

ENTROPY OF INTUITIONISTIC FUZZY SET BASED ON SIMILARITY MEASURE

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ABSTRACT. *In this paper, we introduce the concept of similarity measure of intuitionistic fuzzy sets, propose a kind of new method to describe entropy of intuitionistic fuzzy set based on similarity measure of intuitionistic fuzzy sets and put forward some formulas to calculate entropy of intuitionistic fuzzy set.*

Keywords: Intuitionistic fuzzy set, Entropy, Similarity measure, Fuzzy set

1. Introduction. Since the fuzzy set was introduced by Zadeh [31], many new approaches and theories treating imprecision and uncertainty have been proposed, such as the interval-valued fuzzy sets introduced by Zadeh [32] and the generalized theory of uncertainty (GTU) introduced by Zadeh [33] and so on. Among these theories, a well-known extension of the classic fuzzy set is intuitionistic fuzzy set theory, which was pioneered by Atanassov [1, 2]. Since then, many researchers have investigated this topic and obtained some meaningful conclusions. For example, Cornelis et al. in implication of intuitionistic fuzzy sets [6], Zhou and Wu in generalized intuitionistic fuzzy rough approximation operators [36], Liu and Wang in multi-criteria decision-making methods based on intuitionistic fuzzy sets [20], Xu in intuitionistic preference relations and their application in group decision making [28] and clustering algorithm for intuitionistic fuzzy sets [29], respectively, Hung and Yang in the J-divergence of intuitionistic fuzzy sets and its application to pattern recognition [16], Grzegorzewski in the distance between intuitionistic fuzzy sets based on the Hausdroff metric [12], Szmidt and Kacprzyk in the distance between intuitionistic fuzzy sets based on the geometrical representation of an intuitionistic fuzzy set [23], Zeng and Li in the correlation coefficient of intuitionistic fuzzy sets [35], Davvaz in intuitionistic fuzzy algebra [8], Lupiañez in intuitionistic fuzzy topology [21]. Moreover, some researchers have pointed out that there is a strong connection between Atanassov's intuitionistic fuzzy sets and interval-valued fuzzy sets. For more details, readers can refer to [4, 10, 25].

Entropy and similarity measure of fuzzy sets are two important topics in fuzzy set theory and application. Entropy of fuzzy set describes the fuzziness degree of a fuzzy set and was first introduced by Zadeh [31]. Since then, many scholars have studied it from different points of view. For example, in 1972, De Luca and Termini [9] introduced some axioms to describe the fuzziness degree of fuzzy set. Kaufmann [17] put forward a method