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Khalid Saeed · Władysław Homenda (Eds.)

Computer Information Systems and Industrial Management

17th International Conference, CISIM 2018
Olomouc, Czech Republic, September 27–29, 2018
Proceedings

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Preface

CISIM 2018 was the 17th of a series of conferences dedicated to computer information systems and industrial management applications. The conference was supported by Springer LNCS Information Systems. This year it was held during September 27–29, 2010, in Olomouc, Czech Republic, at Palacký University Olomouc. More than 70 papers were submitted to CISIM by researchers and scientists from a number of reputed universities around the world. These scientific and academic institutions belong to Australia, Chile, Colombia, Czech Republic, France, Germany, India, Italy, Japan, Lithuania, Luxembourg, Malaysia, Mexico, New Zealand, Peru, Poland, Portugal, South Korea, Tunisia, and the USA. Most of the papers were of high quality, but only 69 of them were sent for peer review. Each paper was assigned to at least two referees initially, and the accept decision was taken after receiving two positive reviews. In the case of conflicting decisions, another expert's review was sought for the respective papers. In total, about 150 reviews and comments were collected from the referees for the submitted papers. In order to maintain the guidelines of Springer's *Lecture Notes in Computer Science* series, the number of accepted papers was limited. Furthermore, a number of electronic discussions were held by the Program Committee (PC) chairs to decide about papers with conflicting reviews and to reach a consensus. After the discussions, the PC chairs decided to accept for publication in the proceedings book the best 42 of the total submitted papers. The main topics covered by the chapters in this book are biometrics, security systems, multimedia, classification and clustering, and industrial management. Besides these, the reader will find interesting papers on computer information systems as applied to wireless networks, computer graphics, and intelligent systems.

We are grateful to the four esteemed speakers for their keynote addresses. The authors of the keynote talks were Profs. Anna Bartkowiak, Wrocław University, Poland; Nabendu Chaki, University of Calcutta, India; Jan Mielniczuk, Institute of Computer Science, Polish Academy of Science; and Kaori Yoshida, Kyushu Institute of Technology, Japan. All the keynote abstracts are published in the proceedings book.

We would like to thank all the members of the PC and the external reviewers for their dedicated efforts in the paper selection process, particularly Profs. Kateřina Slaninová, Jan Martinovič, and Pavel Moravec, all from the Technical University of Ostrava, Czech Republic. Special thanks are extended to the members of the Organizing Committee both the international and local members, namely, to Prof. Vít Voženílek and Jitka Doležalová, both from Palacký University Olomouc, Czech Republic; and the Springer team for their great efforts to make the conference a success. We are also grateful to Andrei Voronkov, whose EasyChair system eased the submission and selection process and greatly supported the compilation of the proceedings. The proceedings editing was managed by Prof. Jiří Dvorský (Technical University of Ostrava, Czech Republic), to whom we are indeed very grateful.

We hope that the reader's expectations will be met and that the participants enjoyed their stay in the beautiful city of Olomouc.

September 2018

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Keynotes

Assessing Data Variables by Some Collective Intelligence Methods

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Abstract. Statistically, since Pearson, data are recorded as matrices of size $n \times p$, where rows contain n subjects (individuals, cases), and columns are values of the p variables (attributes) characterizing the subjects. When performing traditional multivariate analysis of the recorded data, the crucial problem is: should all the p recorded variables be taken for the analysis; may be less of them will be sufficient and some of them are not relevant, or even an impediment. The old saying: “the more the better” has become questionable nowadays: too many non-relevant variables may be disturbing by introducing some random effects into the data.

The problem to solve is composite. I will consider it in the context of regression or classification analysis, when dealing with directly recorded ‘variables’ (no ‘features’ derived from them). I will concentrate on group of methods referred to as Collective Intelligence (contains, among others, Ensemble Learning, Decision trees and Random Forests). Specifically, I will concentrate on the Random Forests (RFs) methodology. RFs offer some non-conventional indices of importance of variables in the context of regression and clustering. They work directly on original variables (not on new features derived from them). They can work on mixed type variables, that is quantitative (numeric) or qualitative (categorical). They work without assumption on the probability distribution of the variables. They yield an internal unbiased estimate of the generalization error. It has been shown that RFs are resistant to outliers, however not all of them are universally consistent. I intend to show – on real data examples – how all this works in practice.

A Data-Driven Approach Towards Forecasting Generalized Mid-Term Energy Requirement for Industrial Sector Users of Smart Grid

Nabendu Chaki

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Abstract. One of the major improvements that Smart Grid offers over traditional power grid is a balanced supply demand ratio. As electricity is hard to store for future usage, it is important to be aware of the demand in order to generate enough electricity for uninterrupted power supply. Thus, forecasting plays a vital role in Smart Grid. However, with various range of rapidly fluctuating parameters that influence electricity consumption patterns, it is next to impossible to design a single forecasting model for different types of users. Typically, electricity usage depends on demographic, socio-economic and climatic environment of any region. Besides, the dependencies between influencing parameters and consumption varies over different sectors, like, residential, commercial and industrial. In this paper, our main goal is to develop a generalized mid-term forecasting model for industrial sector, that can accurately predict quarterly energy usage of a large geographic region with diverse range of influencing parameters. The proposed model is designed and tested on real life datasets of industrial users of various states in the U.S.

Selection of Active Predictors for Misspecified Binary Model

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Abstract. Selection of active predictors in high dimensional regression problems plays a pivotal role in contemporary data mining and statistical inference. However, properties of frequently applied selection procedures such as consistent choice of an active set usually strongly rely on assumption that data follows a specific model.

In the presentation we address this problem and discuss general setups when estimation procedures can approximately recover the direction of the true vector of parameters and estimate its support consistently. This explains sometimes observed phenomenon that certain procedures work well even when the underlying data generating mechanism is misspecified; e.g. methods constructed for linear models are applied to binary regression. The basic reasoning was discovered long ago by D. Brillinger and P. Rudd but it is scarcely known in data mining community.

As a particular application we introduce a two-stage selection procedure which first screens predictors using LASSO method for logistic regression and then chooses the final model via optimization of Generalized Information Criterion on ensuing hierarchical family. We discuss its properties and in particular the fact that in the case of misspecification it picks with large probability a model which approximates Kullback-Leibler projection (in the average sense) onto the family of logistic regressions.

Kansei Information Processing and Its Applications

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Abstract. Kansei Information Processing is a part of Human-Computer Interaction research. “Kansei” is a Japanese word that covers the meanings of sensitivity or sensibility. Kansei studies is an interdisciplinary research field. It intends to understand what Kansei is, how Kansei works, and how to apply an understanding of Kansei in the design of new products and services. I would like to introduce Kansei studies and its applications in my talk.

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