Editorial

Dear Colleague:
Welcome to volume 24(3) of Intelligent Data Analysis (IDA) Journal.

This issue of the IDA journal is the third issue for our 24th year of publication. It contains twelve articles representing a wide range of topics related to the theoretical and applied research in the field of Intelligent Data Analysis.

The first two articles are about graph mining in IDA. The first article by Senthilselvan *et al.* is about distributed frequent subgraph mining which they emphasize plays a key role in retrieving required information or patterns from the huge amount of data in a short period of time. The authors argue that majority of the existing methods target static graphs, and the distributed solution for dynamic graphs has not been explored. The authors propose a novel approach called DFSME, which uses SPARK to discover frequent subgraphs from an evolving graph in a distributed environment. DFSME maintains a set of subgraphs between frequent and infrequent subgraphs, which is used to decrease the search space. Their experiments with synthetic and real-world datasets authorize the effectiveness of DFSME for mining recurrent subgraphs from huge evolving graph datasets. The second article by Gomez *et al.* is about on-line analytical processing which is based on the multidimensional model, where data can be seen as a cube such that each cell contains one or more measures that can be aggregated along dimensions. The authors propose a formal multidimensional model for graph analysis, that considers the basic graph data, and also background information in the form of dimension hierarchies. Their case study supports the claim that, for many kinds of OLAP-like analysis on graphs, the graphoid model works better than the typical relational OLAP alternative, and for the classic OLAP queries, it remains competitive.

The second group of articles in this issue are about advanced learning in IDA. Faleiros *et al.* in the first article of this group discuss graph based algorithms where they propose an unsupervised learning algorithm based on the bipartite graph, referred to as Propagation in Bipartite Graph (PBG). The authors show that PBG is more flexible and easier to be adapted for different applications than the mathematical formalism of the generative models. Furthermore, the proposed algorithm can be parallelized and is competitive for tasks such as textual collection modelling. In the next article Zhang and Jatowt introduce a one-class Naïve Bayes text classifier. The authors address the problem of building a one-class classifier when only the positive examples are labelled. They show that a configurable one-class classier such as one-class Naive Bayes can be optimized by examining the clustering quality of the classification on target data. Their experimental analysis with real-world data shows that their approach generally achieves high classification accuracy, and in some cases improves the accuracy by more than 10% compared to state-of-art baselines. Luo and Yong in the third article of this group introduce a fusion bat algorithm to achieve higher accuracy and stability. Their experiments show that their proposed algorithm has remarkable advantages in accuracy and stability for high dimensional, unimodal and multimodal problems. Fazakis *et al.* in the next article of this group discuss active learning which is a typical approach for learning from both labelled and unlabeled examples aiming to build efficient and accurate predictive models at minimum expense under an expert's guidance. The authors introduce a pool-based active learning regression algorithm employing the query by committee strategy to evaluate the informative-

ness of unlabeled examples. Their experimental results on a plethora of benchmark datasets demonstrate the efficiency of the proposed method. Le *et al.* in the last article of this group argue that in the area of time series data mining, a challenging task is to design an effective and efficient low-dimensional representation of high-dimensional time series data. They name SAX as a popular method which normalizes the given time series, then divides a time series into segments. They propose an improvement of SAX by using complexity invariance. Their experiments, demonstrate that their new algorithm outperforms SAX in time series classification.

And finally the third group of articles are about enabling techniques and innovative application in IDA. The first article of this group by Dias *et al.* is about extraction of qualitative behavioral rules for industrial processes from reduced concept lattice. The authors argue that formal concept analysis (FCA) is an alternative approach to extract and represent knowledge of real world systems. However, in complex systems the number of formal concepts can be large. To deal with the complexity of FCA, the authors develop a novel approach to represent the behavior of physical processes through qualitative rules based on proper implications extracted from the reduced concept lattice. Their case study show that the qualitative behavior of an industrial process is preserved even when the reduction techniques are applied. Masegoza *et al.* in the next article of this group discuss analysing concept drift through a case study where they present a method for exploratory data analysis of streaming data based on probabilistic graphical models. The authors claim that changes in the economic climate during certain period manifests itself as concept drift in the underlying data where they explore and analyze their data using a probabilistic graphical modeling framework. The authors show how learning these types of models from data provides additional insight into the hidden mechanisms governing the drift in the domain. Yoon and Kim in the next article of this issue argue that estimation methods for the parameters of the model in state space models have been developed from the historic Kalman filter approach. The authors explore the availability of the Bayes method for parameter estimation with no constraints on the parameter space and find that the estimation for the state space is acceptable as long as the priors are not vague on both the state and the parameter space. The authors extend the applications of the Bayes method for the linear state space model where a variety of constraints are imposed on the parameter space. Dang *et al.* in the eleventh article of this issue present a semantic-aware collaborative filtering (SACF) recommendation method for emergency plans. The preparation of emergency plans needs to refer to historical emergency plans, but these are too numerous and are of uneven quality and the authors propose an approach for emergency plans recommendation to address the aforementioned challenges. Their extensive experiments on a real-world dataset, and their results demonstrate that SACF improves the accuracy of emergency plan recommendations. And finally, the last article of this issue by Mohammadi et al is also about collaborative recommender systems. The authors argue that one of the principal disadvantages and challenges of the collaborative filtering type algorithms is content awareness, namely they use only people's behavior to produce recommendations and are not aware of the predicted content's metadata. The authors study and compare two ways of incorporating this type of content information directly into the matrix factorization approach and extend the baseline optimization problem by two techniques. The results of their experiments on the benchmark data sets show that their proposed model has a better performance compared to some other methods.

In conclusion, we would like to thank all the authors who have submitted the results of their excellent research to be evaluated by our referees and published in the IDA journal. This year, we are also working on a special issue which is from the best papers of CIARP-2019 conference that was held in Havana-

Cuba, on October 2019. We look forward to receiving your feedback along with more and more quality articles in both applied and theoretical research related to the field of IDA.

With our best wishes
Dr. A. Famili
Editor-in-Chief