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.

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