
Editorial

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Biographical notes: Selma Khouri is an Associate Professor at National Computer Science Engineering School (ESI), in Algeria. Her research studies focus on big data integration, semantic-based data modelling and business intelligence. She was an Associate Researcher in the Laboratory of Computer Science and Automatic Control for Systems (LIAS, France) from 2014 to 2017. She is involved in the research community by serving as Editorial Board member of *IJDATS Journal* and as an organiser/co-organiser of international workshops. She also published several papers in international conferences including CAISE, ER and DEXA. She has been involved in Algerian, French and European research projects. She is currently part of the industrial project 'DataConnect: Integration and Exploitation of Massive Data from Connected Cars', involving universities from Algeria, Morocco and France.

Lakhdar Loukil is a Professor at the Department of Computer Science at the University of Oran 1 (Algeria). He received his PhD thesis in 2010 from the same university. He leads the Multi-objective Optimization Team of the Laboratory of Parallel and Embedded Architectures, and Intensive Computation (LAPECI). His areas of interest are combinatorial optimisation, machine learning, parallel and distributed computing. He is currently leading a national research project entitled 'Optimizing the Exploitation of Water Resources in the Agro-Fish Culture Context' (2018–2021). He is also part of the Euro-Mediterranean project PRIMA WATERMED 4.0 'Efficient use and management of conventional and non-water resources through smart technologies applied to improve the quality and safety of Mediterranean agriculture in semi arid areas' (2019–2022). He supervises several PhD theses.

Ladjel Bellatreche is a Full Professor at National Engineering School for Mechanics and Aerotechnics (ISAE-ENSMA), Poitiers – France since September 2010. He leads the Data and Model Engineering Team of the Laboratory of Computer Science and Automatic Control for Systems. Prior to that, he spent eight years as an Assistant and then Associate Professor at Poitiers University – France. His research interest focuses on data science and green data systems. He is author or co-author of more than 270 papers in international conferences, journals and books. He serves as an Associate Editor of the *Data and Knowledge (DKE) Journal*, Elsevier.

1 Introduction

Welcome to our special issue entitled ‘Modelling as a Service for Designing and Analysing QoS-Oriented Information, Data and Knowledge Systems’, of the *International Journal of Reasoning-based Intelligent Systems*. This special issue manages revised and substantially extended versions of selected papers presented at the First International Conference on Embedded and Distributed Systems (EDiS’2017) that was held in Oran, Algeria from 17 to 18 December 2017. EDiS’2017 aims at bringing together researchers about distributed systems, embedded systems, optimisation, high-performance computing, and model-driven engineering.

We managed our special issue by selecting eight full papers out of the 41 papers accepted in EDiS’2017. We selected papers with great significance and impact on modelling and designing value-added systems offering high quality of service, respecting their environment constraints, and considering the user as the main actor to satisfy. Designing value-added systems is a complex process that has to consider the context shaped by several functional and non-functional requirements related to quality and efficiency of the targeted services and applications. The complexity is intensified by constraints like cost optimisation and green computing actions for energy consumption, circular economy, the respect of international norms and standards, etc., considered as the main challenges that advanced systems should overcome. The second aim of this special issue was to offer the Maghreb and more generally African researchers (and their globally located associates) the possibility to share and disseminate their exciting results with the global community. We invited the authors to extend their EDiS’2017 papers by 40% novel material. We have also proposed an open call that attracted two additional papers related to the topics of our special issue. A total of ten papers were managed through at least two review rounds and at most three rounds. The program committee is composed of international experts from leading academic institutions. Besides their essential role in evaluating the scientific quality of the articles, we recommend them to encourage particularly young researchers and provide them constructive recommendations contributing in improving and guiding them in their future work. We take this opportunity to warmly thank the committee members for their efforts in providing constructive reviews.

After the third review round, we have accepted four papers distributed as follows: three extended papers from EDiS’2017 and one paper from the open call, which provides a competitive acceptance rate of 40%. The accepted papers cover various issues validated through different applications domains. The underlying topics meet the main objective of the special issue related to the design of QoS-oriented data and information and knowledge systems (recommender systems, mobile applications, smart power grid systems) respecting different constraints (users QoS constraints, energy consumption). These topics

concern several application domains like tourism or sport (Tour de France). Different advanced techniques have been used for managing the identified issues like graph techniques, unsupervised and supervised learning methods. The presentation of the four selected papers is performed as follows: we start with the three papers selected from EDiS’2017 and we end with the paper selected from the open call.

The first paper titled ‘Measurement-based methodology for modelling the energy consumption of mobile devices’, authored by Khalil Ibrahim Hamzaoui (France and Morocco), Mohammed Berrajaa (Morocco), Mostafa Azizi (Morocco), Giuseppe Lipari (France) and Pierre Boulet (France), presents an experimental methodology to build an energy consumption model of applications on mobile devices. Considering the energy consumption as the result of interactions between hardware, software, users, and the application environment, the paper identifies different parameters that monitor energy consumption like frequency of processors, the initial level of the battery and the energy dissipated by clock cycle. The methodology conducted consists of four stages: data gathering, data preparation, modelling for fixed frequencies and modelling for variable frequencies. The methodology starts by recording accurate measures of energy consumption during the use of the selected application. Using these measures, a first model of energy consumption is built for fixed frequencies, by linear regression. A second model of the energy consumption is built-in function of the operating frequency and the activity of the processor by regression on the parameters of the fixed frequency models. One main quality of the proposed methodology is the relevance of the recorded data that leads to an accurate model. The cost model is built based on three application usage scenarios: local video playing, remote video playing, and GPS navigation. The collection of experimental data is collected during the Tour de France in a wheelchair.

The second paper titled ‘Mobile agent and ontology approach for web service discovery using QoS’, authored by Nadia Ben Seghier and Okba Kazar (both from Algeria), proposes a multi-agent architecture aiming to match services to users, under QoS requirements. The proposed architecture is based on three layers: service requester, middleware, and service provider. The architecture uses different techniques to meet the targeted goal of simplifying and optimising the web services discovery and increasing the number of relevant services recommended to the user. Mobile agent techniques are used in the process of service discovery. Metadata and user profile are exploited to reduce the search space of the service discovery process. Domain ontologies are used for defining mappings between the web service characteristics presented in the user request and those stored in the metadata catalogue. The feasibility of the proposed architecture is illustrated through an application example and ontology related to the tourism domain. A set of experiments are conducted to demonstrate the efficiency of the discovering process using different metrics including response time, reliability availability and execution price.

The third paper titled ‘SCOL: similarity and credibility-based approach for opinion leaders detection in collaborative filtering-based recommender systems’, authored by Nassira Chekkai, Ilyes Chorfi, Souham Meshoul, Badreddine Chekkai (cited authors are from Algeria), Didier Schwab (France), Mohamed Belaoued and Amel Ziani (Algeria) aims to alleviate the cold start challenge; reflecting the starting situation where the information is insufficient to predict items in recommender systems based on collaborative filtering. The proposed solution uses a graph modelling approach where a trust social network is constructed and represented by a weighted graph composed of many communities. Each community regroups a set of users who have the same preferences. The cold start issue is approached by identifying the set of the most important delegates (called opinion leaders) inside and outside communities, among the social network, who can represent as many users as possible. The similarity between users is based on three measures; namely Pearson, Spearman and Kendall, which are used to detect the smallest set of users having relevant relationships in the considered social network. The credibility of users is based on the analysis of their activity and their personality. The approach is tested using three datasets: Tijuana Restaurant, Dating agency and MovieLens datasets. The accuracy of the system is evaluated in terms of precision, mean absolute error and recall.

The fourth paper titled ‘Machine learning methods against false data injection in smart grid’ authored by Mohamed Hamlich, Abdelkarim El Khantach and Nouredine Belbounaguia (all authors from Morocco), discusses the issue of detecting false data injection in an electrical grid. The study highlights that a large flow of false data in power systems can be generated due to the increasing number of access points to the power grid, which constitutes a major risk for a good functioning of the smart grid. More generally, this issue raises many concerns about the safety and sound management of energy resources. The issue is managed using machine learning techniques, and the proposed approach is based on a comparative study between five supervised learning methods, which are: k-nearest neighbour algorithm ‘KNN’, random trees ‘RT’, random forest ‘RF’, multi-layer perceptron ‘MLP’ and vector support machine ‘SVM’ which gave the best performances during the detection phase. The test database is constructed using the ‘PSS/E’ power system simulation and analysis software, which is a Siemens PTI software package. To evaluate the performance of the models, different measures are used: precision, recall, specificity, accuracy, F-score, receiver operating characteristic (ROC) and area under ROC curve (AUC). The results proved the effectiveness of decision trees for classifying data in terms of accuracy.

We believe that the findings of these papers demonstrate the efficiency of north-south scientific networks and the availability of significant expertise in modelling and designing innovative solutions considering QoS as the main

concern. Such expertise can certainly play a leading role for creating exciting new opportunities supporting the digital innovation.

We congratulate the authors who submitted articles to EDiS’2017 and to our special issue. We would like to thank Professor Kazumi Nakamatsu, former Editor-in-Chief of *IJRIS*, for accepting our proposal of a special issue and for assisting us whenever required. We dedicate this special issue to all those who have made their best efforts to contribute to this publication. The complete international program committee of this special issue is listed below.

2 International program committee

- Sabeur Aridhi, University of Lorraine, France
- Faten Atigui, Conservatoire National des Arts et Métiers CNAM, France
- Ghalem Belalem, University of Oran 1, Algeria
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