Research on several problems about uninorms

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Abstract. Uninorms introduced by Yager in 1996 are a new class of aggregation operators, which are also an important generalization of t-norms and t-conorms. At present, uninorms have been widely used in lots of fields such as expert system, decision making, fuzzy reasoning, image processing and so on. In the theoretical study about this class of operators, several subclasses emerged, and some extensions also appeared.

About the properties of uninorms, the most attentions from researchers are distributivity and migrativity properties at present. The concept of the migrativity was first introduced by Durance and Sarkoci when they investigated the convex combination of a continuous t-norm and the drastic product T_D. At present, the migrativity has been applied to decision-making and image processing. Fodor et al. characterized the migrativity for continuous t-norms completely. Mesiar and Bustince introduced the α -sum of semicopulas, and completely characterized the α -migrative semicopulas, copulas and quasi-copulas. Wu and Ouyang studied the migrativity for t-subnorm. This talk introduces the research about the migrativity involving uninorms and some of other aggregation operators.

About the distributivity for uninorms, we mainly introduces the research of distributivities involving the following operators: uninorms, semi- uninorms, t-norms (t-conorms), nullnorms and semi-t-operators, where semi-uninorms are an extension of uninorms, and nullnorms and t-operators are generalizations of t-norms and t-conorms, which are equivalent to each other. By eliminating commutativity from the properties of t-operators, Drygas introduced the concept of semi-t-operators, which are a generalization of both t-operators and nullnorms.

As to the problem of characterizing uninorms, Fodor et al. characterized the representable uninorms when they studied th e general structure of uninorms in 1997. De Baets characterized the idempotent uninorms in 1998. Hu et al. characterized the uninorms continuous in the open unit square in 2001. So far, the problem about the characterization of uninorms has not been solved completely yet. In this talk, we introduce the research work about the characterization of uninorms with continuous underlying operators, including the results obtained by now and some remaining problems.

Keywords: fuzzy connectives, uninorms, distributivity, migrativity, characterization.