# 2019 IEEE International Conference on Services Computing (SCC 2019)

Milan, Italy 8 – 13 July 2019



IEEE Catalog Number: CFP19345-POD ISBN: 978-1-7281-2721-7

## Copyright © 2019 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

 IEEE Catalog Number:
 CFP19345-POD

 ISBN (Print-On-Demand):
 978-1-7281-2721-7

 ISBN (Online):
 978-1-7281-2720-0

ISSN: 2474-8137

#### Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400

Fax: (845) 758-2633

E-mail: curran@proceedings.com Web: www.proceedings.com



# 2019 IEEE International Conference on Services Computing (SCC) SCC 2019

## **Table of Contents**

Message from the IEEE SERVICES 2019 Steering Committee Chair xiii.  Message from the IEEE SERVICES 2019 Congress General Chair xiv.  Message from the IEEE SERVICES 2019 Program Chair-in-Chief and Vice Program  Chair-in-Chief xv.  Message from the IEEE SERVICES 2019 Symposia Chairs xvi.  Message from the Technical Committee Chair on Services Computing xvii.  Message from the IEEE SCC 2019 Chairs xviiii  IEEE SCC 2019 Program Committee xix  IEEE SCC 2019 Reviewers xx
Session 1: Service Recommendations I
Regularizing Matrix Factorization with Implicit User Preference Embeddings for Web API Recommendation .1
Helpfulness-Aware Matrix Factorization for Cross-Category Service Recommendations .9
Recommending Energy-Efficient Data Mining Services with Data as Contextual Factors .1.4
Session 2: Fog Computing
Service Placement in Fog Computing Using Constraint Programming .1.9
Fog Function: Serverless Fog Computing for Data Intensive IoT Services .28

### **Session 3: IoT Systems and Stream Processing** Mirko Viroli (University of Bologna, Česena), and Schahram Dustdar (TÚ Wien) Trustworthy IoT: An Evidence Collection Approach Based on Smart Contracts .46..... Claudio Agostino Ardagna (Università degli Studi di Milano), Rasool Asal (Khalifa University), Ernesto Damiani (Khalifa University), Nabil El Ioini (Free University of Bolzen/Bolzano), and Claus Pahl (Free University of Bolzen/Bolzano) Increased Fault-Tolerance and Real-Time Performance Resiliency for Stream Processing Workloads through Redundancy .51..... Geoffrey Phi Tran (University of Southern California), John Paul Walters (University of Southern California), and Stephen Crago (University of Southern California) **Session 4: Containers and Edge Computing** Sophia Antipolis), and Daniel Hagimont (Université de Toulouse) A Container Scheduling Strategy Based on Machine Learning in Microservice Architecture .65...... Jingze Lv (Sun Yat-sen University), Mingchang Wei (Sun Yat-sen University), and Yang Yu (Sun Yat-sen University) Context-Aware Multi-QoS Prediction for Services in Mobile Edge Computing 72...... Zhizhong Liu (Henan Polytechnic University), Quan Z. Sheng (Macquarie University), Wei Emma Zhang (Macquarie University), Dianhui Chu (Harbin Institute of Technology), and Xiaofei Xu (Harbin Institute of Technology) **Session 5: Security and Privacy** F-LaaS: A Control-Flow-Attack Immune License-as-a-Service Model .80..... Sandeep Kumar (Indian Institute of Technology Delhi), Diksha Moolchandani (Indian Institute of Technology Delhi), Takatsugu Ono (Kyushu University), and Smruti R. Sarangi (Indian Institute of Téchnology Delhi) FlashGhost: Data Sanitization with Privacy Protection Based on Frequent Colliding Hash Table 90 Yan Zhu (University of Science and Technology Beijing), Shuai Yang (University of Science and Technology Beijing), Cheng-Chung Chu (Tunghai University), and Rongquan Feng (Peking University) Helping Users Managing Context-Based Privacy Preferences .1.00. Md. Zulfikar Alom (University of Insubria), Barbara Carminati

(University of Insubria), and Elena Ferrari (University of Insubria)

### **Session 6: Service and Data Management**

FM4SN: A Feature-Oriented Approach to Tenant-Driven Customization of Multi-Tenant Service Networks .1.0.8...... Indika Kumara (Eindhoven University of Technology / Jheronimus Academy of Data Science), Jun Han (Swinburne University of Technology), Alan Colman (Swinburne University of Technology), Willem-Jan Van Den Heuvel (Jheronimus Academy of Data Science / Tilburg University), and Damian Tamburri (Jheronimus Academy of Data Science / Eindhoven University of Technology) An Online Personalized Reputation Estimation Model for Service-Oriented Systems .1.16..... Jianlong Xu (Shantou University), Xin Du (Shantou University), Weihong Cai (Shantou University), Changsheng Zhu (Shantou University), and Yindong Chen (Shantou University) Set-Covering Theory-Based Data Placement Cost Optimization for Online Social Networks .121...... Xia Ji (Anhui University), Ruiyue Zhu (Anhui University), and Xuejun Li (Anhui University) **Session 7: Service Composition and Pipelines** NLSC: Unrestricted Natural Language-Based Service Composition through Sentence Embeddings .126 Oscar J. Romero (Carnegie Mellon University), Ankit Dangi (Carnegie Mellon University), and Sushma A. Akoju (Carnegie Mellon University) Enhancing Monitoring Queries Invoking Composition of Services .1.3.6. Malik Khalfallah (Airbus) and Parisa Ghodous (Lyon 1 University) On the Design and Architecture of Deployment Pipelines in Cloud- and Service-Based Computing - A Model-Based Qualitative Study .141..... Uwe Zdun (University of Vienna), Evangelos Ntentos (University of Vienna), Konstantinos Plakidas (University of Vienna), Amine El Malki (University of Vienna), Daniel Schall (Siemens Corporate Technology), and Fei Li (Siemens Corporate Technology) **Session 8: Cloud Services** A Genetic-Based Approach to Location-Aware Cloud Service Brokering in Multi-Cloud Environment 146.... Tao Shi (Victoria University of Wellington), Hui Ma (Victoria University of Wellington), and Gang Chen (Victoria University of Wellington) A Transactional Approach for Reliable Elastic Cloud Resources .1.5.4..... Farah Bellaaj Elloumi (University of Sfax), Hayet Brabra (University of Paris-Saclay), Mohamed Sellami (University of Paris-Saclay), Walid Gaaloul (University of Paris-Saclay), and Sami Bhiri (University Tunis El Manar)

Towards a Democratic Federation for Infrastructure Service Provisioning .1.62..... Bishakh Chandra Ghosh (Indian Institute of Technology Kharagpur), Sourav Kanti Addya (Indian Institute of Technology Kharagpur), Anurag Satpathy (National Institute of Technology Rourkela), Soumya K. Ghosh (Indian Institute of Technology Kharagpur), and Sandip Chakraborty (Indian Institute of Technology Kharagpur) **Session 9: Processes and Workflows** Overlapping Analytic Stages in Online Process Mining .167...... Gabriel Marques Tavares (Londrina State University), Paolo Ceravolo (Università degli Studi di Milano), Victor G. Turrisi Da Costa (Londrina State University), Ernesto Damiani (Khalifa University), and Sylvio Barbon Junior (Londrina State University) Novel Discovery Mechanism for Crossing-Workflow Fragments Leveraging Activity Relevance .1.76... Jinfeng Wen (China University of Geosciences Beijing), Zhangbing Zhou (China University of Geosciences Beijing), Xiao Xue (Tianjin University), and Yucong Duan (Hainan University) Leveraging Shallow Machine Learning to Predict Business Process Behavior .1.84..... Annalisa Appice (University of Bari Aldo Moro), Nicola Di Mauro (University of Bari Aldo Moro), and Donato Malerba (University of Bari Aldo Moro) Session 10: Service Recommendations II Service Recommendation Based on Attentional Factorization Machine .189..... Yingcheng Cao (Hunan University of Science and Technology), Jianxun Liu (Hunan University of Science and Technology), Min Shi (Hunan University of Science and Technology), Buqing Cao (Hunan University of Science and Technology), Ting Chen (Hunan University of Science and Technology), and Yiping Wen (Hunan University of Science and Technology) A POI-Sensitive Knowledge Graph Based Service Recommendation Method .1.97...... Sihang Hu (Harbin Institute of Technology), Zhiying Tu (Harbin Institute of Technology), Zhongjie Wang (Harbin Institute of Technology), and Xiaofei Xu (Harbin Institute of Technology) QF-RNN: QI-Matrix Factorization Based RNN for Time-Aware Service Recommendation .202...... Xing Wu (Tsinghua University), Yushun Fan (Tsinghua University), Jia Zhang (Carnegie Mellon University), Haozhe Lin (Tsinghua University), and Jungi Zhang (Tsinghua University) **Session 11: Resource Management** Towards Risk-Aware Cost-Optimal Resource Allocation for Cloud Applications .210..... Mohan Baruwal Chhetri (Swinburne University of Technology), Abdur Rahim Mohammad Forkan (Swinburne University of Technology), Quoc Bao Vo (Swinburne University of Technology), Surya Nepal (Data61), and

Ryszard Kowalczyk (Swinburne University of Technology)

Dynamic Data Routing Decisions for Compliant Data Handling in Service-and Cloud-Based Architectures: A Performance Analysis .215
Amirali Amiri (University of Vienna), Christoph Krieger (University of Stuttgart), Uwe Zdun (University of Vienna), and Frank Leymann (University of Stuttgart)
Enhancing Availability of Traffic-Aware Virtual Cluster Allocation in Cloud Datacenters .220
Session 12: Work-in-Progress Papers
Situation-Aware Access Control in Federated Data-as-a-Service for Maritime Search and Rescue 228.
Samson Oni (University of Maryland Baltimore County), Zhiyuan Chen (University of Maryland Baltimore County), Adina Crainiceanu (U.S. Naval Academy), Karuna Joshi (University of Maryland Baltimore County), and Don Needham (U.S. Naval Academy)
Facilitating the Support of Cloud-Based Service Marketplaces .231.  Büttner Jacqueline (Universität Duisburg-Essen), Hesenius Marc (Universität Duisburg-Essen), and Gruhn Volker (Universität Duisburg-Essen)
Ephemeral Data Handling in Microservices .234
Winnability Prediction for IT Services Bids .237.  Pei Guo (IBM Research Almaden), Aly Megahed (IBM Research Almaden), Shubhi Asthana (IBM Research Almaden), and Paul Messinger (University of Alberta)
Author Index 2/1