

Commenced Publication in 1973

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board Members

David Hutchison

Lancaster University, Lancaster, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Friedemann Mattern

ETH Zurich, Zurich, Switzerland

John C. Mitchell

Stanford University, Stanford, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

C. Pandu Rangan

Indian Institute of Technology Madras, Chennai, India

Bernhard Steffen

TU Dortmund University, Dortmund, Germany

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

More information about this series at <http://www.springer.com/series/7408>

Xin Peng · Apostolos Ampatzoglou ·
Tanmay Bhowmik (Eds.)

Reuse in the Big Data Era

18th International Conference on Software
and Systems Reuse, ICSR 2019
Cincinnati, OH, USA, June 26–28, 2019
Proceedings

Editors

Xin Peng
Fudan University
Shanghai, China

Apostolos Ampatzoglou
University of Macedonia
Thessaloniki, Greece

Tanmay Bhowmik
Mississippi State University
Mississippi State, MS, USA

ISSN 0302-9743

ISSN 1611-3349 (electronic)

Lecture Notes in Computer Science

ISBN 978-3-030-22887-3

ISBN 978-3-030-22888-0 (eBook)

<https://doi.org/10.1007/978-3-030-22888-0>

LNCS Sublibrary: SL2 – Programming and Software Engineering

© Springer Nature Switzerland AG 2019

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

This volume contains the proceedings of the International Conference on Software and Systems Reuse (ICSR 2019) held during June 26–28, 2019, in Cincinnati, Ohio, USA.

The International Conference on Software and Systems Reuse is the premier international event in the software reuse community, and starting from this year, “Systems” was added to the name of the conference to emphasize the role of systems engineering in reuse and to highlight the relevance of reuse to cyber physical systems, sociotechnical systems, autonomous systems, intelligent systems, embedded systems, Internet of Things, systems of systems, and other Industry 4.0 applications. The main goal of ICSR is to present the most recent advances and breakthroughs in the area of software and systems reuse and to promote an intensive and continuous exchange among researchers and practitioners.

The conference featured three keynotes from industry, government, and academia, namely, Juha Savolainen from Danfoss, Michelle Simon from the U.S. Environmental Protection Agency, and Yang Liu from Nanyang Technological University. We received 32 submissions (excluding withdrawn submissions). Each submission was reviewed by three Program Committee members. The Program Committee decided to accept 13 papers, resulting in an acceptance rate of 40.1%. This conference was a collaborative work that could only be realized through many dedicated efforts. We would like to thank all the colleagues who made possible the success of ICSR 2019: Florine Postell, Xin Peng, Apostolos Ampatzoglou, Clemente Izurieta, Alexander Chatzigeorgiou, Areti Ampatzoglou, Tanmay Bhowmik, Wentao Wang, and Nan Niu. We also thank the ICSR Steering Committee for the approval to organize this edition in Cincinnati. Finally, we thank the sponsorship of Danfoss and the College of Engineering and Applied Science (CEAS) at the University of Cincinnati.

May 2019

Xin Peng
Apostolos Ampatzoglou
Tanmay Bhowmik

Organization

Conference Chair

Nan Niu

University of Cincinnati, USA

Local Chair

Florine Postell

University of Cincinnati, USA

Program Co-chairs

Xin Peng

Fudan University, China

Apostolos Ampatzoglou

University of Macedonia, Greece/University
of Groningen, The Netherlands

Industry Innovation Co-chairs

Clemente Izurieta

Montana State University, USA

Alexander Chatzigeorgiou

University of Macedonia, Greece

Publicity Chair

Areti Ampatzoglou

University of Groningen, The Netherlands

Proceedings Chair

Tanmay Bhowmik

Mississippi State University, USA

Student Volunteer Chair

Wentao Wang

University of Cincinnati, USA

Program Committee

Eduardo Almeida

Federal University of Bahia, Brazil

Elvira-Maria Arvanitou

University of Macedonia, Greece

Paris Avgeriou

University of Groningen, The Netherlands

Rami Bahsoon

University of Birmingham, UK

Tanmay Bhowmik

Mississippi State University, USA

Stamatia Bibi

University of Western Macedonia, Greece

Jan Bosch

Chalmers University of Technology, Sweden

Yuanfang Cai

Drexel University, USA

Ann Campbell	SonarSource, Switzerland
Rafael Capilla	King Juan Carlos University, Spain
Bihuan Chen	Fudan University, China
Zadia Codabux	Colby College, USA
Eleni Constantinou	University of Mons, Belgium
Wei Dong	National University of Defense Technology, China
John Favaro	Intecs, Italy
Shinpei Hayashi	Tokyo Institute of Technology, Japan
He Jiang	Dalian University of Technology, China
Georgia Kapitsaki	University of Cyprus, Cyprus
David Kitchen	Johnson & Johnson, USA
Takashi Kobayashi	Tokyo Institute of Technology, Japan
Boris Kontsevoi	Intetics Inc., USA
Jaeyoon Lee	Lancaster University, UK
Ge Li	Peking University, China
Hui Liu	Beijing Institute of Technology, China
Ting Liu	Xi'an Jiaotong University, China
Yang Liu	Nanyang Technological University, Singapore
Xiaoxing Ma	Nanjing University, China
Antonio Martini	University of Oslo, Norway
Klaus Schmid	University of Hildesheim, Germany
Ioannis Stamelos	Aristotle University of Thessaloniki, Greece
Hailong Sun	Beihang University, China
Jun Sun	Singapore University of Technology and Design, Singapore
Linzhang Wang	Nanjing University, China
Jun Wei	Chinese Academy of Sciences, China
Xin Xia	Monash University, Australia
Bing Xie	Peking University, China
Zhenchang Xing	Australian National University, Australia
Gang Yin	National University of Defense Technology, China
Shi Ying	Wuhan University, China
Yijun Yu	The Open University, UK
Uwe Zdun	University of Vienna, Austria
Hongyu Zhang	The University of Newcastle, Australia
Wei Zhang	Peking University, China
Jianjun Zhao	Kyushu University, Japan
Tom Zimmerman	Microsoft Research, USA

Contents

Software Reuse Practice

A Flexible and Efficient Approach to Component Test in Time-Critical Scenarios	3
<i>Xiaojing Bao, Zhenxing Wang, and Xiao Chen</i>	

Software Product Line and Requirements Reuse

Extending FragOP Domain Reusable Components to Support Product Customization in the Context of Software Product Lines	17
<i>Daniel Correa, Raúl Mazo, and Gloria Lucia Giraldo</i>	
Towards a Software System for Facilitating the Reuse of Business Processes	34
<i>Konstantinos Athanasopoulos, Georgios Theodoridis, Christos Darisaplis, and Ioannis Stamelos</i>	
Automated Support to Capture Creative Requirements via Requirements Reuse	47
<i>Quoc Anh Do, Surendra Raju Chekuri, and Tanmay Bhowmik</i>	
A Comparative Analysis of Game Engines to Develop Core Assets for a Software Product Line of Mini-Games	64
<i>Martín Sierra, María Constanza Pabón, Luisa Rincón, Andres Navarro-Newball, and Diego Linares</i>	

Reuse and Design and Evolution

Behavioral Evolution of Design Patterns: Understanding Software Reuse Through the Evolution of Pattern Behavior.	77
<i>Derek Reimanis and Clemente Izurieta</i>	
Developing a Flexible Simulation-Optimization Framework to Facilitate Sustainable Urban Drainage Systems Designs Through Software Reuse	94
<i>Yang Yang and Ting Fong May Chui</i>	
Automatically Extracting Bug Reproducing Steps from Android Bug Reports	100
<i>Yu Zhao, Kye Miller, Tingting Yu, Wei Zheng, and Minchao Pu</i>	

Intelligent Software Reuse

Searching Software Knowledge Graph with Question	115
<i>Min Wang, Yanzhen Zou, Yingkui Cao, and Bing Xie</i>	
SemiTagRec: A Semi-supervised Learning Based Tag Recommendation Approach for Docker Repositories.	132
<i>Jiahong Zhou, Wei Chen, Guoquan Wu, and Jun Wei</i>	
Slicing Based Code Recommendation for Type Based Instance Retrieval	149
<i>Rui Sun, Hui Liu, and Leping Li</i>	
NLI2Code: Reusing Libraries with Natural Language Interface	168
<i>Qi Shen, Bing Xie, Yanzhen Zou, Zixiao Zhu, and Shijun Wu</i>	

Domain-Specific Software Development

A Double-Edged Sword? Software Reuse and Potential Security Vulnerabilities	187
<i>Antonios Gkortzis, Daniel Feitosa, and Diomidis Spinellis</i>	
ACO-RR: Ant Colony Optimization Ridge Regression in Reuse of Smart City System	204
<i>Qiaoyun Yin, Ke Niu, Ning Li, Xueping Peng, and Yijie Pan</i>	
An Improved Approach for Complex Activity Recognition in Smart Homes	220
<i>Nirmalya Thakur and Chia Y. Han</i>	
Examining the Reusability of Smart Home Applications: A Case Study on Eclipse Smart Home	232
<i>Paraskevi Smiari, Stamatia Bibi, and Daniel Feitosa</i>	

Post Papers

“Reuse on Steroids”: Reuse of Code, Compliance Tools, and Clearing Results	251
<i>Arun Azhakesan and Frances Paulisch</i>	
Sustainable Software Reuse in Complex Industrial Software Ecosystem: The Practice in CFETSIT.	253
<i>Yixiao Li, Zhubin Chuan, Tong Wu, Yijian Wu, Xin Peng, and Gang Zhang</i>	

Author Index	257
-------------------------------	-----