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Knowledge Representation for Health Care

HEC 2016 International Joint Workshop, KR4HC/ProHealth 2016
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Revised Selected Papers

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Preface

The introduction of computers in health care can contribute toward homogenizing services, increase the quality of those services, and reduce the costs of health-care systems. Two of the computer-based approaches to provide these benefits are supported on technologies for knowledge representation and process-oriented management. These technologies include medical data analysis and processing, clinical practice modeling, intelligent decision support systems and recommenders, clinical process management, personalized and patient-centric e-Health and m-Health, etc.

The Joint International Workshop KR4HC-ProHealth represents the effort of two communities to bring together experts in these technologies in order to present new advances and to deliver results on promising intelligent systems and technologies supporting clinical tasks. Two are the main viewpoints that converge in the workshop:

- As part of medical informatics, the knowledge-representation for health care (KR4HC) view focuses on representing and reasoning with medical knowledge in computers as a means to support knowledge management and clinical decision-making. This community aims at developing efficient representations, technologies, and tools for integrating all the important elements that health-care providers work with: electronic medical records (EMRs) and health-care information systems, clinical practice guidelines, and standardized medical vocabularies.
- As part of business process management, the process-oriented information systems in health-care (ProHealth) view focuses on using business process management technology to provide effective solutions for the management of health-care processes. This community aims at adapting successful process management solutions to health-care processes and needs, with a particular interest in organization, optimization, cooperation, risk analysis, flexibility, re-utilization, and integration of health-care tasks and teams.

For a fourth time, this workshop brought together researchers from the previously mentioned two communities who have been addressing these challenges from different perspectives. The knowledge representation (KR) for health-care community, which is part of the larger medical informatics community, aims at developing knowledge representation and reasoning systems to support knowledge management and clinical decision-making. In the past this community has worked to build efficient representations, technologies, and tools for integrating all the important computer elements required to provide modern health care. Some of these are: EMRs and health-care information systems, clinical practice guidelines, and standardized medical vocabularies. In turn, the community about process-oriented information systems in health-care, which is part of the larger business process management (BPM) community, aims to adopt BPM technologies to implement solutions for health-care process management. KR and BPM technologies are mutually complementary to provide a holistic approach to the health-care sector, which is currently

demanding intelligent computer solutions to improve their clinical procedures, to increase clinical practice safety, and to homogenize clinical interventions.

In 2012, 2013, and 2015 joint workshops were organized bringing together health-care knowledge representation as dealt with in previous KR4HC workshops, and health-care process support as addressed in previous ProHealth workshops, with a considerable success. Participants in the joint workshops could explore the potential and the limitations of the two approaches for supporting health-care knowledge and process management and clinical decision-making. The workshops also provided a forum wherein challenges, paradigms, and tools for optimized knowledge-based clinical process support could be debated. All the organizers and participants of the workshops agreed on the profit of the event, which encouraged us to organize a fourth edition of the joint workshop in 2016.

With the same general objectives of these previous workshop, the fourth joint workshop was made to increase interactions between researchers and practitioners from these complementary fields. In this new forum we wanted to offer stakeholders the opportunity not only to improve the understanding of domain-specific requirements, methods, theories, tools, and techniques, but also to explore how the approaches from the two communities could be better integrated.

The KR4HC/ProHealth 2016 received 12 papers from Europe (Belgium, France, Germany, Greece, Israel, Luxemburg, The Netherlands, Spain, and UK), Asia (China and Hong Kong), and America (USA). Papers had to clearly establish their research contribution as well as their benefits to health care. Six papers were selected to be presented at the workshop as long presentations, according to their relevance, quality, and originality. Three more papers were selected for short presentations, after the expert review recommendations. Only the six full papers appear in this volume, together with a paper by the keynote speaker, Dr. Jesualdo Tomás Fernández-Breis.

In his challenging keynote presentation "Can Existing Biomedical Ontologies Be More Useful for EHR and DSS?," Dr. Fernández-Breis from the Faculty of Computer Science at the University of Murcia (Spain), exposed the increasing benefits of using biomedical ontologies in health care. He foresaw a next-generation EHR and decision support systems in which ontologies will be fundamental for enabling interoperability. He also dug into the main technological issues that need to be solved in order to make biomedical ontologies useful for EHR and DSS, and presented relevant and promising contributions to this end.

We would like to conclude by expressing our gratitude to the invited speaker for his participation, and the members of the Program Committee for their support selecting the best papers. All of them helped us to compile a high-quality program for the KR4HC/ProHealth 2016 workshop.

We hope you will find our selection of the papers of the joint KR4HC/ProHealth 2016 workshop included in this volume interesting and stimulating.

December 2016

David Riaño
Richard Lenz
Manfred Reichert

Organization

KR4HC/ProHealth 2016 was organized by David Riaño, Universitat Rovira i Virgili, Spain, Richard Lenz, University of Erlangen-Nuremberg, Germany, and Manfred Reichert, University of Ulm, Germany.

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Contents

Ontologies in Health Care

Can Existing Biomedical Ontologies Be More Useful for EHR and CDS? . . . 3
Jesualdo Tomás Fernández-Breis, Manuel Quesada-Martínez, and Astrid Duque-Ramos

Clinical Quality, Evaluation, and Simulation

Formalization and Computation of Diabetes Quality Indicators with Patient Data from a Chinese Hospital 23
Haitong Liu, Annette ten Teije, Kathrin Dentler, Jingdong Ma, and Shijing Zhang

Simulation-Based Episodes of Care Data Synthetization for Chronic Disease Patients 36
David Riaño and Alberto Fernández-Pérez

A Public Health Surveillance Platform Exploiting Free-Text Sources via Natural Language Processing and Linked Data: Application in Adverse Drug Reaction Signal Detection Using PubMed and Twitter 51
Pantelis Natsiavas, Nicos Maglaveras, and Vassilis Koutkias

Computer Guideline Engineering and Usage

Knowledge-Driven Paper Retrieval to Support Updating of Clinical Guidelines: A Use Case on PubMed 71
Veruska Zamborlini, Qing Hu, Zhisheng Huang, Marcos da Silveira, Cedric Pruski, Annette ten Teije, and Frank van Harmelen

Applying SPARQL-Based Inference and Ontologies for Modelling and Execution of Clinical Practice Guidelines: A Case Study on Hypertension Management 90
Charalampos Doulaverakis, Vassilis Koutkias, Grigoris Antoniou, and Ioannis Kompatsiaris

Comorbidity and Clinical Process Management

Generating Conflict-Free Treatments for Patients with Comorbidity Using Answer Set Programming 111
Elie Merhej, Steven Schockaert, T. Greg McKelvey, and Martine De Cock

Detecting New Evidences for Evidence-Based Medical Guidelines with Journal Filtering. 120
Qing Hu, Zhisheng Huang, Annette ten Teije, and Frank van Harmelen

Author Index 133