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Editorial

Applied Mathematics in Biomedical Sciences and Engineering 2014

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The interdisciplinary approach is becoming an increasing need in scientific and industrial communities. The most evident example of such a need is the strong interconnection between applied mathematics and biomedical sciences/engineering. Indeed, biomedical sciences and engineering have become one of the most important application areas of applied mathematics.

This annual issue includes seven high-quality, peer-reviewed articles that might provide researchers in the field of applied mathematics with the current state-of-the-art knowledge of this emerging interdisciplinary research field. With this annual issue, we hope to stimulate the continuing efforts to solve real-world biomedical problems with advanced theories and technologies of applied mathematics.

The paper "*Continuous nondestructive monitoring method using the reconstructed three-dimensional conductivity images via GREIT for tissue engineering*" by S. Ahn et al. presents a data collection strategy for microscale electrical impedance tomography (EIT). The authors modified Graz consensus reconstruction (GREIT) algorithm that has advantages to be applied to the microscale EIT structure and applied it to the micro-EIT cuboid container with the specific current driving method.

The paper "*Neuronal ensemble decoding using a dynamical maximum entropy model*" by D. Sin et al. proposes a new decoder for extracting the dynamical neuronal information, which is based on the conventional maximum entropy decoding that can consider correlations between neurons and firing rates of individual neurons. Two simulation studies well demonstrate that the proposed dynamic maximum entropy decoder is capable of capturing the time-varying feature of neuronal ensemble activity.

The paper "*Modeling TB-HIV syndemic and treatment*" by C. J. Silva and D. F. M. Torres describes the formulation of a model for tuberculosis and HIV transmission dynamics, considering individuals that pass from HIV to AIDS and giving simulations for the evolution of infection, considering treatments of both or each of the diseases separately.

The paper "*Regularization of DT-MRI using 3D median filtering methods*" by S. Kwon et al. proposes a new regularization strategy for diffusion tensor magnetic resonance imaging (DT-MRI) tractography. The authors extended two-dimensional median filters to three-dimensional medial filters and compared their performances with real human MRI data.

The paper "*A constitutive model for the annulus of human intervertebral disc: implications for developing a degeneration model and its influence on lumbar spine functioning*" by J. Cegonino et al. proposes a mathematical model for the annulus of human intervertebral disc containing porous matrix, water, proteoglycan, and collagen fibres network. Finite element analysis, numerical characterization, and the validation based on experimental results were carried out for the proposed model.

The paper "*Removal of muscle artifacts from single-channel EEG based on ensemble empirical mode decomposition and multiset canonical correlation analysis*" by X. Chen et al. proposes an effective method to remove muscle artifacts contaminating EEG signals based on ensemble empirical mode decomposition (EEMD) and multiset canonical correlation analysis (MCCA). The performance of the proposed method was validated using numerical simulations and real EEG data analyses.

The paper "*Enhanced template matching using dynamic positional warping for identification of specific patterns in electroencephalogram*" by W.-D. Chang and C.-H. Im treats an improved template matching approach for signal pattern recognition for EEG. In the approach, they adopted dynamic positional warping technique developed recently for handwriting pattern analysis.

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