

Lecture Notes on Data Engineering and Communications Technologies

Volume 21

Series editor

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

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Editors

Digital Business

Business Algorithms, Cloud Computing
and Data Engineering

 Springer

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ISSN 2367-4512 ISSN 2367-4520 (electronic)
Lecture Notes on Data Engineering and Communications Technologies
ISBN 978-3-319-93939-1 ISBN 978-3-319-93940-7 (eBook)
<https://doi.org/10.1007/978-3-319-93940-7>

Library of Congress Control Number: 2018944343

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Printed on acid-free paper

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

Preface

Professionals and Business Consultants have predicted that “Digital Business” shall dominate the Computing and Business arena for the next 10 years rather than simply Data Mining or Business Intelligence. It is one of the niche areas of Computer Science and Business Management. The term “Digital Business” is used in a context of digital transformation, disruptive technologies and holistic business integration/optimization/convergence. However, its dimension is much more than that. A key part of this domain is information employed at work, which requires a holistic approach of information management and connecting value chain to derive more throughput out of the entire business ecosystem.

As digital technologies offer new ways to connect, collaborate, conduct business and build bridges between people, it touches the core of all business functions. Digital technologies have also challenged existing business models and their present form of operation. One of the key driving forces is the capacity of innovation and the commercialization of information and communication technology. Digital business encompasses the entire business model, such as marketing, ICT, social as well as core business activities and its convergence. From a sheer technology perspective, it has gone beyond, such as Cloud Computing, Internet of Things, Mobile platform, Big Data, etc. This edited volume covers the three distinct areas such as Cloud Computing, Digital Mess, i.e. Internet of Things and Business Algorithms which integrate them all.

All most every industrial sector and business enterprises are now focusing on digitization of core systems and processes, along with development of new frameworks and models. Digital Mess or, Internet of Things (IoT) has become the core of many applications by combining affordable embedded sensors and actuators. This digital transformation process has given rise to processing of massive amount of heterogeneous data, known as Big Data through cloud computing.

This volume covers various business algorithms to solve various issues and challenges, faced by the business organizations, including Big Data, Digital Business Transformation, Cloud Computing and IoT along with some scientific and web-based application areas. This book also provides future research directions for these areas for researchers.

We are thankful to the Editor-in-Chief of the Springer Book Series on *Lecture Notes on Data Engineering and Communications Technologies* Prof. Fatos Xhafa and also Springer Executive Editor Dr. Thomas Ditzinger, for his kind acceptance of this volume in his series. We are also thankful to all the reviewers, for their support in reviewing the chapters to bring out the volume in time. I am also thankful to all my co-editors Prof. Xin-She Yang, Dr. Madjid Tavana, Dr. Florin Popentiu-Vlădicescu and Prof. Feng Qiao, for their support and encouragement.

I am sure that the readers shall get immense ideas and knowledge from this volume.

Bhubaneswar, India

Prof. (Dr.) Srikanta Patnaik

Editorial

The evolution of new technologies such as IoT, cloud computing and widespread use of smart phones has initiated the faster adoption of digitization wave by organizations and enterprises in business world. This current technological advancement has given rise to a revolutionary era, which has led to the transformation of traditional business world into digital form. Moreover, digital transformation of businesses has created many new opportunities with the integration of digitization process across the horizontal and vertical value chains of the organization ranging from digitization of planning and other processes to digitization of the product itself and respective solutions. All these transformations and disruptions together form a digital ecosystem where both products and processes are digitized and are adopted by traditional firms and industries and thus present new obstacles and challenges.

This book has presented a comprehensive collection of works from potential researchers and scholars who have shared their works and findings related to this area. It addresses a wide range of IoT-based problems, frameworks, solutions and applications related to smart environments and applications, where vast amount of data is being generated. Again, as this research area is highly multidisciplinary in nature, the chapters considered in this book are the ones that have addressed recent trends and challenges while maintaining innovativeness. Further, this book is technically organized to contain 18 chapters that are broadly categorized into four major sections namely (i) Digital Business Transformation, (ii) Cloud Computing (iii) IOT & Mobility (iv) Information Management & Social Media. A brief overview of each chapter is given below:

Chapter “[Towards Algorithmic Business: A Paradigm Shift in Digital Business](#)” gives a brief idea about what is algorithmic business along with an overview about how it is related to IoT and digital transformation. It also discusses how algorithms are impacting current and future business applications.

Chapter “[A Decentralized Business Ecosystem Model for Complex Products](#)” first studies decentralized business ecosystem for complex products by considering different scenarios and identifies the objectives, significant actors and their relevant

interaction patterns for developing architecture to support the model. The new ecosystem they introduce not only supports transactions between complex products but also supports both value creation and sharing between the components.

Chapter “[Compliance Management in Business Processes](#)” addresses the compliance management issue in business processes by first giving an overview of the concept and possible pros and cons in the absence of compliance management system. They further discuss various compliance management activities and finally the compliance management functionalities (CMFs).

Chapter “[Sustainable Cloud Computing Realization for Different Applications: A Manifesto](#)” investigates the challenges in sustainable cloud computing along with the current developments for different applications. The authors propose a taxonomy for application management in sustainable cloud computing and map existing works to the taxonomy for identifying research gaps.

Chapter “[Auction Based Scheme for Resource Allotment in Cloud Computing](#)” proposes a dynamic model for resource allocation in cloud computing using winner determination scheme for computing cost and achieving optimal resource allocation. The authors consider the requirement of both the users and the cloud service providers for calculating the final cost.

Chapter “[M-Cloud Computing Based Agriculture Management System](#)” presents a mobile-based cloud computing framework to solve problems related to agriculture for increasing productivity. The framework attempts to solve problems concerning agriculture faster by gathering and sharing environmental as well as location-based information among farmers thus modernizing agriculture.

Chapter “[Detection and Analysis of Drowsiness in Human Beings Using Multimodal Signals](#)” proposes a framework for analysing and detecting the drowsiness state in a human being that monitors alertness of mind and body while driving. The authors consider here multi-modal signals such as visual information and biosignals (EEG) for implementing the framework for the analysis purpose.

Chapter “[Enhancing Security and Privacy in Enterprises Network by Using Biometrics Technologies](#)” proposes a novel security mechanism using biometric trait of employees in the encryption process of data exchanged by enterprises. The proposed approach ensures security and confidentiality in enterprise network to provide stronger security measures.

Chapter “[Lightweight Context-Based Web-Service Composition Model for Mobile Devices](#)” discusses a new lightweight context-based model for web service composition of the mobile device itself using POS tagger. The authors use POS tagger to identify service requests from users in NLQ form and the responses are further composed in the mobile device itself by web service providers.

Chapter “[On Weighted Extended Cumulative Residual Entropy of \$k\$ -th Upper Record](#)” considers a shift-dependent version of generalized cumulative residual entropy and discusses its advantages and applications for k -th upper record and establishes a non-parametric estimator with its asymptotic normality along with characterization of the results.

Chapter “[Impact of Mobility in IoT Devices for Healthcare](#)” proposes an IoT-based platform that helps in providing personalized tips, tracing, reminders and educational contents about medical conditions proactively. The authors also discuss about mobility in IoT and its convergence with respect to mobile cloud, devices and social media.

Chapter “[Multiple Mobile Elements Based Energy Efficient Data Gathering Technique in Wireless Sensor Networks](#)” studies the limitations of the existing data gathering techniques in WSN and proposes a related framework that introduces Mobile Elements. Further, the authors use data fusion at cache point to ensure data gathering efficiency by reducing instances of transmissions. Also, the proposed technique is claimed to be efficient by the authors in many aspects such as packet delivery ratio, lesser delay, reduced overhead optimum energy consumption and decreased packet drop.

Chapter “[Online Social Communities](#)” presents a comprehensive list of online social communities and classifies them according to their usage. Various ONSC are further discussed from the user participation lifecycle perspective along with disjoint and overlapping communities over both static and dynamic networks.

Chapter “[The ‘Verticals’, ‘Horizontal’, and ‘Diagonals’ in Organisational Communication: Developing Models to Mitigate Communication Barriers Through Social Media Applications](#)” proposes a three-tier communication paradigm for addressing the communication barrier problem among organizational workforce. This paradigm builds interpersonal as well as intrapersonal skills and mitigates performance anxieties to enhance overall productivity. The authors examine these aspects and mitigate the communication barrier through social media applications.

Chapter “[Subjective Interestingness in Association Rule Mining: A Theoretical Analysis](#)” investigates the nature of subjective interestingness among associations of several items of a supermarket considering the manager’s expectation and customer’s purchase patterns. The authors observe the limitations and propose a two-dimensional framework that presents matching methodology horizontally and granularity of user knowledge across vertical axis. They also make an attempt to identify relevant research gaps in this context and pose significant research questions.

Chapter “[Identifying Sentiment of Malayalam Tweets Using Deep Learning](#)” presents a comparative study to identify sentiments in Malayalam tweets by using various deep learning methods. The findings are then compared with several baseline methods such as SVM and RKS-RLSC, etc. for the effectiveness of methods. F1-score, precision, recall and accuracy are considered by the authors as evaluation measures.

Chapter “[Twitter Based Sentiment Analysis of GST Implementation by Indian Government](#)” provides a mathematical analysis of sentiments of Indian public over GST implementation and the author’s observation over the impact made by the tax structure is carried out on Twitter data that has been collected over the period of GST implementation phase as well as the Pre-GST and Post-GST phases of the Indian economic reformation scenario.

Chapter “[Event Detection Using Twitter Platform](#)” discusses several event detection techniques that are used on Twitter for prediction, detection and managing disaster-based events. Further, the chapter summarizes the performance of various data collection, analysis and event detection tools over Twitter data.

Prof. Srikanta Patnaik

Prof. Xin-She Yang

Dr. Madjid Tavana

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He has worked for many years on problems associated with software reliability and has been Co-Director of two NATO Research Projects. Also, he is on the advisory board of several international journals, including “Reliability and Risk Analysis: Theory & Applications” and is a reviewer to “ACM Computing Reviews”. He is currently Associated Editor to the *International Journal of Information and Communication Technology* (IJICT)—Inderscience Publishers. He is an independent expert to the European Commission—H2020 programme, for Net Services—Software and Services, Cloud. He is currently Visiting Professor at “ParisTech”. He also lectures at the Technical University of Denmark. He was elected Fellow of the Academy of Romanian Scientists in 2008 and Director of the Doctoral School “Engineering sciences” for the period 2011–2015. Details about his CV are presented on the following sites:

<http://www.staff.city.ac.uk/~pop/>

<http://www.staff.city.ac.uk/~pop/list.html>.

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