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研究兴趣

我的研究兴趣涵盖程序设计语言、安全和系统 (也涉及软件工程)，专注于开发创新性的理论、技术和工具，以提高现实世界计算机软件的性能、可用性、可靠性和安全性。我现在正在研究静态程序分析和编译器优化问题，包括**指针分析**和**数据流分析**，用于分析大型 (百万行代码的) 软件应用程序。此外，我对类型系统、形式化语义和形式化验证也很感兴趣。

教育经历

2022/4 **计算机科学与工程 博士**，
澳大利亚, 悉尼, 新南威尔士大学.
导师: 薛京灵, 卓越教授, IEEE Fellow

2018/7 **计算机科学与技术 工程学硕士**，
中国, 北京, 中国科学院计算技术研究所和中国科学院大学.
导师: 李炼研究员

2014/7 **天文学 理学学士**，
中国, 北京, 北京师范大学.
导师: 余恒副教授

2013/7 **教育技术学 理学学士**，
中国, 北京, 北京师范大学.
导师: 陈青讲师和余胜泉教授

科研经历

2022/3 至今 **博士后研究员**，
澳大利亚, 悉尼, 新南威尔士大学.
导师: 薛京灵卓越教授

2018/7 –
2019/2 **研究助理**，
中国, 北京, 中国科学院计算技术研究所.
导师: 李炼研究员

指导经历

2022/3 至今 **桂玉江**, 博士生，研究 *Android* 信息流分析,
合作导师.

2017/9 –
2018/5 **郑恒杰**, 武汉大学本科生，研究 *Android API* 演化,
指导本科论文并获评优秀论文.

荣誉和奖项

2019-2022 博士奖学金

2019 **ACM SIGSOFT Distinguished Paper Award (ASE 2019)**

2018 中科院计算所优秀硕士论文
中科院计算所计算机体系结构国家重点实验室优秀学生

2015-2018 专业奖学金

2014 北京师范大学天文系优秀本科论文

北京师范大学励耘实验班成员

2009-2013　专业奖学金

██████ 开源项目

Qilin　首个支持细粒度上下文敏感性的 Java 指针分析框架

Qilin 支持变量级别的上下文敏感性，即方法中不同变量/对象能够在完全不同的上下文中被分析。传统的方法级的上下文敏感指针分析在 Qilin 中被当作是细粒度上下文敏感的一个特例。Qilin 工具箱包含多种最先进的指针分析算法：(1) Andersen 分析 (2) 传统的方法级的上下文敏感指针分析 context-sensitivity (如, kCFA 和 kOBJ)，以及 (3) 多种细粒度上下文敏感指针分析技术如 Eagle 和 Selectx 等. Qilin 在分析精度和效率上均达到世界领先水平。
项目：https://github.com/QilinPTA/Qilin.git
Docker 镜像：https://hub.docker.com/r/hdjay2013/qilin

Conch　用于加速对象敏感指针分析的上下文去膨胀技术

Conch 通过验证三个线性条件（对真实应用中需要上下文敏感分析的对象来说几乎总是必要条件）来识别上下文独立对象，然后通过在指针分析时限制这些对象组合出新上下文（组合后的上下文不能提升指针分析精度）达到显著提升指针分析速度和可扩展性同时几乎不丢失分析精度的效果。
项目：http://www.cse.unsw.edu.au/~corg/tools/conch/
Docker 镜像：https://hub.docker.com/r/hdjay2013/conch-tosem-artifact

Turner　在加速对象敏感指针分析的现有预分析技术中，分析精度和分析效率之间达到更佳平衡点的技术

Turner 能够使对象敏感指针分析跑得比保精度的加速技术显著快同时比现有不保精度的加速技术更加精确。Turner 是用于选择影响分析精度的变量/对象的第一个过程内预分析技术。
项目：http://www.cse.unsw.edu.au/~corg/turner/
Docker 镜像：https://hub.docker.com/r/hdjay2013/turner

Fpc　细粒度 IFDS 路径边回收技术

Fpc 使用数据流值级别的细粒度路径边回收技术, 通过从内存中删除已经不会再被使用的路径边，能够让基于 IFDS 的数据流分析减少内存使用. 该技术同时可以避免已回收路径边的再处理.
项目：https://github.com/DongjieHe/FPC.git
Docker 镜像：https://doi.org/10.5281/zenodo.7965678

IctApiFinder　自动检测 Android 应用中 API 不兼容使用问题的系统方法

IctApiFinder 第一次将 Android 应用 API 不兼容使用的检测问题巧妙地规约为一个过程间上下文敏感的数据流分析问题。IctApiFinder 能够显著提升现有工具 Android Lint 的分析精度，同时可以显著减少其误报率达 82.1%。
项目：https://github.com/DongjieHe/IctApiFinder.git
Docker 镜像：https://hub.docker.com/r/hdjay2013/ictapifinder

██████ 发表文章

ISSTA'23　**Reducing the Memory Footprint of IFDS-based Data-Flow Analyses Using Fine-Grained Garbage Collection**,
Dongjie He, Yujiang Gui, Yaoqing Gao, and Jingling Xue,
32nd ACM SIGSOFT International Symposium on Software Testing and Analysis, ISSTA'23 (**CCF-A**).

TOSEM'23　**IFDS-based Context Debloating for Object-Sensitive Pointer Analysis**,
Dongjie He, Jingbo Lu, and Jingling Xue,
ACM Transactions on Software Engineering and Methodology, TOSEM 2023 (**CCF-A**).

TSE'22　**Selecting Context-Sensitivity Modularly for Accelerating Object-Sensitive Pointer Analysis**,
Dongjie He, Jingbo Lu, Yaoqing Gao, and Jingling Xue,
IEEE Transactions on Software Engineering, TSE 2022 (**CCF-A**).

ECOOP'22　**Qilin: A New Framework for Supporting Fine-Grained Context-Sensitivity in Java Pointer Analysis**,
Dongjie He, Jingbo Lu, and Jingling Xue, The 36th European Conference on Object-Oriented Programming, ECOOP 2022 (**CCF-B**).

ASE'21　**Context Debloating for Object-Sensitive Pointer Analysis**,
Dongjie He, Jingbo Lu, and Jingling Xue, The 36th IEEE/ACM International Conference on Automated Software Engineering, ASE 2021 (**CCF-A**).

SAS'21	**Selective Context-Sensitivity for k-CFA with CFL-Reachability**, *Jingbo Lu, **Dongjie He**, and Jingling Xue*, The 28th Static Analysis Symposium, SAS 2021 (**CCF-B**).
ECOOP'21	**Accelerating Object-Sensitive Pointer Analysis by Exploiting Object Containment and Reachability**, ***Dongjie He**, Jingbo Lu, Yaoqing Gao, and Jingling Xue*, The 35th European Conference on Object-Oriented Programming, ECOOP 2021 (**CCF-B**).
TOSEM'21	**Eagle: CFL-Reachability-based Precision-Preserving Acceleration of Object-Sensitive Pointer Analysis**, *Jingbo Lu, **Dongjie He**, and Jingling Xue*, ACM Transactions on Software Engineering and Methodology, TOSEM 2021 (**CCF-A**).
ISSRE'20	**Exposing Android Event-Based Races by Selective Branch Instrumentation**, *Diyu Wu, **Dongjie He**, Shiping Chen, and Jingling Xue*, The 31st International Symposium on Software Reliability Engineering, ISSRE 2020 (**CCF-B**).
ISSRE'20	**Correlating UI Contexts with Sensitive API Calls: Dynamic Semantic Extraction and Analysis**, *Jie Liu, **Dongjie He**, Diyu Wu, and Jingling Xue*, The 31st International Symposium on Software Reliability Engineering, ISSRE 2020 (**CCF-B**).
ASE'19	**Performance-Boosting Sparsification of the IFDS Algorithm with Applications to Taint Analysis**, ***Dongjie He**, Haofeng Li, Lei Wang, Haining Meng, Hengjie Zheng, Jie Liu, Shuangwei Hu, Lian Li, and Jingling Xue*, 34th IEEE/ACM International Conference on Automated Software Engineering, ASE 2019 (**CCF-A**). ACM SIGSOFT Distinguished Paper Award
ASE'18	**Understanding and Detecting Evolution-Induced Compatibility Issues in Android Apps**, ***Dongjie He**, Lian Li, Lei Wang, Hengjie Zheng, Guangwei Li, and Jingling Xue*, 33rd IEEE/ACM International Conference on Automated Software Engineering, ASE 2018 (**CCF-A**).
Draft	**A CFL-Reachability Formulation of Callsite-Sensitive Pointer Analysis with Built-in On-the-Fly Call Graph Construction**, ***Dongjie He**, Jingbo Lu#, and Jingling Xue*, submitted to TOPLAS 2023 (**CCF-A**), #: co-first.
Draft	**Automatic Generation of Precision-Aware Stand-Alone Library Summaries for Whole-Program Pointer Analysis**, *Jingbo Lu, **Dongjie He**, Wei Li, Yaoqing Gao, and Jingling Xue*, submitted to ASE 2023 (**CCF-A**).
Draft	**A Container-Usage-Pattern-based Context Debloating Approach for Object-Sensitive Pointer Analysis**, ***Dongjie He**, Yujiang Gui, Wei Li, Yonggang Tao, Changwei Zou, Yulei Sui, and Jingling Xue*, submitted to OOPSLA 2023 (**CCF-A**).
Draft	**Merge-Replay: Efficient IFDS-Based Taint Analysis by Consolidating Equivalent Value Flows**, *Yujiang Gui, **Dongjie He**#, and Jingling Xue*, submitted to ASE 2023(**CCF-A**), #: co-first.
Draft	**A Context-Sensitive Pointer Analysis Framework for Rust and its Application to Call Graph Construction**, *Wei Li, **Dongjie He**, and Jingling Xue*, submitted to ASE 2023(**CCF-A**).

学术服务

	Web Chair
CGO'20	18th ACM/IEEE International Symposium on Code Generation and Optimization
	Journal Reviewer
SPE'22	Software: Practice and Experience 2022
JCST'22	Journal of Computer Science and Technology 2022
	Program Committee
ASE'23	38th IEEE/ACM International Conference on Automated Software Engineering

LCTES'23	24th ACM SIGPLAN/SIGBED International Conference on Languages, Compilers, and Tools for Embedded Systems

Extended Review Committee

ECOOP'22	36th European Conference on Object-Oriented Programming
OOPSLA'22	2022 ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications

Sub-Reviewer

OOPSLA'20, ICSE'21

Artifact Evaluation Committee

OOPSLA'21	2021 ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications
CGO'22	20th ACM/IEEE International Symposium on Code Generation and Optimization
ECOOP'22	36th European Conference on Object-Oriented Programming
CC'22	31st ACM SIGPLAN International Conference on Compiler Construction
OSDI'22	16th USENIX Symposium on Operating Systems Design and Implementation
ATC'22	2022 USENIX Annual Technical Conference
OOPSLA'22	2022 ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications
ASE'22	37th IEEE/ACM International Conference on Automated Software Engineering
Programming	The Art, Science, and Engineering of Programming (2023)

SRC Reviewer

PLDI'23	44th ACM SIGPLAN Conference on Programming Language Design and Implementation