Contents

Frontmatter

Message from the Chairs	iii v
Research Papers	
Fuzzing	
WEIZZ: Automatic Grey-Box Fuzzing for Structured Binary Formats Andrea Fioraldi, Daniele Cono D'Elia, and Emilio Coppa — Sapienza University of Rome, Italy	1
Active Fuzzing for Testing and Securing Cyber-Physical Systems Yuqi Chen, Bohan Xuan, Christopher M. Poskitt, Jun Sun, and Fan Zhang — Singapore Management University, Singapore; Zhejiang University, China; Zhejiang Lab, China; Alibaba-Zhejiang University Joint Institute of Frontier Technologies, China	14
Learning Input Tokens for Effective Fuzzing Björn Mathis, Rahul Gopinath, and Andreas Zeller — CISPA, Germany	27
Symbolic Execution and Constraint Solving	
Fast Bit-Vector Satisfiability Peisen Yao, Qingkai Shi, Heqing Huang, and Charles Zhang — Hong Kong University of Science and Technology, China	38
Relocatable Addressing Model for Symbolic Execution David Trabish and Noam Rinetzky — Tel Aviv University, Israel	51
Running Symbolic Execution Forever Frank Busse, Martin Nowack, and Cristian Cadar — Imperial College London, UK	63
Repair and Debug	
Can Automated Program Repair Refine Fault Localization? A Unified Debugging Approach Yiling Lou, Ali Ghanbari, Xia Li, Lingming Zhang, Haotian Zhang, Dan Hao, and Lu Zhang — Peking University, China; University of Texas at Dallas, USA; Ant Financial Services, China	75
Automated Repair of Feature Interaction Failures in Automated Driving Systems Raja Ben Abdessalem, Annibale Panichella, Shiva Nejati, Lionel C. Briand, and Thomas Stifter — University of Luxembourg, Luxembourg; Delft University of Technology, Netherlands; University of Ottawa, Canada; IEE, Luxembourg	88
CoCoNuT: Combining Context-Aware Neural Translation Models using Ensemble for Program Repair Thibaud Lutellier, Hung Viet Pham, Lawrence Pang, Yitong Li, Moshi Wei, and Lin Tan — University of Waterloo, Canada; Purdue University, USA	101
Mobile Apps	
Detecting and Diagnosing Energy Issues for Mobile Applications Xueliang Li, Yuming Yang, Yepang Liu, John P. Gallagher, and Kaishun Wu — Shenzhen University, China; Southern University of Science and Technology, China; Roskilde University, Denmark; IMDEA Software Institute, Spain	115
Automated Classification of Actions in Bug Reports of Mobile Apps Hui Liu, Mingzhu Shen, Jiahao Jin, and Yanjie Jiang — Beijing Institute of Technology, China	128
Data Loss Detector: Automatically Revealing Data Loss Bugs in Android Apps Oliviero Riganelli, Simone Paolo Mottadelli, Claudio Rota, Daniela Micucci, and Leonardo Mariani — University of Milano-Bicocca, Italy	141
Machine Learning I	
Reinforcement Learning Based Curiosity-Driven Testing of Android Applications Minxue Pan, An Huang, Guoxin Wang, Tian Zhang, and Xuandong Li — Nanjing University, China	153
Effective White-Box Testing of Deep Neural Networks with Adaptive Neuron-Selection Strategy Seokhyun Lee, Sooyoung Cha, Dain Lee, and Hakjoo Oh — Korea University, South Korea	165

DeepGini: Prioritizing Massive Tests to Enhance the Robustness of Deep Neural Networks Yang Feng, Qingkai Shi, Xinyu Gao, Jun Wan, Chunrong Fang, and Zhenyu Chen — Nanjing University, China; Hong Kong University of Science and Technology, China; Ant Financial Services, China	177
Machine Learning II	
Detecting and Understanding Real-World Differential Performance Bugs in Machine Learning Libraries Saeid Tizpaz-Niari, Pavol Černý, and Ashutosh Trivedi — University of Colorado Boulder, USA; TU Vienna, Austria	189
Higher Income, Larger Loan? Monotonicity Testing of Machine Learning Models Arnab Sharma and Heike Wehrheim — University of Paderborn, Germany	200
Detecting Flaky Tests in Probabilistic and Machine Learning Applications Saikat Dutta, August Shi, Rutvik Choudhary, Zhekun Zhang, Aryaman Jain, and Sasa Misailovic — University of Illinois at Urbana-Champaign, USA	211
Bug Localization and Test Isolation	
Scaffle: Bug Localization on Millions of Files Michael Pradel, Vijayaraghavan Murali, Rebecca Qian, Mateusz Machalica, Erik Meijer, and Satish Chandra — University of Stuttgart, Germany; Facebook, USA	225
Abstracting Failure-Inducing Inputs Rahul Gopinath, Alexander Kampmann, Nikolas Havrikov, Ezekiel O. Soremekun, and Andreas Zeller — CISPA, Germany	237
Debugging the Performance of Maven's Test Isolation: Experience Report Pengyu Nie, Ahmet Celik, Matthew Coley, Aleksandar Milicevic, Jonathan Bell, and Milos Gligoric — University of Texas at Austin, USA; Facebook, USA; George Mason University, USA; Microsoft, USA	249
Security	
Feedback-Driven Side-Channel Analysis for Networked Applications İsmet Burak Kadron, Nicolás Rosner, and Tevfik Bultan — University of California at Santa Barbara, USA	260
Scalable Analysis of Interaction Threats in IoT Systems Mohannad Alhanahnah, Clay Stevens, and Hamid Bagheri — University of Nebraska-Lincoln, USA	272
DeepSQLi: Deep Semantic Learning for Testing SQL Injection Muyang Liu, Ke Li, and Tao Chen — University of Electronic Science and Technology of China, China; University of Exeter, UK; Loughborough University, UK	286
Regression Testing	
Dependent-Test-Aware Regression Testing Techniques Wing Lam, August Shi, Reed Oei, Sai Zhang, Michael D. Ernst, and Tao Xie — University of Illinois at Urbana-Champaign, USA; Google, USA; University of Washington, USA; Peking University, China	298
Differential Regression Testing for REST APIs Patrice Godefroid, Daniel Lehmann, and Marina Polishchuk — <i>Microsoft Research, USA; University of Stuttgart, Germany</i>	312
Empirically Revisiting and Enhancing IR-Based Test-Case Prioritization Qianyang Peng, August Shi, and Lingming Zhang — University of Illinois at Urbana-Champaign, USA; University of Texas at Dallas, USA	324
Challenging Domains	
Intermittently Failing Tests in the Embedded Systems Domain Per Erik Strandberg, Thomas J. Ostrand, Elaine J. Weyuker, Wasif Afzal, and Daniel Sundmark — Westermo Network Technologies, Sweden; Mälardalen University, Sweden; University of Central Florida, USA	337
Feasible and Stressful Trajectory Generation for Mobile Robots Carl Hildebrandt, Sebastian Elbaum, Nicola Bezzo, and Matthew B. Dwyer — <i>University of Virginia, USA</i>	349
Detecting Cache-Related Bugs in Spark Applications Hui Li, Dong Wang, Tianze Huang, Yu Gao, Wensheng Dou, Lijie Xu, Wei Wang, Jun Wei, and Hua Zhong — Institute of Software at Chinese Academy of Sciences, China; University of Chinese Academy of Sciences, China; Beijing University of Posts and Telecommunications, China	363
Binary Analysis	
Patch Based Vulnerability Matching for Binary Programs Yifei Xu, Zhengzi Xu, Bihuan Chen, Fu Song, Yang Liu, and Ting Liu — Xi'an Jiaotong University, China; Nanyang Technological University, Singapore; Fudan University, China; ShanghaiTech University, China; Zhejiang University, China	376

Identifying Java Calls in Native Code via Binary Scanning George Fourtounis, Leonidas Triantafyllou, and Yannis Smaragdakis — University of Athens, Greece	388
An Empirical Study on ARM Disassembly Tools Muhui Jiang, Yajin Zhou, Xiapu Luo, Ruoyu Wang, Yang Liu, and Kui Ren — Hong Kong Polytechnic University, China; Zhejiang University, China; Arizona State University, USA; Nanyang Technological University, Singapore	401
Static Analysis and Search-Based Testing	
How Effective Are Smart Contract Analysis Tools? Evaluating Smart Contract Static Analysis Tools using Bug Injection Asem Ghaleb and Karthik Pattabiraman — University of British Columbia, Canada	415
A Programming Model for Semi-implicit Parallelization of Static Analyses Dominik Helm, Florian Kübler, Jan Thomas Kölzer, Philipp Haller, Michael Eichberg, Guido Salvaneschi, and Mira Mezini — TU Darmstadt, Germany; KTH, Sweden	428
Recovering Fitness Gradients for Interprocedural Boolean Flags in Search-Based Testing Yun Lin, Jun Sun, Gordon Fraser, Ziheng Xiu, Ting Liu, and Jin Song Dong — National University of Singapore, Singapore, Singapore Management University, Singapore; University of Passau, Germany; Xi'an Jiaotong University, China	440
Build Testing	
Scalable Build Service System with Smart Scheduling Service	450
Kaiyuan Wang, Greg Tener, Vijay Gullapalli, Xin Huang, Ahmed Gad, and Daniel Rall — Google, USA	452 463
How Far We Have Come: Testing Decompilation Correctness of C Decompilers Zhibo Liu and Shuai Wang — Hong Kong University of Science and Technology, China	475
Numerical Software Analysis and Clone Detection	
Discovering Discrepancies in Numerical Libraries Jackson Vanover, Xuan Deng, and Cindy Rubio-González — University of California at Davis, USA	488
Testing High Performance Numerical Simulation Programs: Experience, Lessons Learned, and Open Issues Xiao He, Xingwei Wang, Jia Shi, and Yi Liu — University of Science and Technology Beijing, China; CNCERT/CC, China	502
Functional Code Clone Detection with Syntax and Semantics Fusion Learning Chunrong Fang, Zixi Liu, Yangyang Shi, Jeff Huang, and Qingkai Shi — Nanjing University, China; Texas A&M University, USA; Hong Kong University of Science and Technology, China	516
Learning to Detect Table Clones in Spreadsheets Yakun Zhang, Wensheng Dou, Jiaxin Zhu, Liang Xu, Zhiyong Zhou, Jun Wei, Dan Ye, and Bo Yang — Institute of Software at Chinese Academy of Sciences, China; Jinling Institute of Technology, China; North China University of Technology, China	528
Tool Demonstrations	
ObjSim: Lightweight Automatic Patch Prioritization via Object Similarity Ali Ghanbari — University of Texas at Dallas, USA	541
Crowdsourced Requirements Generation for Automatic Testing via Knowledge Graph Chao Guo, Tieke He, Wei Yuan, Yue Guo, and Rui Hao — Nanjing University, China	545
TauJud: Test Augmentation of Machine Learning in Judicial Documents Zichen Guo, Jiawei Liu, Tieke He, Zhuoyang Li, and Peitian Zhangzhu — Nanjing University, China	549
EShield: Protect Smart Contracts against Reverse Engineering Wentian Yan, Jianbo Gao, Zhenhao Wu, Yue Li, Zhi Guan, Qingshan Li, and Zhong Chen — Peking University, China; Boya Blockchain, China	553
Echidna: Effective, Usable, and Fast Fuzzing for Smart Contracts Gustavo Grieco, Will Song, Artur Cygan, Josselin Feist, and Alex Groce — Trail of Bits, USA; Northern Arizona University, USA	557
ProFL: A Fault Localization Framework for Prolog George Thompson and Allison K. Sullivan — North Carolina A&T State University, USA; University of Texas at Arlington, USA	561
FineLock: Automatically Refactoring Coarse-Grained Locks into Fine-Grained Locks Yang Zhang, Shuai Shao, Juan Zhai, and Shiqing Ma — Hebei University of Science and Technology, China; Rutgers University, USA	565

CPSDebug: A Tool for Explanation of Failures in Cyber-Physical Systems Ezio Bartocci, Niveditha Manjunath, Leonardo Mariani, Cristinel Mateis, Dejan Ničković, and Fabrizio Pastore — TU Vienna, Austria; Austrian Institute of Technology, Austria; University of Milano-Bicocca, Italy; University of Luxembourg, Luxembourg	569
Test Recommendation System Based on Slicing Coverage Filtering Ruixiang Qian, Yuan Zhao, Duo Men, Yang Feng, Qingkai Shi, Yong Huang, and Zhenyu Chen — Nanjing University, China Kong University of Science and Technology, China; Mooctest, China	573
Doctoral Symposium	
Automated Mobile Apps Testing from Visual Perspective Feng Xue — Northwestern Polytechnical University, China	577
Program-Aware Fuzzing for MQTT Applications Luis Gustavo Araujo Rodriguez and Daniel Macêdo Batista — University of São Paulo, Brazil	582
Automatic Support for the Identification of Infeasible Testing Requirements João Choma Neto — University of São Paulo, Brazil	587
Author Index	592