

membership functions can be tuned to capture the behavior of various real memristors.

5:24PM *Analysing The Segmentation Of Energy Consumers Using Mixed Fuzzy Clustering* [#15470]

Hanna Schafer, Joaquim L. Viegas, Marta C. Ferreira, Susana M. Vieira and J. M. C. Sousa, University of Lisbon, Portugal

The current demands on the energy market, such as efficiency, sustainability and affordability, increase the need for customer understanding and data analysis. This paper presents an analysis of the segmentation of electricity consumers based on the fuzzy clustering of time variant electricity consumption data and invariant features like the demographic customer information. The algorithm used is mixed fuzzy clustering (MFC), which allows to integrate both variant and invariant features into one clustering. The clustering is evaluated both in its stability over the two years of data, using a entropy measurement and in its general quality given by the three clustering validity indices, Calinski-Harabasz, Davies-Bouldin and Silhouette index.

Fuzzy Logic II

Wednesday, August 5, 4:30PM-6:00PM, Room: Galata, Chair: Vladik Kreinovich

4:30PM *On Intuitionistic Fuzzy Lattices* [#15434]

Lemnaoaur Zedam, Ewa Rak and Soheyb Milles, Department of Mathematics, Med Boudiaf University - Msila, Algeria; Faculty of Mathematics and Natural Sciences, Rzeszow University, Poland

In this paper, inspired by the concept of intuitionistic fuzzy lattices previously introduced by Thomas and Nair, we introduce the notion of intuitionistic fuzzy complete lattice and investigate some of its basic properties. In particular, some interesting characterizations closely related to the intuitionistic fuzzy complete lattices are given.

4:48PM *Differently implicational hierarchical inference algorithm under interval-valued fuzzy environment* [#15222]

Tang Yiming, Hefei University of Technology, China

Under interval-valued fuzzy environment, based on the differently implicational idea and hierarchical inference mechanism, the interval-valued universal triple I algorithm is put forward. To begin with, the interval-valued fuzzy implications and related residual pairs are researched. Furthermore, the interval-valued universal triple I principles are proposed, and the optimal solutions of the interval-valued universal triple I algorithm are achieved from the viewpoints of residual pairs together with the R-implications, and the corresponding hierarchical inference mode is established, meanwhile the reversible properties of the interval-valued universal triple I algorithm are proved. Finally, it is verified by examples that the interval-valued universal triple I algorithm performs better than the interval-valued triple I algorithm.

5:06PM *Truth ratios of syllogistic moods* [#15157]

Mikhail Zarechnev and Bora I Kumova, Izmir Institute Of Technology, Turkey

The syllogistic system consists of 256 moods, of which only 24 have been recognized as true. From a set-theoretical point of view, a mood can be represented with three sets and their possible relationships. Three sets can have up to seven sub-sets or spaces. In an earlier work we have used 41 permutations of the spaces, out of which every mood matches an individual number as true or false cases. The truth ratio of a mood is then calculated, by relating the true and false cases with each other. In this work we revise the previously presented properties of the moods and the syllogistic system, this time by using the maximum possible cover, which

5:42PM *Cost Analysis in Construction Projects using Fuzzy OLAP Cubes* [#15370]

Maria Martinez-Rojas, Nicolas Marin, Carlos Molina and M Amparo Vila, Department of Computer Science and Artificial Intelligence, University of Granada, Spain; Department of Computer Sciences, University of Jaen, Spain

In this paper a fuzzy multidimensional structure to analyze cost data in construction projects is proposed. As we will see, the use of a fuzzy structure provides a more intuitive use of the information associated to construction domain. This way, primary evaluation criteria in assessing the success of construction projects like economic objectives can be more friendly controlled. We propose both a fuzzy cost multidimensional structure and its implementation in Linguistic F-Cube Factory, a fuzzy OLAP system.

consists of 96 distinct space permutations. Our results mostly verify our previous findings, like the additional true mood anasoy, the inherently symmetric truth distribution of the moods. Additionally we have revealed some new properties, like the equivalence of some moods, which reduces the system to 136 distinct moods.

5:24PM *A Grade Assignment and IFS Translation Approach based on Intensive Region Searching* [#15344]

Zhang Hengshan, Zheng Qinghua, Liu Ting and Cui Xiaojun, MOEKLINNS Lab, Department of Computer Science and Technology, Xian Jiaotong University, China

Intuitionistic Fuzzy Set (IFS) is considered as a nature solution for information fusion. How to transform the information with non-uniform distribution into IFS? In this paper, the authors proposed an approach to deal with this challenge. First, the intensive region (IR) of non-uniform distribution data is searched. Second, the evaluation grades are assigned to IR and other regions. IR is assigned to more grades, because of the higher data rate in it. Finally, the non-uniform data is translated into IFS based on the suitable grades assignment. The experiment is conducted to study the effectiveness and advantage of this approach.

5:42PM *Why Sugeno lambda-Measures* [#15064]

Hung Nguyen, Vladik Kreinovich, Joe Lorkowski and Saiful Abu, New Mexico State University, United States; University of Texas at El Paso, United States

To describe expert uncertainty, it is often useful to go beyond additive probability measures and use non-additive (fuzzy) measures. One of the most widely used classes of such measures is the class of Sugeno lambda-measures. Their success is somewhat paradoxical, since from the purely mathematical viewpoint, these measures are -- in some reasonable sense -- equivalent to probability measures. In this paper, we explain this success by showing that while (1) mathematically, it is possible to reduce Sugeno measures to probability measures, but (2) from the computational viewpoint, using Sugeno measures is much more efficient. We also show that among all fuzzy measures which are equivalent to probability measures, Sugeno measures (and a slightly more general family of measures) are the only ones with this efficiency property.

Fuzzy Modeling and Identification III

Wednesday, August 5, 4:30PM-6:00PM, Room: Amfi, Chair: Alexander Gegov

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