SPECIAL ISSUE: EDITORIAL

Michał Baczyński, Erich Peter Klement and Radko Mesiar

This special issue of Kybernetika contains papers originally presented at the 8th International Conference on Fuzzy Sets – Theory and Applications (FSTA 2006), which was held in Liptovský Ján (Slovakia) on January 31 – February 3, 2006. Based on the evaluations of our referees, we have finally accepted 11 contributions for publication.

The papers in this issue can roughly be grouped into four parts.

The first one consists of three papers devoted to fuzzy relations. In the first contribution, J. Drewniak and U. Dudziak study the preservation of several properties of fuzzy relations under aggregation. More precisely, they study under which aggregation operators the class of fuzzy relations on a given universe with a given fixed property, like reflexivity, symmetry, connectedness, transitivity, is closed. In the second paper, J. Drewniak and B. Pękala consider sup-$*$ powers of fuzzy relations under several assumptions about the operation $*$. They also present some properties of fuzzy relations on a finite set and several interesting examples. The paper by J. Sobera deals with three compositions of relations introduced by Bandler and Kohout with a modification proposed by De Baets and Kerre. She investigates all possible mixed pseudo-associativities of these compositions of relations.

Another group of three papers is devoted to the study of operations on the unit interval applied in the fuzzy set theory and fuzzy logics. M. Baczyński and B. Jayaram discuss in detail some properties of three classes of fuzzy implications, recently introduced by Yager and Jayaram, which are called the f-generated, g-generated and h-generated fuzzy implication, respectively. They describe their relationships and compare them with the well established (S, N)-implications, S-implications and R-implications. In the cases where they intersect the precise sub-families have been determined. The uniqueness of generators is also investigated. The following paper of P. Drygaś is related to the structure of continuous uninorms with neutral element $e \in [0, 1]$. It is known that, if a uninorm U is continuous then $e = 0$ or $e = 1$, so in fact continuous operations on the open unit interval are considered. It is shown that every associative, increasing binary operation with neutral element $e \in (0, 1)$, which is continuous on the open unit square may be written, on $[0, 1)^2$ or $(0, 1]^2$, as an ordinal sum of a semigroup and a group. Furthermore, this group is isomorphic to the positive real numbers with multiplication. As special cases of the main result, two well-known representations of continuous uninorms are obtained. B. Butkiewicz investigates binary operations called B_{and} and B_{or}, which can be used in fuzzy systems. These operations are weaker than the commonly used t-norms and t-conorms.

Some basic mathematical properties of these operations are presented. The author defines and examines also weak B-operations.

Copulas describe the dependence structure of multivariate random variables. Construction methods for copulas are investigated in the following three contributions. F. Durante, A. Kolesárová, R. Mesiar and C. Sempi study the class copulas with given horizontal and vertical sections, i.e., when for a random vector (X, Y) the conditional joint distributions under the conditions $X < x$ resp. $Y < y$ (for a fixed x and y) are known. Constructions yielding singular copulas, as well as those yielding absolutely continuous copulas are given. Based on linear interpolation, the following paper by B. De Baets, H. De Meyer and R. Mesiar brings a new construction method for semilinear copulas with prescribed diagonal section yielding a possibly non-commutative copula. For these copulas, some association parameters are given in terms of the diagonal sections. The last paper part devoted to constructions of copulas is due to F. Durante, E. P. Klement, J. J. Quesada-Molina and P. Sarkoci. Based on a generalization of the Darsow product, from two given copulas a third one is constructed in such a way that all three copulas (of dimension 2) can be seen as two-dimensional marginals of some copula of dimension 3. Moreover, shuffles of the copula Min are studied here.

In the last group of papers we have two contributions. T. Bacigál focuses on the exploitation of aggregation operators in time series modeling with switching regime controlled by an aggregation operator. The proposed models of regime-switching time series are then applied to exchange rate development modeling. The last paper of S. Krajči is purely theoretical and it brings new looks at generalized concept lattices.

We are grateful to all authors who submitted papers to this special issue, regardless whether they finally could be accepted or not. Our special thanks goes to all reviewers whose comments, remarks and suggestions have not only significantly enhanced the scientific level of the accepted papers, but also they provided valuable suggestions for further work in the case of not accepted papers. Last but not least, our gratitude goes to the editorial office of Kybernetika for a perfect cooperation during the preparation of this special issue.

Note that the 9th FSTA conference will be held February 4 – 8, 2008, traditionally in Liptovský Ján, Slovakia.

Michał Baczyński, Institute of Mathematics, University of Silesia, ul. Bankowa 14, 40-007 Katowice. Poland.
e-mail: michal.baczynski@us.edu.pl

Erich Peter Klement, Department of Knowledge–Based Mathematical Systems, Johannes Kepler University, A-4040 Linz. Austria.
e-mail: ep.klement@jku.at

Radko Mesiar, Department of Mathematics, Faculty of Civil Engineering, Slovak University of Technology, Radlinského 11, 813 68 Bratislava, Slovak Republic and Institute for Research and Applications of Fuzzy Modeling, University of Ostrava, Czech Republic.
e-mail: mesiar@math.sk