

Mathware & Soft Computing

> The magazine of the European Society for Fuzzy Logic and Technology



A conversation between J.L. Verdegay and J. Kacprzyk moderated by G. Pasi

BBVA Foundation Frontiers of Knowledge Award in the Information and Communication Technologies to Lofti A. Zadeh by L. Magdalena

The evolution of hybrid Soft Computing: A personal journey- P. Bonissone

Of machines and humans: The art of decision making-A. Figueiras-Vidal

Selected papers from second Brazilian Congress on Fuzzy Systems- R. Santiago and B. Bedregal

June 2013





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## Scientific Reports

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#### NEWS

# Ph.D. Thesis defended by Rosa M. Rodríguez Domínguez

Department of Computer Science, University of Jaen, Spain



Rosa M. Rodríguez Domínguez defended her PhD Thesis, entitled "Using Comparative Linguistic Preferences in Decision Making under Uncertainty" the last 29th April. Her supervisor is Luis Martínez López from the University of Jaen.

Usually, the complexity of decision making problems is because of the uncertainty that surrounds the alternatives and the knowledge of the experts. One of the main topics in decision making is the modelling and treatment of the uncertainty of the different types of information that can be used by experts to provide their preferences. Our research focuses on decision making problems in qualitative contexts with high degree of uncertainty, where experts usually use linguistic information to express their preferences. The use of linguistic information has provided reliable and successful results in this type of decision making problems, but sometimes it is limited because the linguistic models use linguistic terms defined a priori and restrict to experts for providing their preferences by using just one term, which may not reflect exactly what they want. To overcome these limitations, different linguistic models have

been introduced in the literature to provide richer expressions than single linguistic terms, but they are either far away from the common language used by experts in decision making problems and/or do not have defined any formalization to generate the linguistic expressions.

Therefore, the main aim of this thesis focused on trying to enrich the vocabulary of expression for experts provide their assessments in a more flexible way in decision making problems. To do so, it is presented a new representation model of linguistic information entitled Hesitant Fuzzy Linguistic Term Sets (HFLTS), which allows experts express their preferences with more than one linguistic term by comparative linguistic expressions close to common language used by human beings in decision problems. Besides, different models of group decision making, multicriteria decision making and multiexpert multicriteria decision making, where experts can provide their preferences by using single linguistic terms or comparative linguistic expressions based on HFLTS have been proposed.

To show the useful of the HFLTS, a real problem of nuclear safeguards evaluation has been solved by using the multiexpert multicriteria decision making model defined in this research memory. Finally, a new module has been developed to manage the HFLTS and comparative linguistic expressions in a decision support system so-called Multicriteria Decision Analysis with Computing with Words.

Some results of this thesis have been published in international journals such as, IEEE Transactions on Fuzzy Systems, Information Sciences, International Journal of General Systems and International Journal of Uncertainty, Fuzziness and knowledge-based Systems.