

Shuyang Liu

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EDUCATION

Huazhong University of Science and Technology
B.E. in Computer Science

GPA: 3.92/4.00
Sept. 2020 - Jun. 2024

PUBLICATION

Symmetry-Preserving Program Representations for Learning Code Semantics

Kexin Pei, Weichen Li*, Qirui Jin*, **Shuyang Liu**, Scott Geng, Lorenzo Cavallaro, Junfeng Yang, Suman Jana

Accepted by Symposium on Machine Programming (MAPS) workshop at ESEC/FSE 2023

Submitted to International Conference on Learning Representations (ICLR), 2024. Under Review.

RESEARCH EXPERIENCE

Exploiting Code Symmetries for Learning Program Semantics

Columbia University

Advisor: Suman Jana

Mar. 2023 - Aug. 2023

- Constructed and computed Program Dependence Graphs (PDGs) based on data and control dependencies between statements.
- Implemented nine types of semantic-preserving source transformations beyond PDG automorphisms.
- Evaluated a range of baselines for method name prediction and defect detection.

Adversarial Attack on Large Language Models (LLMs) for code

University of Chicago

Advisor: Kexin Pei

Sept. 2023 - Present

Extended our work from inter-statement dependence to intra-statement dependence, constructing fine-grained Program Interpretation Graphs for LLMs to capture code symmetries.

- Static typed language: Extracted dependencies between tokens for Java based on JavaParser.
- Dynamic typed language: Performed static type inference for Python based on Pytype.

Automatic Identification of Bug Inducing Commits (BICs)

CASTLE Lab, Hong Kong University of Science and Technology

Advisor: Ming Wen

Ongoing

- Systematically validated bug-fixing and associated bug-inducing commits for 237 bugs across five large open-source Java projects via bisect testing on version histories.
- Conducted control-flow and data-flow analysis to slice dependent statements for enhanced statement coverage analysis.
- Improved BIC candidate detection by integrating failure coverage analysis with the SZZ algorithm.

EXCHANGE PROGRAM

Real-time Traffic Sign Recognition with Adversarial Training

School of Computing, National University of Singapore

Advisor: Terence Sim

May. 2022 - Aug. 2022

- Role: Student Team **Leader**
- Constructed and tuned a Convolutional Neural Network (CNN); Implemented a suite of innovative data augmentation techniques to improve adversarial robustness and generalize to diverse scenarios.

TECHNICAL SKILLS

- **Languages:** C/C++, Java, Python (Pytorch, Tensorflow)
- **Tools:** Git, Linux, LaTeX, CodeQL, Soot, Tree-sitter, and JavaParser
- **Areas of Interest:** Software Engineering, Security, Programming Languages, and Machine Learning
- **Selected Honors & Awards:** Excellent Student Cadre (2020), Outstanding Undergraduate of Academic Performance (2021), Science and Technical Innovation Scholarship (2022)