

Studies in Computational Intelligence 769

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Modern Approaches for Intelligent Information and Database Systems

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Preface

Intelligent information and database systems are a very vibrant research area for over thirty years now. Over the years, the researchers have proposed more and more complex theoretical models. These models provide a theoretical background for numerous applications. The applications, on the one hand, have a profound influence on almost all areas of human activity and on the other hand, enable us to validate the underlying theoretical concepts.

In the recent years, we witness an enormous growth of available data ranging from textual repositories of the Internet to the overwhelming flow of data generated by the IoT. The data can be analyzed in a variety of ways, and some of the already achieved goals like reliable, speaker-independent speech transcription ten years ago belonged to the realm of science fiction. This all was possible due to the remarkable progress on both intelligent information and database systems. The resulting systems are complex and perform data-intensive and resource-consuming tasks. To cope with the flood of data, we need to acquire a profound understanding of old issues, to rethink previous paradigms, and to develop new concepts and approaches. The aim of the book is to provide readers with a carefully selected collection of research reports to facilitate the comprehension of the state of the art of such systems, thus promoting new research.

The area of intelligent information and database systems is very wide. This book presents the theory and practice of the ongoing research in its most active sections. Nowadays, we witness the integration of artificial intelligence and classic database technologies. In recent years, due to the advances in technology amounts of multimedia, social media, and IoT data are available. All this makes it possible to develop a novel class of innovative information systems. Their main goal is to offer the end users quasi-intelligent operation. They combine advanced learning techniques, knowledge engineering, NLP, decision support systems, IoT, computer vision, and tools and techniques for intelligent information systems to name some of used techniques.

The chapters in this book cover research work on these diverse topics. They are presented and discussed both from the practical and theoretical points of view and are extended versions of the poster presentations of the 10th Asian Conference on

Intelligent Information and Database Systems—ACIIDS 2018 which was held in Dong Hoi City, Vietnam, from March 19th until 21st, 2018.

The volume consists of 45 chapters that are divided into seven parts:

Part I “Knowledge Engineering and Semantic Web” includes five chapters that focus on uncertainty elicitation of experts using belief function, storing hypergraph-based data models in non-hypergraph data storage, using a three-stage consensus-based method for collective knowledge determination, modeling of fuzzy ontology by utilizing fuzzy set and fuzzy description logic, and recommending group experts for question and answering sites.

Part II “Natural Language Processing and Text Mining” consists of seven chapters that deal with predicting the popularity of presidential candidates using a fuzzy logic approach, representing DNA sequences by discrete wavelet transformation known from text similarity recognition, predicting the type of a DBpedia entity, tweet integration, or event detection, predicting the length of written responses to open-ended questions, combining inner approach and context-based approach to extract features of medical record data.

In Part III “Machine Learning and Data Mining” which encompasses nine chapters, we have collected research on: robust scale-invariant normalization and similarity measurement for time series data; attributes of game AI using fuzzy logic, building a detection model for water quality, a deep learning approach to case-based reasoning to the evaluation and diagnosis of cervical carcinoma, fast and memory-efficient mining of periodic frequent patterns, development of seawater temperature announcement system for red tide estimation, a fuzzy approach for the diagnosis of depression, a coupling support vector machines with the feature learning of deep convolutional neural networks for classifying microarray gene expression data, and finally on a weighted approach for class association rules.

Part IV “Decision Support Systems” contains seven chapters. They focus on supporting product development, supporting investments decision making on the basis of system dynamics, improvement of the community bus operation management system, and predicting consumer choices based on product brand. The very important topic of the e-commerce is discussed in the context of dynamic configuration of same-day delivery, the current trends in online shopping in the Czech Republic, and achieving lean and agile supply chain.

Part V “Computer Vision Techniques and Applications” comprises seven chapters and concentrates upon the identification of persons by his/her actions or more conventionally by face in the surveillance applications. They also discuss some industrial applications such as video stream magnification for touchless object vibration measurement or CNN-based classification for small specific datasets. The computer vision techniques are used also in the medical research for the breast cancer detection.

In Part VI “Sensor Networks and Internet of Things and Tools” part, we have collected five research reports. They discuss a multi-metric routing protocol of mobile ad hoc networks, integrating data access to heterogeneous data stores for IoT cloud, path estimation from smartphone sensors, localization of patients in

urgent admission department and the design of universal hardware node board for smart home and the IoT.

Part VII “Techniques for Intelligent Information Systems.” It encompasses five chapters. Their authors propose and analyze new methods and techniques for securing our data in public cloud, forecast load using leveraging database technology, analyze privilege control system with data mining techniques, use agent programming languages and logics in agent-based simulation, and propose a tool for computing the leakage of multi-threaded programs.

We sincerely do hope that this volume should be a valuable source of reference data and provide ample inspiration for your future research work. It should be also useful for students interested in computer science and in particular in artificial intelligence, big data, multimedia processing, and advanced databases.

We would like to express our sincere thanks to Prof. Janusz Kacprzyk, the Editor of this series, and Dr. Thomas Ditzinger from Springer for their interest and support for our project. Our thanks are due to all reviewers, who helped us to guarantee the highest quality of the chapters included in the book. Finally, we cordially thank all the authors for their valuable contributions to the content of this volume.

Wrocław, Poland

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Madrid, Spain

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Contents

Part I Knowledge Engineering and Semantic Web

A Three-Stage Consensus-Based Method for Collective Knowledge Determination	3
Dai Tho Dang, Van Du Nguyen, Ngoc Thanh Nguyen and Dosam Hwang	
Fuzzy Ontology Modeling by Utilizing Fuzzy Set and Fuzzy Description Logic	15
Xuan Hung Quach and Thi Lan Giao Hoang	
An Approach for Recommending Group Experts on Question and Answering Sites	27
Dinh Tuyen Hoang, Ngoc Thanh Nguyen, Huyen Trang Phan and Dosam Hwang	
A Method for Uncertainty Elicitation of Experts Using Belief Function	39
Tuan Nha Hoang, Tien Tuan Dao and Marie-Christine Ho Ba Tho	
Storing Hypergraph-Based Data Models in Non-hypergraph Data Storage	51
András Béleczi, Bálint Molnár and Bence Sarkadi-Nagy	

Part II Natural Language Processing and Text Mining

A Fuzzy Logic Approach to Predict the Popularity of a Presidential Candidate	63
Pritom Mazumder, Navid Anjum Chowdhury, Moh. Anwar-Ul-Azim Bhuiya, Shabbir Haque Akash and Rashedur M. Rahman	
DNA Sequences Representation Derived from Discrete Wavelet Transformation for Text Similarity Recognition	75
Phan Hieu Ho, Ngoc Anh Thi Nguyen and Trung Hung Vo	

Tweet Integration by Finding the Shortest Paths on a Word Graph	87
Huyen Trang Phan, Dinh Tuyen Hoang, Ngoc Thanh Nguyen and Dosam Hwang	
Event Detection in Twitter: Methodological Evaluation and Structural Analysis of the Bibliometric Data	99
Musa Ibarhim M. Ishag, Kwang Sun Ryu, Jong Yun Lee and Keun Ho Ryu	
Combination of Inner Approach and Context-Based Approach for Extracting Feature of Medical Record Data	113
Van-Minh Le, Quang-Ngu Truong and Tu-Thien Huynh	
A Novel Method to Predict Type for DBpedia Entity	125
Thi-Nhu Nguyen, Hideaki Takeda, Khai Nguyen, Ryutaro Ichise and Tuan-Dung Cao	
Context-Based Personalized Predictors of the Length of Written Responses to Open-Ended Questions of Elementary School Students	135
Roberto Araya, Abelino Jiménez and Carlos Aguirre	
Part III Machine Learning and Data Mining	
Robust Scale-Invariant Normalization and Similarity Measurement for Time Series Data	149
Ariyawat Chonbodeechalermroong and Chotirat Ann Ratanamahatana	
Perceiving Attributes of Game AI Using Fuzzy Logic	161
Saadman Shahid Chowdhury, Ruhul Mashbu, Ariq Ahnaf Shaan, Kazi Al Ashfaq, Fazal Mahmud Niloy and Rashedur M. Rahman	
Approaches to Building a Detection Model for Water Quality: A Case Study	173
Fitore Muharemi, Doina Logofătu, Christina Andersson and Florin Leon	
A Deep Learning Approach to Case Based Reasoning to the Evaluation and Diagnosis of Cervical Carcinoma	185
José Neves, Henrique Vicente, Filipa Ferraz, Ana Catarina Leite, Ana Rita Rodrigues, Manuela Cruz, Joana Machado, João Neves and Luzia Sampaio	
A Fuzzy Approach for the Diagnosis of Depression	199
Abhijit Thakur, Md. Sakibul Alam, Md. Rashidul Hasan Abir, Mahir Ashab Ahmed Kushal and Rashedur M. Rahman	
A Weighted Approach for Class Association Rules	213
Loan T. T. Nguyen, Bay Vo, Thang Mai and Thanh-Long Nguyen	

Fast and Memory Efficient Mining of Periodic Frequent Patterns 223
 Vincent Mwintieru Nofong

A Coupling Support Vector Machines with the Feature Learning of Deep Convolutional Neural Networks for Classifying Microarray Gene Expression Data 233
 Phuoc-Hai Huynh, Van-Hoa Nguyen and Thanh-Nghi Do

Development of Seawater Temperature Announcement System for Quick and Accurate Red Tide Estimation 245
 Yu Agusa, Takuya Fujihashi, Keiichi Endo, Hisayasu Kuroda and Shinya Kobayashi

Part IV Decision Support Systems

Support Product Development Framework by Means of Set of Experience Knowledge Structure (SOEKS) and Decisional DNA 257
 Muhammad Bilal Ahmed, Cesar Sanin and Edward Szczerbicki

Actual Situation and Development in Online Shopping in the Czech Republic, Visegrad Group and EU-28 269
 Libuše Svobodová and Martina Hedvičáková

How Product Brand Effects Consumer Decision 281
 Vaclav Zubr, Hana Mohelska and Marcela Sokolova

Investments Decision Making on the Basis of System Dynamics 293
 Galymkaiyr Mutanov, Marek Milosz, Zhanna Saxenbayeva and Aida Kozhanova

Dynamic Configuration of Same-Day Delivery in E-commerce. 305
 Arkadiusz Kawa, Bartłomiej Pieranski and Wojciech Zdrenka

Lean and Agile Supply Chains of E-commerce in Terms of Customer Value Creation 317
 Arkadiusz Kawa and Anna Maryniak

Improvement of Community Bus Operation Management System 329
 Kento Ando, Yu Fujihara, Takuya Fujihashi, Keiichi Endo, Hisayasu Kuroda and Shinya Kobayashi

Part V Computer Vision Techniques and Applications

Novel Human Action Recognition in RGB-D Videos Based on Powerful View Invariant Features Technique 343
 Sebastien Mambou, Ondrej Krejcar, Kamil Kuca and Ali Selamat

Study of CNN Based Classification for Small Specific Datasets 355
Huu Ton Le, Thierry Urruty, Marie Beurton-Aimar, Thi Phuong Nghiem,
Hoang Tung Tran, Romain Verset, Marie Ballere, Hien Phuong Lai
and Muriel Visani

How to Choose Deep Face Models for Surveillance System? 367
Vy Nguyen, Tien Do, Vinh-Tiep Nguyen, Thanh Duc Ngo
and Duc Anh Duong

**GPU Video Stream Magnification as a Tool for Touchless Object
Vibration Measurement** 377
Dawid Sobel, Karol Jędrasiak and Aleksander Nawrat

**Viewpoint Invariant Person Re-identification with Pose
and Weighted Local Features** 387
Chun-Huei Chen, Ju-Chin Chen and Kawuu W. Lin

Breast Cancer Detection Using Modern Visual IT Techniques 397
Sebastien Mambou, Petra Maresova, Ondrej Krejcar, Ali Selamat
and Kamil Kuca

**Contactless Identification System Based on Visual Analysis
of Examined Element** 409
Lukas Kolda, Ondrej Krejcar, Ali Selamat, Peter Brida and Kamil Kuca

Part VI Sensor Networks and Internet of Things

**Integrated Data Access to Heterogeneous Data Stores
for IoT Cloud** 423
Shodai Watanabe and Akihito Nakamura

Path Estimation from Smartphone Sensors 435
Jan Racko, Peter Brida, Juraj Machaj and Ondrej Krejcar

**A Multi-metric Routing Protocol to Improve the Achievable
Performance of Mobile Ad Hoc Networks** 445
Vu Khanh Quy, Nguyen Tien Ban and Nguyen Dinh Han

**Novel Approach for Localization of Patients in Urgent Admission
Department** 455
Jan Kubicek, Libor Michalek, Tomas Urbanczyk, Jaromir Konecny,
Martin Tomis, Filip Benes, Jiri Svub, Pavel Stasa and Leopold Pleva

**Design of Universal Hardware Node Board for Smart-Home
Automation and the IoT** 465
Jan Stepan, Richard Cimler, Jan Matyska and Ondrej Krejcar

Part VII Tools and Techniques for Intelligent Information Systems

OpenWebCrypt—Securing Our Data in Public Cloud 479
Péter Vörös and Attila Kiss

**A Novel Load Forecasting System Leveraging Database
Technology** 491
Chee Keong Wee and Richi Nayak

**A Novel Database Exploitation Detection and Privilege Control
System Using Data Mining** 505
Chee Keong Wee and Richi Nayak

**Agent Programming Languages and Logics in Agent-Based
Simulation** 517
John Bruntse Larsen

A Tool to Compute the Leakage of Multi-threaded Programs 527
Tri Minh Ngo and Quang Tuan Duong

**Erratum to: Fuzzy Ontology Modeling by Utilizing Fuzzy Set and
Fuzzy Description Logic** E1
Xuan Hung Quach and Thi Lan Giao Hoang

Author Index. 539