Editorial Preface

Special Issue on Healthcare and Pervasive Information Systems

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This special issue contains extended versions of selected papers presented in the workshops on i) Healthcare Information Systems, Interoperability, Security and Efficiency; and ii) Pervasive Information Systems, both part of the 4th World Conference on Information Systems and Technologies, held in Recife, Brazil in March 2016.

The selected papers are contributions such as research papers, case studies and demonstrations that present innovative and original scientific results, methodological aspects, concepts and approaches in the multidisciplinary field of healthcare and pervasive information systems (Varshney, 2007). Topics include integration and interoperability (Cardoso et al., 2014; Marins et al., 2014), health records (Portela et al., 2010), data security and quality (Machado et al., 2010; Portela, Vilas-boas, Santos, 2012), semantic mappings (Häyrinen, Saranto, Nykänen, 2008), decision support systems (Musen, Middleton, Greenes, 2014; Santos et al., 2012) and business intelligence (Pereira et al., 2016).

The overall purpose of systems developed in the field of Healthcare Information Systems is to extract and present clinically relevant information. Medical information appears in many different forms, i.e., parameters, value measurements, time courses, images, and volume sequences. Methods to attain new types of information are continuously being developed, and the detail and quality of recorded data are increasing rapidly. In addition, it is necessary to be able to integrate and analyse information from a large number of patients and time instances. Efficient solutions to these problems are crucial components in future health care systems. The development of principles and methods for such solutions constitutes the agenda of the research for the next years, in particular on the development of systems for medical decision support and medical image analysis. Technology plays an important role in developing systems that are more and more pervasive and useful and contributes to reducing errors and costs, as well as increasing quality of service. Particular attention should be given to the technology acceptance, a theory that models how users come to accept and use technology (Portela et al., 2013). Important issues also addressed in this area are the safety and security through the identification and assessment of the vulnerability of critical infrastructures and global security challenges through the development of advanced tools for information mining and analysis.

Management, planning and decision are based increasingly on knowledge. The collections of data that are available today (e.g. from monitoring devices) allow a more efficient support for these activities. However, their size, nature and complexity require intelligent data structures in order to create storage, processing and analytical discovery of more effective ways of knowledge as to its

diffusion technologies. Data mining and data warehousing fields can contribute significantly for empowering and automating the process of decision-making. Important contributions can be made in critical areas as intensive medicine (e.g. predicting organ failure/dysfunction and outcome of patients, solutions for pain monitoring and control in post-surgery patients). Real-time and online intelligent decision support systems are of most importance to supply professionals and patients with important information in useful time and data quality assessment is fundamental for detecting critical events (Braga et al., 2016; Portela 2016).

Pervasive information systems extend the information system paradigm by introducing a set of novel characteristics. Information affects the way humans interact with the built-in environments. For example, in the health context, a pervasive patient timeline introduces a new way of monitoring and interpreting information (Braga et al., 2015; Portela et al., 2013). They will also play an important role in improving intelligent decision support systems (Portela et al., 2014).

This special issue contains five articles.

The first article introduces an innovative way of presenting and representing information about patients in Intensive Care Units. The Pervasive Patient Timeline provides access to a real-time environment in order to support the decision-making process. The pervasive property is crucial because decisions are taken in any place, time or context. This solution is patient centred and allows analysing all patient data and predict clinical events in order to improve the healthcare quality.

The second article presents the evaluation of a Pervasive Intelligent Decision Support System in Intensive Medicine using the Technology Acceptance Model(TAM). The main goal is to provide a better understanding of user's intentions and their satisfaction. TAM3 was used to evaluate the Perceived Ease of USE, Perceived Usefulness, Behaviour Intention and Use Behaviour. This approach was applied to a real system called INTCare which was implemented in the Intensive Care Unit of Centro Hospitalar do Porto. In this study, we identified what the best and worst system's features are and understood the users' opinions and their concordance level.

The third article is a study about comorbidities. Several studies showed that comorbidities are related to increased hospital costs, with higher in-hospital mortality and to prolonged length-of-stay. The article aims to study the annual evolution of coded comorbidities in hospital administrative databases.

The fourth article focuses on data quality. In hospitals, patient data are collected through real-time data streaming. Data quality assessment is fundamental for detecting critical events. A study was made for evaluating noise values. In this study, real data provided by mechanical ventilation were analysed, and it was possible to conclude that 56.59% of the events were critical, and 5% of the collected data were noise values.

The fifth article presents an intelligent decision support system to assess thrombophilia predisposition. The approach focuses on the processing of information acquired from molecular and biochemical parameters and clinical data in order to identify patients with hypercoagulable states, to prevent recurrent events, to monitor the treatment of patients with chronic illness and improve their quality of life.

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Carlos Filipe Portela holds a PhD in Information Systems and Technologies since 2013. He belongs to the Research Centre ALGORITMI. His research was started in the INTCare R&D project (Intensive Medicine area) being then extended to education and public administration areas. He already has relevant indexed publications in the main research topics: Intelligent Decision Support Systems, Intelligent Systems, Pervasive Data, Business Intelligence, Data Mining and Knowledge Discovery. He has also been co-organizer of several workshops and reviewer of many indexed journals and conferences in these topics. Currently, he also is an Invited Assistant Professor of the Information Systems Department, School of Engineering, University of Minho, Portugal, where he has been supervising several master students in the areas above mentioned and a Guest Lecturer in Institute Polytechnic of Porto - ESMAD.