual and Semantic Merge Conflicts (Experience Paper)", *Proceedings of the 31st ACM SIGSOFT International Symposium on Software Testing and Analysis*

SANER'22 Mark Santolucito, **Jialu Zhang**, Ennan Zhai, Jurgen Cito, Ruzica Piskac: "Learning CI Configuration Correctness for Early Build Feedback", *Proceedings of the 29th edition of the IEEE International Conference on Software Analysis, Evolution and Reengineering*

arxiv **Jialu Zhang**, Jose Cambronero, Sumit Gulwani, Vu Le, Ruzica Piskac, Gustavo Soares, Gust Verbruggen: "Repairing Bugs in Python Assignments Using Large Language Models", in submission, preprint

arxiv **Jialu Zhang**, Yitan Wang, Mark Santolucito, Ruzica Piskac: "Succinct Explanations with Cascading Decision Trees", in submission, preprint

Research Experience

2017-Present **Yale University**, *Rigorous Software Engineering (ROSE) Group.*

Research Assistant for **Ruzica Piskac**.

• Designed Clef, the first paper at PL/SE conference on the topic of competitive programming. Automatically repaired incorrect competitive-level programs including non-functional property such as time and memory exceeded **[ASE'22]**.

• Designed ConfigX to derive complex dependencies between configurations by analyzing the semantics of system source code. Detected 2233 real silent misconfigurations in Apache, VSFTPD and PostgreSQL **[OOPSLA'21]**.

• Designed VeriCI to predict Continuous Integration (CI) build status (91% accuracy) with probable root cause locations in the source code **[SANER'22]**.

• Introduced a novel cascading decision trees model for accurate, fast, and interpretable classification. Evaluated our model on standard UCI datasets, shortened the explanation depth by over 60.42% for positive classifications [In submission].

2022 **Microsoft Research**, *Program Synthesis using Examples (PROSE) group*, Remote.

Research Intern for **Jose Cambronero, Vu Le, Sumit Gulwani**.

• Designed MMAPR, the first unified tool to automatically repair both syntactic and semantic errors in Python program using large language model [In submission].

2021 **Microsoft Research**, *Research in Software Engineering (RiSE) group*, Remote.

Research Intern for **Shuvendu Lahiri, Todd Mytkowicz**.

• Designed Gmerge, the first language model powered tool to repair merge conflicts. Evaluated on Microsoft Edge, obtained the state-of-the-art 64% fix rate on semantic merge conflicts **[ISSTA'22]**.

Currently under productizing in Microsoft Edge.

Teaching Experience

Database Systems (Fall 2018, Fall 2019, Fall 2021), Yale University. **Head TA**. In charge of quizzes and homework assignments. Helped instructor for designing exams. Led weekly office hour sessions. Average student-TA ratio: 1:40.

Principles of Operating Systems (Spring 2022), Yale University.

Principles and Practice of Computer Algorithms (Summer 2015), Shanghai Jiao Tong University.

Invited Talks and Presentations

2022 "Automated Feedback Generation for Competition-Level Code". ASE 2022.

2022 "Using Large Language Models to Repair Syntax and Semantic Bugs in Educational Programming Assignments", Microsoft Research,October 2022.

2022 "Automated Feedback Generation for Competition-Level Code". Microsoft Research, October 2022.

2022 "Automate What Users Need: Automatically Detecting And Repairing Errors", Microsoft Research, Virtual, July 2022.

2022 “Using Pre-trained Language Models to Resolve Textual and Semantic Merge Conflicts”. ISSTA 2022.

2022 “Learning CI Configuration Correctness for Early Build Feedback”. SANER 2022.

2021 "Statically Detecting Silent Misconfigurations with Deep Interaction Analysis". OOPSLA 2021.

2021 “Resolving Merge Conflicts in Microsoft Edge Using GPT-3”. Microsoft Research, July 2021.

2020 "Misconfiguration, From Networking to Programming Language", Shanghai Jiao Tong University, July 2020.

2019 "Statically Detecting Configuration Errors in Continuous Integration", Ninth Summer School on Formal Techniques (SSFT), May 2019.

Selected Honors and Awards

2022 Yale GSA CTF Award

2017 Yale University Graduate Fellowship

2017 National Endeavor Fellowship (Top 1%)

2017 A+ Senior Thesis, Shanghai Jiao Tong University (Top 5%)

2016, 2017 Academic Excellence Scholarship of Shanghai Jiao Tong University

Services

OOPSLA'23 **Program Committee Member** (External)

OOPSLA'23 Artifact Evaluation Committee Member

VMCAI'22 Artifact Evaluation Committee Member

Reviewer PLDI'18, PLDI'20, PLDI'21, PLDI'22, CAV'21, CAV'22, S&P'23

Coach ICPC North America Championship (Yale Team)

Lab Session GAINS: Girls Advancing in STEM, 2022

Keynote GAINS: Girls Advancing in STEM, 2022

Advertising Experience

2019-Present John Kolesar, Collaborated on a successful conference submission, currently as a Yale PhD Student.

2019-Present De Li, Collaborated on a successful conference submission, currently applying to graduate school.

2018-2019 Andreas Ravichandran, Collaborated on a senior thesis, currently at Centiva Capital.

Hobbies

Table Tennis Retired Pro player. Coached by Ding Song (Former Gold Metal of World Champion)

References

Ruzica Piskac (advisor)
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Shuvendu Lahiri
Senior Principal Researcher
RiSE: Research in Software Engineering Group, Microsoft Research
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Sumit Gulwani
Partner Research Manager
PROSE: Programming by Examples and Natural Language Team, Microsoft Research
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