YINLIN DENG

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RESEARCH INTERESTS

My research interest lies broadly in the intersection of software engineering and machine learning. I am interested in developing intelligent analysis, testing, verification, and synthesis techniques to improve the reliability, robustness, and performance of software systems, especially for machine learning systems.

Currently, I focus on testing machine learning libraries, which serve as the foundation for building, training, and deploying deep learning models. My previous work has helped to find **353** real-world bugs in popular open-source deep learning libraries including PyTorch, TensorFlow, JAX, and OneFlow.

EDUCATION

University of Illinois Urbana-Champaign (UIUC) — **Illinois, USA**
Ph.D. student in Computer Science — Aug. 2021−May 2026 (expected)
Advisor: Prof. Lingming Zhang

Peking University — **Beijing, China**
B.Sc. in Computer Science, Turing Class — Sept. 2017−June 2021

PUBLICATIONS

Agentless: Demystifying LLM-based Software Engineering Agents [paper][code]
Chunqiu Steven Xia*, **Yinlin Deng***, Soren Dunn, Lingming Zhang.
The ACM International Conference on the Foundations of Software Engineering ***(FSE 2025)***.

Can LLMs Implicitly Learn Numeric Parameter Constraints in Data Science APIs? [paper]
Yinlin Deng, Chunqiu Steven Xia, Zhezhen Cao, Meiziniu Li, Lingming Zhang
The Thirty-eighth Annual Conference on Neural Information Processing Systems ***(NeurIPS 2024)***.

Top Leaderboard Ranking = Top Coding Proficiency, Always? EvoEval: Evolving Coding Benchmarks via LLM [paper][webpage][code]
Chunqiu Steven Xia*, **Yinlin Deng***, Lingming Zhang.
The First Conference on Language Modeling ***(COLM 2024 Oral spotlights)***.

NExT: Teaching Large Language Models to Reason about Code Execution [paper]
Ansong Ni, Miltiadis Allamanis, Arman Cohan, **Yinlin Deng**, Kensen Shi, Charles Sutton, Pengcheng Yin.
The Forty-first International Conference on Machine Learning ***(ICML 2024)***.

ExeDec: Execution Decomposition for Compositional Generalization in Neural Program Synthesis [paper]
Kensen Shi, Joey Hong, **Yinlin Deng**, Pengcheng Yin, Manzil Zaheer, Charles Sutton.
The Twelfth International Conference on Learning Representations ***(ICLR 2024 Oral)***.

White-box Compiler Fuzzing Empowered by Large Language Models [paper][code]
Chenyuan Yang, **Yinlin Deng**, Runyu Lu, Jiayi Yao, Jiawei Liu, Reyhaneh Jabbarvand, Lingming Zhang.
Object-Oriented Programming, Systems, Languages, and Applications 2024 (in PACM PL) ***(OOPSLA 2024)***.

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

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

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

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

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

Coverage-Guided Tensor Compiler Fuzzing with Joint IR-Pass Mutation [paper][code][artifact]
Jiawei Liu, Yuxiang Wei, Sen Yang, **Yinlin Deng**, and Lingming Zhang.
Proceedings of the ACM on Programming Languages 6 ***(OOPSLA1 2022)****.*

** denotes equal contribution*

PROFESSIONAL EXPERIENCE

Student Researcher at Google DeepMind May 2023−Dec. 2023
Topic: Program synthesis with large language models
Manager: Charles Sutton, Mentor: Kensen Shi

Research Intern at Fujitsu Research of America May 2022−Aug. 2022
Topic: Feature engineering for Automated Machine Learning (AutoML)
Manager: Mukul Prasad, Mentor: Mehdi Bahrami

Research Intern at Microsoft Research, Asia June 2020−Jan. 2021
Topic: Table range detection for Spreadsheet Intelligence
Manager: Shi Han, Mentor: Xiao Lv

STEP Intern at Google July 2019−Sept. 2019
Topic: Static deep learning model compression for Federated Learning

HONORS & AWARDS

- Two Sigma PhD Fellowship 2024
- SIGSOFT CAPS Travel Grant for ICSE 2024
- NSF travel award for ICSE 2023
- SIGSOFT CAPS Travel Grant for ESEC/FSE 2022
- Gold Medal in the ICPC Asia-East Continent Final Contest 2019
- Gold Medal in the ICPC Asia Regional Contest Nanjing Site 2019
- Most innovative project in Google AI/ML Winter Camp Beijing Site 2019
- Merit student in Peking University 2017
- Silver Medal in the National Olympiad in Informatics (NOI) 2015