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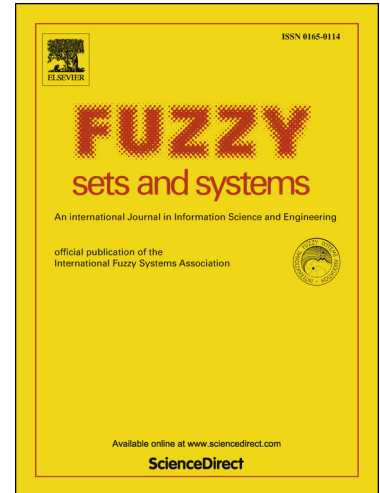
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On the Definition of Penalty Functions in Data Aggregation

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Abstract

In this paper, we point out several problems in the different definitions (and related results) of penalty functions found in the literature. Then, we propose a new standard definition of penalty functions that overcomes such problems. Some results related to averaging aggregation functions, in terms of penalty functions, are presented, as the characterization of averaging aggregation functions based on penalty functions. Some examples are shown, as the penalty functions based on spread measures, which happen to be continuous. We also discuss the definition of quasi-penalty functions, in order to deal with non-monotonic (or weakly/directionally monotonic) averaging functions.

Keywords: penalty functions, aggregation functions, averaging aggregation function, spread measures, quasi-penalty functions

1. Introduction

Aggregation functions [1, 2] are mainly used for obtaining a single output value from several input values. This procedure is indispensable in many applications, such as fuzzy rule based systems and classification systems [3, 4, 5], pattern recognition, image processing [6] or decision making [7, 8]. Examples of aggregation functions are t-norms and t-conorms, uninorms, overlap and grouping functions, weighted quasi-arithmetic means, ordered weighted averaging (OWA) functions, Choquet and Sugeno integrals (see, e.g., [3, 4, 9, 10, 11]).

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