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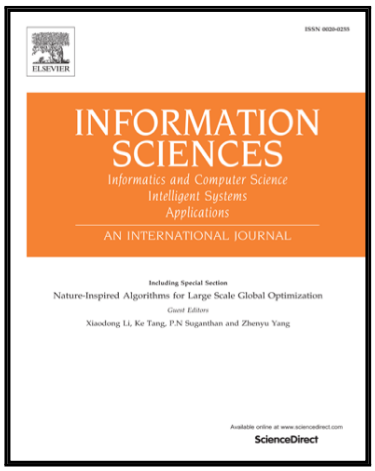

Reduction of Attributes in Averaged Similarities

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Reduction of Attributes in Averaged Similarities

D. Boixader J. Recasens

Abstract

Similarity Relations may be constructed from a set of fuzzy attributes. Each fuzzy attribute generates a simple similarity, and these simple similarities are combined into a complex similarity afterwards. The Representation Theorem establishes one such way of combining similarities, while averaging them is a different and more realistic approach in applied domains. In this paper, given an averaged similarity by a family of attributes, we propose a method to find families of new attributes having fewer elements that generate the same similarity. More generally, the paper studies the structure of this important class of fuzzy relations.

1 Introduction

Similarity Relations were introduced by Zadeh [11] as a natural way of fuzzifying classical equivalence relations. They have become widely used, and they appear under different names in the literature, depending on the authors and on the specific algebrization of the multivalued transitivity axiom. So *Similarity Relation, Likeness, Fuzzy Equality, T-indistinguishability Operator*, or simply *Fuzzy Equivalence Relation*, are common terms that refer to this class of fuzzy relations.

Following Trillas and Valverde [10] we favor the term *T-indistinguishability Operator*, which makes explicit reference to the t-norm T, and we will use *Similarity* only in an informal way.

Definition 1.1. *Let X be a set and T a t-norm. A T-indistinguishability operator E on X is a fuzzy relation $E : X \times X \to [0, 1]$ satisfying, for all $x, y, z \in X$,*

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