

Yuxiang Lei, Ph.D. in Software Engineering

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Summary

Yuxiang Lei, PhD, graduated from the School of Computer Science at the University of Technology Sydney (UTS) and has recently completed a one-year postdoctoral fellowship at the University of New South Wales (UNSW). His research focuses on formal languages, compiler theory, and program analysis. Noteworthy achievements include publications in top-tier conferences such as PLDI, OOPSLA, and SAS. Along with his academic research, he actively participates in the open-source community. He is in charge of developing and maintaining of two open-source program analysis projects, *POCR* and *SVF*, which are recognized with over 1k stars on GitHub and widely used by peers, with over 20 papers published on top-tier conferences.

Employment History

2023 – 2024 📌 **Postdoc Fellow**, University of New South Wales, NSW, Australia.
Supervisor: A.Prof. Yulei Sui.
Research field: formal language and compiler theory.
Focus: syntax analysis, parser, graph-based analysis, performance optimization.

Education

2018 – 2023 📌 **Ph.D. in Software Engineering**, University of Technology Sydney, NSW, Australia.
Research field: program analysis.
Supervisor: A.Prof. Yulei Sui.
Focus: static analysis, C/C++, program abstraction, performance.
Thesis title: *Improving the Efficiency of Graph-Based Static Analysis*.

Awards



2022 📌 ACM SIPLAN Distinguished Artifact Award.
2019 📌 Radhia Cousot Young Researcher Best Paper Award.

Research Publications




1. **Yuxiang Lei**, Camille Bossut, Yulei Sui and Qirun Zhang, “Context-free language reachability via skewed tabulation”, *Proceedings of the ACM on Programming Languages*, vol. 8, PLDI 2024. (CCF-A)
2. Pei Xu, **Yuxiang Lei***, Yulei Sui and Jingling Xue, “Iterative-epoch online cycle elimination for context-free language reachability”, *Proceedings of the ACM on Programming Languages*, vol. 8, pp. 1437–1462, OOPSLA1, 2024. (CCF-A)
3. **Yuxiang Lei**, Yulei Sui, Shin Hwei Tan and Qirun Zhang, “Recursive state machine guided graph folding for context-free language reachability”, *Proceedings of the ACM on Programming Languages*, vol. 7, pp. 318–342, PLDI 2023. (CCF-A)

4. **Yuxiang Lei**, Yulei Sui, Shuo Ding and Qirun Zhang, “Taming transitive redundancy for context-free language reachability”, *Proceedings of the ACM on Programming Languages*, vol. 6, pp. 1556–1582, *OOPSLA2 2022*. (CCF-A)
5. **Yuxiang Lei** and Yulei Sui, “Fast and precise handling of positive weight cycles for field-sensitive pointer analysis”, *Static Analysis: 26th International Symposium, SAS 2019*. (CCF-B)
6. Jin Gou, **Yuxiang Lei**, Wangping Guo, Yiqiao Cai and Wei Luo, “A novel improved particle swarm optimization algorithm based on individual difference evolution”, *Applied Soft Computing*, vol. 57, pp. 468–481, 2017.

Projects

- 2020 – now  **POCR**, a context-free language reachability analysis tool.
Role: Creator and developer.
Award: ACM SIPLAN Distinguished Artifact Award (2022).
Recognition: The techniques implemented in this tool were recognized with 4 papers published at top-tier conferences PLDI (CCF-A) and OOPSLA (CCF-A). This tool is also widely used by peers, with 7 papers published at top-tier conferences.
- 2018 – now  **SVF**, an LLVM-based C/C++ program analysis tool.
Role: Developer.
Awards: Radhia Cousot Young Researcher Best Paper Award (2019).
Recognition: 1.3k stars on GitHub. 18 papers were accepted and published in top-tier conferences based on this tool.

Skills

- Programming  C/C++, Python, Matlab, GNU, LLVM, Git, Docker, Linux, SQL, \LaTeX .
- Technical  formal language, automata, program analysis, compiler theory software security.
- Misc.  academic research, supervision, technical writing, teaching.