Preface/Editorial

Special issue of Acta Polytechnica Hungarica linked to ISCAMI 2016

This issue of Acta Polytechnica Hungarica contains papers that were invited from the participants of ISCAMI 2016 (International Student Conference on Applied Mathematics and Informatics 2016, Malenovice, Czech Republic). Among the 16 submissions, after a thorough reviewing process, 11 of them have been accepted. The accepted papers have not only stayed true to the theme of the conference, but have also given a fresh twist - they can be easily categorised as papers dealing with applications of Maths to Informatics. On the one hand, they cover a variety of techniques from Soft Computing (Fuzzy Set Theory and Neural Networks) to Optimization and Differential Equations. On the other hand, they cover a myriad of application areas from Medical Diagnostics to Inventory Management to Acoustics to Information Processing to Nutritional Gastronomy! We briefly sketch the topic of each paper published in this special issue.

In the paper "Application of Evaluation Criteria to Cartographic Projections" written by Daniel Szatmári, Margita Vajsáblová and Denisa Mojšová the map projections designed by minimax type criteria, Airy-Kavraiskii's variational criterion and map projections with a minimal RMS distortion in the category of conic, azimuthal and cylindrical projections have been discussed. This article aims to compare the mentioned criteria based on the achieved values of scale distortion in the selected European countries.

In the following paper "The Significance of the Integrated Multicriteria ABC-XYZ Method for the Inventory Management Process", Milan Stojanović, Dušan Regodić analyze a methodology based on the periodical review and assessment of product inventories and the anticipation of demand. The main goal is to present the activities and pace of the fulfillment of inventories derived on the basis of the ABC-XYZ classification.

Dušan Marček, in the paper "The Category Proliferation Problem in ART Neural Networks", concentrates on problems of category proliferation and methods of minimizing of their occurrence and he proposes a new model for the optimized algorithm KMART (Kondadadi & Kozma Modified ART), called IKMART (Improved KMART), which enables to optimize the dilemma of stability/plasticity, increase the precision of categorization and influence the speed of categorization. Some results from the categorization of real text documents, which contextually overlap, are also discussed.

The next paper "Parallelization and validation of algorithms for zebrafish cell lineage tree reconstruction from big 4D image data" is a work of Robert Špir, Karol Mikula, Nadine Peyrieras. The authors present numerical algorithms,

postprocessing and validation steps for an automated cell tracking and cell lineage tree reconstruction from large-scale 3D+time two-photon laser scanning microscopy images of early stages of zebrafish (Danio rerio) embryo development. They also compare the results with ground truth data obtained by manual checking of cell links by biologists and measure the accuracy of their algorithm.

In their paper "New Approach to Fuzzy Decision Matrices", Pavla Rotterová and Ondřej Pavlačka introduce a new approach in which a fuzzy decision matrix does not describe discrete random variables but fuzzy rule bases, when the states of the world are modeled by fuzzy sets defined on the universal set on which the probability distribution is given, and the evaluations of the alternatives are expressed by fuzzy numbers. The proposed solution is illustrated with an example.

The next article "Directional monotonicity of fuzzy implications" of Katarzyna Miś concentrates on some properties of fuzzy implication functions, which are key operation in fuzzy logic. Firstly, the known notion of special implications are discussed, next the notion of inversely special implications as directional decreasing functions is introduced. The author presents several results connected with inversely special R-implications. She also discusses this new property for other families of fuzzy implications like (S,N)-implications, f-implications and g-implications.

In the paper titled "A Nutrition Adviser's Menu Planning for a Client Using a Linear Optimization Model", Lucie Schaynová, presents a new linear optimization model which improves a nutritional adviser's steps and prevents mistakes when preparing a diet plan for a client manually. The model, among other factors, takes into account the client's favourite or the adviser's recommended recipes, prevents unbalanced nutrition, respects the client's eating habits and ensures wastage of food. The model involves linear constraints which also ensures that two incompatible recipes are not used in the same meal and that a recipe is not used in an incompatible meal.

In the following paper "Acoustical Simulations based on FVM Solution of the Helmholtz Equation", Izabela Riečanová and Angela Handlovičová numerically simulate the data obtained by acoustic measurements. These measurements were performed in specialized acoustic laboratory. Their main idea was to study the reflection of different frequencies from boards with openings of various size and shape. The Finite volume method has been used to make the simulations, where the Helmholtz equation is solved using the impedance boundary conditions. The results of simulations are presented.

Roksana Brodnicka and Henryk Gacki in their article "Asymptotic stability of an evolutionary nonlinear Boltzmann-type equation", present a sufficient condition for the asymptotic stability with respect to total variation norm of semigroup generated by an abstract evolutionary non-linear Boltzmann-type equation in the space of signed measures with the right-hand side being a collision operator.

Petr Bujok in the paper "On Modification of Population-Based Approach Used in Adaptive Differential Evolution Algorithm" introduces new approach for the mutation operation in the differential evolution (DE) algorithm. The aim of this technique is to enhance the mutation strategy to avoid the local minimum area. The proposed method is applied in several well-known DE or adaptive DE variants. Selected DE variants and the corresponding counterparts are used to solve the problems of CEC 2015 test suite.

In the contribution "Computer-Aided Diagnostics of Schizophrenia: Comparison of Different Feature Extraction Methods", its authors Radomír Kůs and Daniel Schwarz present an analysis of two brain morphometry techniques and various feature extraction methods utilized in computer-aided diagnostics of schizophrenia. The methodology was incorporated into a classification pipeline and applied to distinguish between first-episode patients and healthy controls on the basis of magnetic resonance images of their brains.

We thank the submitting authors, since in all cases the submitted works were not a mere extension of their presentations at the conference but a thorough revamp that made their contributions both wholesome and substantial. We thank the reviewers who have been kind enough to give off their time, effort and knowledge that has further enriched the accepted works. Our jobs were made much more easy and palatable because of them. Thanks again to all of them.

Our gratitude goes also to the editorial team of Acta Polytechnica Hungarica for the excellent support they provided us throughout this process. Finally, we thank the organizers of the ISCAMI 2016, in particular doc. RNDr. Martin Štěpnička, for more reasons than one. Firstly, for the picturesque setting in which the conference was conducted - a setting that is so heavenly that the mind feels immediately uncluttered - the perfect state for uninhibited thinking. Secondly, for their thoughtfulness and method in the organization and logistical support. A special mention should be made for their empathetic understanding of the financial constraints that people in the academia have to negotiate, especially at the level of students.

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