



PROCEEDINGS OF

**CBMS 2013** PORTO

26<sup>TH</sup> IEEE

**INTERNATIONAL  
SYMPOSIUM ON  
COMPUTER-BASED  
MEDICAL SYSTEMS**

PORTUGAL

**20-22 JUNE UNIVERSITY OF PORTO**

EDITORS

Pedro Pereira Rodrigues - Mykola Pechenizkiy - João Gama

Ricardo Cruz Correia - Jiming Liu - Agma Traina

Peter Lucas - Paolo Soda

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2013 26th IEEE International Symposium on Computer-Based Medical Systems (CBMS)

**Editors:**

Pedro Pereira Rodrigues, Mykola Pechenizkiy, João Gama,  
Ricardo Cruz-Correia, Jiming Liu, Agma Traina,  
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# Preface

The 26th IEEE International Symposium on Computer-Based Medical Systems was held at the University of Porto, Portugal. This was the first time for CBMS to be held in Portugal, and we are delighted that it was hosted in Porto.

CBMS continues to be a truly international event attracting contributors and attendees from all over the world. We have had a good response to our call for papers. Out of 206 submissions from 684 authors and 41 countries, we have selected 60 full papers, thus having 29% acceptance rate for this category. Besides, 37 (18%) short papers and 29 (14%) posters have been selected including both research and application oriented contributions.

Over the past several years CBMS has been accommodating focused special tracks besides the general track. This year, CBMS had 16 special tracks ranging from ontologies, privacy and security to ophtalmologic image processing and analysis, from fetal monitoring applications to learning-based systems. We are grateful to the chairs and programme committee members of the special tracks for helping us to attract many high-level submissions from the different areas of computational medicine, for reviewing the submissions and for organizing interesting technical sessions. Given the high number of tracks and topics, final programme consisted in thematic sessions where presentations were gathered both from special tracks and the general track, yielding 11 themes across 23 sessions.

There was one additional novelty in the technical programme, in comparison with the previous years. Different areas of computational medicine are facing new challenges, created by the rapid growth in information science and technology in general and the complexity and volume of data in particular. Large volume, velocity and variety of data relate to emerging Big Data issues. This way, we included a panel discussion on Big Data Analysis, which was one of the high moments of the symposium.

We are greatly thankful to Prof Jeremy Wyatt (University of Leeds, UK), Prof. Pedro Larrañaga and Prof. Concha Bielza (Universidad Politécnica de Madrid, Spain) and Dr. Bharat Rao (Deloitte, USA) for agreeing to deliver their fantastic keynote talks at CBMS 2013.

We would like to thank Faculty of Medicine of the University of Porto for the opportunity to host the event, the University of Porto for sponsoring the Best Paper Awards, IEEE Computer Society - and its staff for their professional help in the organization of the conference - and our Local Organizing Committee members for their help on different aspects of the organizational process. We are also thankful to IEEE Portugal, LIAAD - INESC TEC, CINTESIS, and IEEE EMBS Portuguese Chapter for their support to the conference, and the EasyChair Conference System that simplified the paper submission and review process.

Last, but not least, we would like to thank all who submitted papers to CBMS 2013, and all who provided reviews, on the basis of which we put together the present programme. We are grateful for your participation. We hope you have enjoyed the symposium and found many topics of interest to you in the technical programme.

General Chairs	Program Committee Chairs	Special Track Chairs
Pedro Pereira Rodrigues	Ricardo Cruz Correia	Peter Lucas
Mykola Pechenizkiy	Jiming Liu	Paolo Soda
João Gama	Agma Traina	



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