Lecture Notes on Data Engineering and Communications Technologies

Volume 10

Series editor

Fatos Xhafa, Technical University of Catalonia, Barcelona, Spain e-mail: fatos@cs.upc.edu

The aim of the book series is to present cutting edge engineering approaches to data technologies and communications. It publish latest advances on the engineering task of building and deploying distributed, scalable and reliable data infrastructures and communication systems.

The series will have a prominent applied focus on data technologies and communications with aim to promote the bridging from fundamental research on data science and networking to data engineering and communications that lead to industry products, business knowledge and standardisation.

More information about this series at http://www.springer.com/series/15362

Georgios Skourletopoulos George Mastorakis Constandinos X. Mavromoustakis Ciprian Dobre · Evangelos Pallis Editors

Mobile Big Data

A Roadmap from Models to Technologies



Editors Georgios Skourletopoulos Department of Computer Science University of Nicosia Nicosia Cyprus

George Mastorakis Department of Business Administration Technological Educational Institute Crete Agios Nikolaos Greece

Constandinos X. Mavromoustakis Department of Computer Science University of Nicosia Nicosia Cyprus Ciprian Dobre Department of Computer Science and Engineering University Politehnica of Bucharest Bucharest Romania

Evangelos Pallis Department of Informatics Engineering Technological Educational Institute of Crete Heraklion Greece

ISSN 2367-4512ISSN 2367-4520 (electronic)Lecture Notes on Data Engineering and Communications TechnologiesISBN 978-3-319-67924-2ISBN 978-3-319-67925-9 (eBook)https://doi.org/10.1007/978-3-319-67925-9

Library of Congress Control Number: 2017954873

© Springer International Publishing AG 2018

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, express 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.

Printed on acid-free paper

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

Preface

The usage of mobile devices steadily grows causing an enormous rise in the mobile data traffic over the Internet. Data is produced by handheld, pervasive and wearable devices, which are configured for collecting and delivering data to related servers that host online and mobile social networks. Notwithstanding, the enormous amount, multi-source collection of data motivates the need to investigate novel access methods, mobile big data collecting techniques, methods to improve the integration of resources' availability through the 3As ('Anywhere, Anything, Anytime') paradigm, distributed big data storing methodologies, and intra- or inter-big data processing mechanisms.

The main target of this book is to give an overview of the great emerging advances and challenges in mobile technologies for collecting, storing and processing mobile big data from an engineering perspective, discussing a wide range of applications and scenarios where mobile big data can be applied. Future directions on theories, practices, standards and strategies that are related to this research domain are discussed. This timely volume includes thirteen rigorously refereed chapters from prominent international researchers and serves as a source of new schemes in the mobile big data field for students, researchers, scientists and practitioners. It may be used in undergraduate and graduate courses on the design and development of mobile big data-driven systems and applications. Researchers and scientists will find the book useful as it provides a current state-of-the-art guide and future trends in mobile big data analytics and management. Finally, practitioners will broaden their expertise on particular topics and methodologies, such as the transition of mobile big data to the Cloud, context-awareness in the mobile big data paradigm and the processing of real-time streaming events on-the-move considering the need for high-velocity processing and low latency response.

Nicosia, Cyprus Agios Nikolaos, Greece Nicosia, Cyprus Bucharest, Romania Heraklion, Greece Georgios Skourletopoulos George Mastorakis Constandinos X. Mavromoustakis Ciprian Dobre Evangelos Pallis

Acknowledgements

This book has been made possible by the great efforts and contributions of many people. First of all, we would like to thank all the contributors for putting together excellent chapters that are very comprehensive and informative. Second, we would like to thank all the reviewers for their valuable suggestions and comments, which have greatly enhanced the quality of this book. Finally, we would like to thank the staff members from Springer International Publishing for putting this book together and assisting us throughout the process.

Contents

Part I Introduction to Mobile Big Data Paradigm

Big Data Analytics: Applications, Prospects and Challenges	3
Levering Mobile Cloud Computing for Mobile Big Data Analytics Yongxin Liu and Houbing Song	21
Game Theoretic Approaches in Mobile Cloud Computing Systems for Big Data Applications: A Systematic Literature Review Georgios Skourletopoulos, Constandinos X. Mavromoustakis, George Mastorakis, Jordi Mongay Batalla, Ciprian Dobre, John N. Sahalos, Rossitza I. Goleva and Nuno M. Garcia	41
Part II Architectures, Applications and Services for Mobile Big Data	
Evidence-Aware Mobile Cloud Architectures	65
Context-Awareness in Location Based Services in the Big Data Era Patrizia Grifoni, Arianna D'Ulizia and Fernando Ferri	85
Mobile Big Data in Vehicular Networks: The Road to Internet of Vehicles Ali Kamouch, Abdelaali Chaoub and Zouhair Guennoun	129

Part III	Data Management for Mobile Big Data
Mobile D	istributed Complex Event Processing—Ubi Sumus?

Part IV Industrial Practices of Mobile Big Data-Driven Models	
Energy-Aware Issues for Handling Big Data in Mobile Cloud Computing Chhabi Rani Panigrahi, Rajesh Kumar Verma, Joy Lal Sarkar and Bibudhendu Pati	233
Evaluating Decision Analytics from Mobile Big Data using Rough Set Based Ant Colony Soumya Banerjee and Youakim Badr	217
Electromagnetic Interference and Discontinuity Effects of Interconnections on Big Data Performance of Integrated Circuits Seyi Stephen Olokede and Babu Sena Paul	181
Quo Vadimus?	147

Big Data—A New Technology Trend and Factors Affecting the Implementation of Big Data in Australian Industries Bhavyadipsinh Jadeja and Tomayess Issa	259
Extending the Sana Mobile Healthcare Platform with Features Providing ECG Analysis Katerina Tsampi, Spyros Panagiotakis, Elias Hatzakis, Emmanouil Lakiotakis, Georgia Atsali, Kostas Vassilakis, George Mastorakis, Constandinos X. Mavromoustakis and Athanasios Malamos	289
Social Networking in Higher Education in India	323