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Editorial for Thematic Section "Machine Learning for Health Care: Modeling, Analysis and Computer Simulation"

Effective computer applications targeting healthcare problems can be traced back to at least the second half of the 20th century. During the first half of the 21st century, this area of application has experienced a revolution, driven by the advent and development of advanced Machine Learning techniques, and supported by the ever more powerful computer hardware, electronics, and the increasingly prevalent global-communications infrastructure. All of these are bringing the medical fields, and computer science, closer together than they have ever been.

This thematic section collects research derived from the current intense interaction between computer scientists working on artificial intelligence, machine learning and big data, and clinicians / medical researchers working on the different branches of health care. The field of MLHC supports the advancement of data analytics, knowledge discovery, and the meaningful use of complex medical data by fostering collaboration and the exchange of ideas between these communities.

The world health challenges on cancer, malaria and retinal diseases growth, that involve intense data analysis as well as precise but flexible modeling, concern this volume of AI solutions.

In "CAD of Breast Cancer: a decade-long review of techniques for Mammography Analysis", Rojas et al. discuss the paradigm shift observed within the machine learning research community (from feature-engineering to feature-learning) and how it is reflected on the design of computer-aided systems for mammography analysis used against breast cancer.

In "Machine Learning Techniques for Diagnosis of Breast Cancer", A. Rojas offers an overview of the recent machine learning techniques for diagnosis of breast cancer, presented from a perspective of the work that he has carried out through several years. The techniques used in the two primary tasks for the early diagnosis of breast cancer (mass detection and mass classification) are discussed.

In "Evaluation of breast cancer by infrared thermography", Morales-Cervantes et al., discuss the analysis of thermograms of patients with suspected breast cancer. The asymmetry of a thermal score (combination of the amount of vascularization and surface temperature) between the breasts of a patient is indicative of anomalies. The automated method presented achieves higher sensitivity (100%) and specificity (68.68%) than an expert oncologist, on 206 test thermograms.

In "Cancer metastasis and the immune system response: CM-IS modeling by Ising model", Alvarado and Arroyo introduce this highly complex biological process, of top interest for cancer diagnosis and therapy. The strength of the immune system response against cancer correlates with the success of the cancer growth. Their interaction is formalized by the Ising model (a classic model for emergent-interaction phenomena) and simulated by means of an agent-based environment.

In "Automatic Cropping of Retinal Fundus Photographs using Convolutional Neural Networks", González-Briceño et al. present a segmentation method based on Deep

Convolutional Networks for cropping of the Region of Interest in Retinal Fundus Photographs (used by physicians to diagnose ocular diseases). The proposed method achieves high accuracy levels (up to 98%) on test images.

In "Random forest and deep learning performance on the Malaria DREAM sub challenge one", D. Barradas-Bautista introduces his machine learning solutions to build a predictor of the clearance and concentration of Artemisin (the standard antimalarial drug) based on multivariate data with over 5000 features. A random forest model allows the ranking of features, which could become new drug targets, and a fully connected Deep Network model achieves a prediction accuracy of 72.20%.

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Guest Editors

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