Li Zhong

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Education

University of California, San Diego (UCSD) *Sept 2019 - June 2024 (expected)*
PhD Candidacy in Computer Science Advisor: Yuanyuan Zhou
Thesis Topic: Detecting Bugs by Identifying Developers' Blind Spots
University of Science and Technology of China (USTC) *Sept 2015 - June 2019*
Bachelor in Computer Science Class for the Gifted Young

Publication

1. LDB: A Large Language Model Debugger via Verifying Runtime Execution Step by Step. [paper][code]
   Li Zhong, Zilong Wang, Jingbo Shang. (Under Submission)
2. Can We Trust LLMs in Software Development? A Study on Robustness and Reliability of LLM-Generated Code. [paper][code]
   Li Zhong, Zilong Wang. (**AAAI'24**)
3. Effective Bug Detection with Unused Definitions. [paper][code]
   Li Zhong, Chengcheng Xiang, Haochen Huang, Yuanyuan Zhou. (**EuroSys'24**)
   Selected Patch to Linux Kernel: [patch1] [patch2][patch3][patch4][patch5]
4. Protecting Data Integrity of Web Applications with Database Constraints Inferred from Application Code. [paper][code]
   Haochen Huang, Bingyu Shen, **Li Zhong**, Yuanyuan Zhou. (**ASPLOS'23**)
5. PYLIVE: On-the-Fly Code Change for Python-based Online Services. [paper][code]
   Haochen Huang*, Chengcheng Xiang*, **Li Zhong**, Yuanyuan Zhou. (**ATC'21**)

Other Research Experience

Erasing Harmful Contents from Stable Diffusion Models (UCSD)
Advisor: Rose Yu *Sep 2023 - Now*
- Propose a external classifier-based methods to erase concepts
- Fine tune stable diffusion models to control content generations in PyTorch
- Achieve a better erasure while prevent interference with other concept.

Self-Guided Debug in Large Language Models (UCSD)
Advisor: Jingbo Shang *Oct 2023 - Now*
- Propose a automated debug technique for large language models
- Achieve state-of-the-art performance (95.1%) in the HumanEval dataset
- Apply chain-of-thought to build an agent for using external debugging tools.

Detecting Missing Constraints in Database from Web App Code (UCSD)
Advisor: Yuanyuan Zhou *Sep 2021 - June 2022*
- Summarize code patterns with implicit assumptions on data integrity
- Static analysis on Django apps based on AST
- Detect 210 missing constraints in popular Django apps

Detect Unused Definition to Expose Bugs in System (UCSD)
Advisor: Yuanyuan Zhou *Aug 2020 - May 2021*
- Develop an inter-procedural analysis LLVM tool to detect 'unused' value
- Prune false positives based on cross-scope features and SMT solvers
- Detect 40 existed bugs and 213 new bugs in MySQL, Linux, NFS-ganesha, etc.

Python Framework for Dynamic Code Change (UCSD)
Advisor: Yuanyuan Zhou *Sep 2019 - May 2020*

- Develop a framework for dynamic code change for Python-based service
- Take advantage of meta-object protocol, dynamic typing to make it flexible
- Implement light-weight mechanism for byte code manipulation on Python

Industry Experience

Large Language Model Inference Weight Update on Neural Engine (Apple)
Host: Cecile Foret, Co-host: Zheng Li *June 2023 - Sept 2023*

- Support inference weight update for LoRA in LLMs.
- Optimize the runtime overhead for weight update
- Support compressed linear layers in transformers.

Value Profiling Driven Memory Operation Optimization (Meta)
Host: Hongtao Yu, Co-host: Wenlei He, Lei Wang *June 2022 - Sept 2022*

- Extend LLVM infrastructure to parse Linux perf traces
- Profile C++ workload value characteristics on workload Clang-10 and HHVM
- Modify memcpy lowering pass in LLVM based on value profiling results.

Call Arg Profiling Driven Code Specialization (Google)
Host: Snehasish Kumar, Co-host: Sotiris Apostolakis *June 2021 - Sept 2021*

- Develop an LLVM pass to instrument C++ programs for arguments profiling
- Replace the heuristic in current function specialization pass of LLVM
- Improve the function specialization pass in LLVM with profile results.

Reduce runtime instruction count on the Transcoder benchmarks up to 5%.

Dynamic Self-tuning Optimizer (Microsoft Research Asia)
Host: Youshan Miao *Nov 2018 - May 2019*

- Investigate different optimizers in machine learning
- Come up with a novel sgd optimizer using adaptive learning rate and prove its convergence
- Achieve a better performance over the Adam optimizer

Professional Service

EuroSys'22 Shadow PC
NeurIPS 2022 Workshop MetaLearn Reviewer
PAKDD'23, IEEE Internet of Things, IEEE Transactions on Wireless Communications Reviewer