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Aggregation functions: Theory and applications, part I

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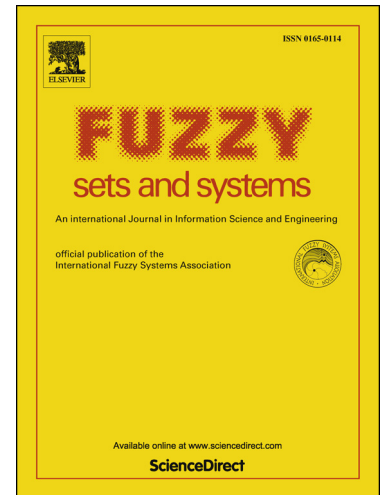
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Aggregation Functions: Theory and Applications, Part I

Editorial

This special issue of Fuzzy Sets and Systems journal consists of nine original papers. All of them concerns either theoretical or applied aspects of aggregation, and in most cases the preliminary results and ideas were presented at two distinguished international conferences, namely at IFSA-EUSFLAT 2015 congress held from June 30 to July 3, 2015, in Gijón, Spain, and at AGOP 2015 summer school held from July 7 to July 10, 2015, in Katowice, Poland. We express our gratitude to all authors for contributing to the high quality of this special issue. We also thank all colleagues who were involved in the reviewing process. Their comments, remarks and suggestions have significantly contributed to the final decisions about the acceptance of submitted papers, and helped to enhance the original accepted submissions. Finally, our thanks goes to the editors and to the editorial office of Fuzzy Sets and Systems for their support and the fruitful cooperation during the preparation of this special issue.

Papers in this issue deals with several aspects of aggregation, including theoretical and applied aspects.

In the first paper “Aggregation Operators in Information Retrieval” written by Stefania Marrara, Gabriella Pasi and Marco Viviani, the use of aggregation operators in the context of Information Retrieval has been discussed. The starting point of this analysis is the consideration that several tasks related to Information Retrieval have been modeled as a Multi-Criteria Decision Making (MCDM) problem, where analyzing the potential impact of aggregation is a challenging issue. This article aims to provide a presentation of the main approaches that in the literature have made use of aggregation operators in Information Retrieval.

In the following paper “Information retrieval from interval-valued fuzzy automata through K_α operators”, Marisol Gómez, Inmaculada Lizasoain and Cristina Moreno analyze fuzzy finite transition systems and fuzzy transformation semigroups when the truth structure is the set of all closed real subintervals contained in $[0, 1]$. Their proposal involves the application of interval-valued fuzzy sets techniques in order to retrieve the information given by the transition functions of the considered automata. In particular, the authors are able to characterize those Atanassov’s K_α operators which provide a fuzzy transformation semigroup starting from an interval-valued fuzzy automaton. The authors also compare different ways of getting an interval-valued fuzzy transformation semigroup starting from two real fuzzy automata.

The next paper “ k -maxitive fuzzy measures: a scalable approach to model interactions” is a work of Javier Murillo, Serge Guillaume and Pilar Bulacio. The authors have focused on the reduction of computational complexity in the case of fuzzy measures, considering models with interactions involving at most k elements, and focusing mainly on k -maxitive fuzzy measures. Considering the Heuristic Least Mean Squares, they have designed a learning algorithm to identify k -maxitive measures from labeled data. Dealing with two real world datasets, a comparison of the complete fuzzy measure and a k -maxitive they show the number of interacting elements is limited and the k -maxitive measures yield the same characterization of interactions and a comparable classification accuracy.

Vicenç Torra, in the paper “Entropy for non-additive measures in continuous domains”, makes use of the definition of f -divergence for non-additive measures previously introduced by himself in order to provide a definition of entropy for non-additive measures in a continuous setting. This definition is based in the KL divergence for this type of measures. Some interesting properties are analyzed and, in particular, it is shown that the new definition can be used to find a measure satisfying the principle of minimum discrimination.

The next article “Principles of inclusion and exclusion for interval-valued fuzzy sets and IF-sets” of Mirko Navara and Mária Navarová is devoted to the principle of inclusion and exclusion generalized to IF-sets, which are essentially equivalent to interval-valued fuzzy sets. The authors investigated already the principle of inclusion and exclusion for fuzzy sets and arbitrary continuous unions and intersections, and they have used obtained earlier results for interval-valued fuzzy sets and IF-sets. They proved that the principle of

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