Chenyuan Yang

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RESEARCH INTEREST

My research aims to improve the *reliability* of software systems. I am interested in leveraging testing, analysis, and verification techniques to make software systems more *reliable* and *robust*, especially for machine learning systems. Besides, I enjoy contributing to the open-source community.

Currently, I focus on testing deep learning libraries, which are the central infrastructure for building, training, optimizing and deploying deep learning models. Until now, my work has totally detected **353** previously unknown bugs for widely-used deep learning libraries, including PyTorch, TensorFlow, JAX, and OneFlow.

EDUCATION

University of Illinois at Urbana-Champaign   Aug. 2022 - Present
Ph.D. Student in Computer Science, advised by Prof. Lingming Zhang   IL, US

Nanjing University   Sept. 2018 - Jul. 2022
B.Sc. in Computer Science and Technology, graduated with honors   Nanjing, China
- Enrolled in *Elite Class*, GPA 91.2/100, rank 1/24

PUBLICATION

KernelGPT: Enhanced Kernel Fuzzing via Large Language Models
Preprint 2023.
Chenyuan Yang, Zijie Zhao, Lingming Zhang. [paper]

White-box Compiler Fuzzing Empowered by Large Language Models
Preprint 2023.
Chenyuan Yang, Yinlin Deng, Runyu Lu, Jiayi Yao, Jiawei Liu, Reyhaneh Jabbarvand, Lingming Zhang. [paper]

Large Language Models are Edge-Case Generators: Crafting Unusual Programs for Fuzzing Deep Learning Libraries
46th IEEE/ACM International Conference on Software Engineering **(ICSE) 2024.**
Yinlin Deng, Chunqiu Steven Xia, Chenyuan Yang, Shizhuo Dylan Zhang, Shujing Yang, Lingming Zhang. [paper]

Large Language Models are Zero-Shot Fuzzers: Fuzzing Deep-Learning Libraries via Large Language Models
32nd ACM SIGSOFT International Symposium on Software Testing and Analysis **(ISSTA) 2023.**
Yinlin Deng, Chunqiu Steven Xia, Haoran Peng, Chenyuan Yang, Lingming Zhang. [paper] [code]

Fuzzing Automatic Differentiation in Deep-Learning Libraries
45th IEEE/ACM International Conference on Software Engineering **(ICSE) 2023.**
Chenyuan Yang, Yinlin Deng, Jiayi Yao, Yuxing Tu, Hanchi Li, Lingming Zhang. [paper] [code]

Fuzzing Deep-Learning Libraries via Automated Relational API Inference
30th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering **(ESEC/FSE) 2022.**
Yinlin Deng*, Chenyuan Yang*, Anjiang Wei, Lingming Zhang. [paper] [code]

Free Lunch for Testing: Fuzzing Deep-Learning Libraries from Open Source
44th IEEE/ACM International Conference on Software Engineering **(ICSE) 2022.**
Anjiang Wei, Yinlin Deng, Chenyuan Yang, Lingming Zhang. [paper] [code]

* denotes joint first authors

Professional Experience

SWE Intern at Project Starline, Google   May. 2023 - August 2023
Hosted by Srinivas Kaza and Lukas Murmann
Topic: JAXGL - Integrate High Performance Graphics Primitives into ML

Research Assistant at PL/FM/SE Group, UIUC   May. 2021 - Present
Advised by Prof. Lingming Zhang
Topic: Fuzzing DL libraries

Research Assistant at SPAR Group, Nanjing University   Aug. 2020 - Apr. 2021
Advised by Prof. Yanyan Jiang
Topic: Testing

Awards

SIGSOFT CAPS Travel Grant for ESEC/FSE 2022   Sept. 2022

China National Scholarship | *Top 0.2%*   Oct. 2020

Special Scholarship for Undergraduates in Basic Science, Nanjing University | *1/24*   Nov. 2021

Elite Program First-class Scholarship, Nanjing University   Oct. 2019

Merit Student, Nanjing University   Oct. 2019

Talks

Fuzzing Automatic Differentiation in Deep-Learning Libraries   May 2023
- Advanced Software Technologies Lab, ETH Zurich

Fuzzing Deep-Learning Libraries via Automated Relational API Inference   Sept. 2022
- Software Engineering Retreat, University of Illinois at Urbana-Champaign

Free Lunch for Testing: Fuzzing Deep-Learning Libraries from Open Source   May 2022
- iSE symposium, Nanjing University

Teaching Experience

Teaching Assistant at Nanjing University   Sept. 2021 - Jul. 2022
Problem Solving, a core course for the students in the elite program

Skill Stack

- **Common:** Python, C, TypeScript, docker, Vim, Git, SQL, LaTeX, libFuzzer

- **Machine Learning:** PyTorch, TensorFlow, JAX