Accepted Manuscript

Modeling Group Assessments by means of Hesitant Fuzzy Linguistic Term Sets

Jordi Montserrat-Adell, Núria Agell, Mónica Sánchez, Francesc Prats,
Francisco Javier Ruiz

PII: S1570-8683(16)30059-3
DOI: http://dx.doi.org/10.1016/j.jal.2016.11.005
Reference: JAL 436

To appear in: *Journal of Applied Logic*

Please cite this article in press as: J. Montserrat-Adell et al., Modeling Group Assessments by means of Hesitant Fuzzy Linguistic Term Sets, *J. Appl. Log.* (2016), http://dx.doi.org/10.1016/j.jal.2016.11.005

Modeling Group Assessments by means of Hesitant Fuzzy Linguistic Term Sets

Jordi Montserrat-Adell[a,b], Núria Agell[b,*], Mónica Sánchez[a], Francesc Prats[a], Francisco Javier Ruiz[a]

[a] *UPC-BarcelonaTech, Barcelona, Spain*
[b] *Esade - Universitat Ramon Llull, Barcelona, Spain*

Abstract

Hesitant linguistic term sets have been introduced to capture the human way of reasoning using linguistic expressions involving different levels of precision. In this paper, a lattice structure is provided to the set of hesitant fuzzy linguistic term sets by means of the operations intersection and connected union. In addition, in a group decision making framework, hesitant fuzzy linguistic descriptions are defined to manage situations in which decision makers are assessing different alternatives by means of hesitant fuzzy linguistic term sets. Based on the introduced lattice structure, two distances between hesitant fuzzy linguistic descriptions are defined. These metric structures allow distances between decision makers to be computed. A centroid of the decision making group is proposed for each distance to model group representatives in the considered group decision making framework.

Keywords: Linguistic modeling, Group decision making, Uncertainty and fuzzy reasoning, Hesitant linguistic term sets.

Introduction

Different approaches have been developed in the fuzzy set literature involving linguistic modeling to handle the imprecision and uncertainty inherent in human preference reasoning [4, 9, 10, 12, 16]. In addition, several extensions of classic fuzzy sets theory have been established to include different levels of precision or multi-granularity in linguistic modeling [3, 7, 14]. Hesitant Fuzzy Linguistic Term Sets (HFLTSs) were introduced to capture the human way of reasoning involving different levels of precision. To this end, a set of linguistic expressions is defined based on the concept of hesitance [14].

L-fuzzy sets are considered as a generalization of the classic fuzzy sets with range values of membership functions in a lattice L [6]. Classic fuzzy sets can be considered as a special case of the L-fuzzy sets with L = [0, 1]. The relation between L-fuzzy sets

*Corresponding author: Department of Information Systems Management and GREC Group, in Esade - Universitat Ramon Llull, Av. Pedralbes 62, Barcelona, Spain (email: nuria.agell@esade.edu).