Fuzzy integral inequalities : A small survey

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It is well known that when these concepts arose in PhD dissertation of Sugeno in 1974 [1], a lot of works has been done as much in the theoretical branch as in the applied. As we know, the classical measure and the corresponding integral are based on the additivity property, but this property is uncommon in the applied context and could be too restrictive for the appliance. For instance, measurement concerning to information could not be additive; in general measurement concerning to human behavior may not be additive. Thus, fuzzy measures replacing the additive property by a kind of monotony, in the sense of set inclusion and this requirement is obviously weaker than additive property.

In the same field, classical integration is based on vectorial structure of the space and in fuzzy context the theory of integration is based on reticular structure of the space.

In general, our motivation on research in this field is to develop a theoretical frame for support the mathematical base of inexact or imprecise measurement, specially in many cases of practical interest like modelling non-deterministic problems.

The properties and applications of the Sugeno integral have been studied by many authors, including Ralescu and Adams [2] in the study of several equivalent definitions of fuzzy integrals, Román-Flores et al. [3, 4, 5] in level-continuity of fuzzy integrals, H-continuity of fuzzy measures and geometric inequalities for fuzzy measures and integral, respectively; Guo and Zhang [9] in set-valued fuzzy measures, R. Mesiar [10] in different aspects of fuzzy measure and fuzzy integral, etc. In Wang and Klir [6] we can see a general overview on fuzzy measurement and fuzzy integration theory.

In the last years, the authors have been working in to develop principal aspects of fuzzy theory such as topological convergences on fuzzy measures, geometric properties of fuzzy measures, fuzzy integrals inequalities and numerical approximation for fuzzy integrals. In this work we present the last researches in fuzzy integral inequalities that include geometric inequalities and the fuzzy integral [5], inequalities for monotone functions with applications for solving fuzzy integrals [7], a Fuzzy-Jensen’s inequality [14], a Fuzzy-Chebyshev’s inequality [8], Fuzzy-Stolarsky’s inequality [12] and convolution type inequality for fuzzy integrals [13]. As we said in the abstract, the purpose of this small survey is to present each one
of these latest works without its proofs (because the demonstrations are in the respective references) and give a reasonable view on the state of art in fuzzy integral inequalities in the last years.

Referencias


