

# 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*

- Employed Tree-sitter to construct Program Dependence Graphs (PDGs) based on data and control dependencies between statements.
- Implemented nine types of semantic-preserving source transformations.
- Evaluated a range of traditional and LLM baseline models for method name prediction.

### **Enhancing Code Semantics Learning with Fine-Grained PDGs**

*University of Chicago*

**Advisor: Kexin Pei**

*Sept. 2023 - Present*

Extended our existing work from inter-statement analysis to intra-statement analysis, constructing fine-grained Program Interpretation Graphs for the model to learn code semantics.

- Static typed language: Employed JavaParser to extract dependencies between tokens for Java.
- Dynamic typed language: Applied Pytype to perform static type inference for Python.

### **Automatic Identification of Bug Inducing Commits**

*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.
- Reproduced SZZ Unleashed algorithm on Defects4J database.
- Improved BIC candidate detection by integrating Failure Coverage analysis with SZZ Unleashed.

## 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 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, Soufflé, CodeQL, Tree-sitter, and JavaParser
- Areas of Interest:** Software Engineering, Security, Programming Languages, and Machine Learning