

Editorial

Computation Intelligence in Medicine—Data Analysis and Modelling

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Received 31 December 2008; Accepted 31 December 2008

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In clinical application, we deal with problems which have to be solved in a fast and objective way. However, human observation is influenced by internal (coming from the observer) as well as external (often independent from the observer) impacts. The objectivity of classification is restricted by the receptivity of human senses which are influenced by the experiences or level of training, psychological conditions (tiredness, hurry, etc.), as well as external conditions (lighting, destructive noise, etc.). The failure in perception questions the entire recognition process. The recognition process itself, influenced also by the abovementioned conditions, may cause a slow down and/or lead to a false diagnosis.

New computerized approaches to various problems have become critically important in healthcare. Mathematical information analysis, modelling, and computer simulation become standard tools underpinning the current rapid progress with developing computational intelligence. We are witnessing a radical change as technologies have been integrated into systems that address the core of medicine, including patient care in ambulatory and in-patient setting, disease prevention, health promotion, rehabilitation, and home care. Computational intelligence is in widespread use for the support of patient medical diagnosis and treatment, the assessment of the quality of care, and the enhancement of decision making, modelling, simulation, and medical research. A computerized support in the analysis of patient information and implementation of a computer-aided diagnosis and treatment systems increases the objectivity of the analysis and speeds up the response to pathological changes.

This special issue consists of 5 articles. The subsequent papers are organized into 3 groups.

The first one employs mathematical tools in the data analysis. A computer-aided diagnosis system for breast

cancer has been presented by Abdel-Qader and Abu-Amara. They have implemented the independent component analysis and fuzzy classifier to identify and label suspicious regions in mammograms.

An estimation methodology is presented by Mital and Pidaparti to determine the breast tumor parameters using the surface temperature profile that may be obtained by infrared thermography. The estimation methodology involves evolutionary algorithms using artificial neural network and genetic algorithm. The artificial neural network is used to map the relationship of tumor depth, tumor size, and the heat generation to the temperature profile over the idealized breast model. The genetic algorithm estimates the tumor parameters (depth, size, and heat generation) by minimizing a fitness function involving the temperature profiles obtained from simulated data or clinical data.

The second group has employed a modelling technique as a support in the assessment or decision-making problem.

Rau et al. have implemented the computational fluid dynamics techniques to investigate the hemodynamic effect of unequal anterior cerebral artery flow rates on the anterior cerebral and anterior communicating artery (ACA-ACOM) bifurcations. Using an idealized 2D symmetric model of the ACA-ACOM geometry, the flow field and wall shear stress (WSS) at the bifurcation regions are assessed for pulsatile inflows with left to right flow ratios.

A model-based approach to reproduce individual heart rate signals acquired during tilt tests is proposed by Le Rolle et al. A new physiological model adapted to this problem and coupling the autonomic nervous system, the cardiovascular system, and global ventricular mechanics is presented. Evolutionary algorithms are used for the identification of patient-specific parameters, in order to reproduce heart rate

signals obtained during tilt tests. The proposed approach is able to reproduce the main components of the observed heart rate signals and represents a first step toward a model-based interpretation of these signals.

The third group, employed in orthopedics, develops experimental and numerical methods to explore the stresses generated around the implants and bone screws. Chaudhary et al. have presented a finite-element model of a human mandible created with a fixated fracture in the parasymphiseal region. The mandibular model has then been anatomically loaded. Next, the forces exerted by the fixation plate onto the simplified screws are obtained and transferred to another finite-element submodel of a screw implant embedded in a trilaminar block with material properties of cortical and cancellous bone. The stress in the bone surrounding the screw implant has been compared for different screw configurations.

Ewa Pietka

Special Issue on Machine Learning Paradigms for Modeling Spatial and Temporal Information in Multimedia Data Mining

Call for Papers

Multimedia data mining and knowledge discovery is a fast emerging interdisciplinary applied research area. There is tremendous potential for effective use of multimedia data mining (MDM) through *intelligent* analysis. Diverse application areas are increasingly relying on multimedia understanding systems. Advances in multimedia understanding are related directly to advances in signal processing, computer vision, machine learning, pattern recognition, multimedia databases, and smart sensors.

The main mission of this special issue is to identify state-of-the-art machine learning paradigms that are particularly powerful and effective for modeling and combining temporal and spatial media cues such as audio, visual, and face information and for accomplishing tasks of multimedia data mining and knowledge discovery. These models should be able to bridge the gap between low-level audiovisual features which require signal processing and high-level semantics. Original contributions, not currently under review or accepted by another journal, are solicited in relevant areas including (but not limited to) the following:

- Multiresolution-based video mining and features extraction
- Dimension reduction and unsupervised data clustering for multimedia content analysis tasks
- Mining methods and algorithms (classification, regression, clustering, probabilistic modelling), as well as association analysis
- Machine learning paradigms that perform spatial and temporal data mining
- Machine learning paradigms that allow for an effective learning of hidden patterns
- Object recognition and tracking using machine learning algorithms
- Interactive data exploration and machine learning discovery
- Mining of structured, textual, multimedia, spatiotemporal, and web data
- Application of MDM to contents-based image/video retrieval and medical data

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Special Issue on Robotic Astronomy

Call for Papers

The number of automatic astronomical facilities worldwide continues to grow, and the level of robotisation, autonomy, and networking is increasing as well. This has a strong impact in many astrophysical fields, like the search for extrasolar planets, the monitoring of variable stars in our galaxy, the study of active galactic nuclei, the detection and monitoring of supernovae, and the immediate follow-up of high-energy transients such as gamma-ray bursts.

The main focus of this special issue will be on the new and existing astronomical facilities whose goal is to observe a wide variety of astrophysical targets with no (or very little) human interaction. The special issue will become an international forum for researchers to summarize the most recent developments and ideas in the field, with a special emphasis given to the technical and observational results obtained within the last five years. The topics to be covered include, but not limited to:

- Robotic astronomy: historical perspective
- Existing robotic observatories worldwide
- New hardware and software developments
- Real-time analysis pipelines
- Archiving the data
- Telescope and observatory control systems
- Transient detection and classification
- Protocols for robotic telescope networks
- Standards and protocols for transient reporting
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- Global networks
- Future strategies

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Manuscript Due	June 15, 2009
First Round of Reviews	September 15, 2009
Publication Date	December 15, 2009

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Special Issue on Selected Papers from Workshop on Synergies in Communications and Localization (SyCoLo 2009)

Call for Papers

In conjunction with the IEEE International Conference on Communications (ICC) 2009 in Dresden, Germany, the International Workshop on Synergies in Communications and Localization (SyCoLo 2009) will be held.

The main objective of this workshop is to show how wireless communications and navigation/localization techniques can benefit from each other. With respect to these synergies the workshop aims at the following fundamental questions:

- How can navigation systems benefit from existing communications systems?
- How can communication systems benefit from positioning information of mobile terminals?

This workshop, whose proposal was jointly generated by the EU Research Projects WHERE and NEWCOM++, aims at inspiring the development of new position-aware procedures to enhance the efficiency of communication networks, and of new positioning algorithms based both on (outdoor or indoor) wireless communications and on satellite navigation systems.

The SyCoLo 2009 is, therefore, well in agreement with the new IJNO journal aims at promoting and diffusing the aims of joint communications and navigation among universities, research institutions, and industries.

This proposed IJNO Special Issue focuses all the research themes related to the timing aspects of joint communications and navigation, and starts from the SyCoLo 2009 where the Guest Editors will attend the different sessions and directly invite the authors of the most promising papers to submit an extended version of their papers to the journal.

The proposed Guest Editors are also part of the Scientific Committees of the SyCoLo 2009, therefore, directly involved in the evaluation of submitted papers.

Topics of interest will include, but are not limited to:

- Hybrid positioning using both wireless communications and satellite navigation systems
- Resource management with positioning information
- Location-aware PHY/MAC algorithms/procedures

- Indoor positioning combined with short-range communications
- Signal processing techniques for (seamless) indoor/outdoor localization

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Manuscript Due	October 1, 2009
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Publication Date	April 1, 2010

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