

Title: A personal view on the evolution of the definition of fuzzy sets

Abstract: Fuzzy sets as initially defined by Zadeh was a quite direct model. Soon Goguen realized that operations proposed by Zadeh simply required a partial order in the valuation space in order to evaluate the degree of membership, not necessarily being the real unit interval. Then it was shown that those operations initially considered by Zadeh were not the unique ones, and that the valuation space could also be given in terms of fuzzy sets (type-2 fuzzy sets). In this way the fuzzy model has been getting more and more complex with time, since reality use to impose the simultaneous presence of several fuzzy sets, that can be connected, aggregated and decomposed in different ways. In particular, Atanassov with his intuitionistic view realized that each fuzzy set should always be linked to its negation. But in a more general framework we should acknowledge that any concept needs its surrounding concepts to be understood, not only its negation. Therefore, a standard approach for fuzziness suggests that each concept should be combined with at least one opposite, and that the nature of the opposition between these two paired fuzzy sets might create different kinds of alternative valuation degrees. But understanding a concept use to imply having a look to all related concepts, not only to its declared opposite. A concept needs surrounding concepts to be understood. Following these basic arguments, in this paper we shall be offering a personal view of the evolution of the definition of fuzzy sets, from the initial definition given by Zadeh to some more complex structures that indeed better fit reality.