An experimental study on the use of fuzzy quantification models for linguistic descriptions of data
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Abstract We evaluate experimentally the behavior of six well-known and frequently used fuzzy quantification models (Zadeh’s scalar and fuzzy cardinality, Yager’s OWA, Delgado’s GD, Sugeno integral and Vila’s VQ) on fifteen data sets, based on the degree of fulfilment these provide when applied for generating linguistic descriptions of data. The aim is to evaluate whether there exist significant differences between these fuzzy quantification models from an empirical point of view for both type-1 and type-2 linguistic descriptions. In the study we calculated, for each data set, the degree of fulfilment of all the possible linguistic descriptions generated by partitions made of up to seven quantifiers and linguistic terms of the variables involved. We conducted tests of statistical significance for these results under a pair-wise comparison. Results indicate that no significant differences were found among the models for type-1 descriptions. This suggests that all approaches exhibit a similar empirical behaviour, with the only exception of a single specific case with very limited outreach. These results also verify and extend previous theoretical results which only involved two of the ten pairs we cover for type-1. For type-2, significant differences are observed in general among all the pairs of quantification models, albeit with different proportions. The results of our study therefore indicate that, for type-1 models, the selection of a particular model for a linguistic description of data problem should be guided in general by other criteria different than its experimental behaviour.

Palabras chave fuzzy quantification, linguistic descriptions of data, natural language generation