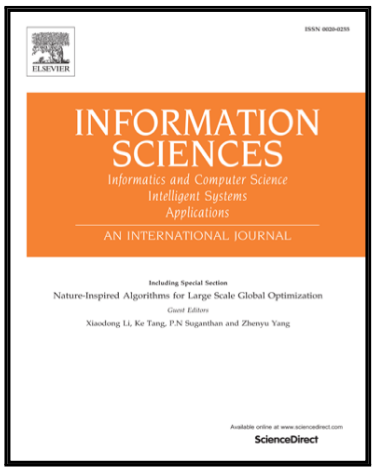

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Abstract

In the authors paper "Discrete bipolar pseudo-integral", Proceedings of 14th IEEE International Symposium on Intelligent Systems and Informatics, Subotica, Serbia, (2016), 123-127, the notion of the bipolar pseudo-integral has been introduced. This paper extends investigations related to this new type of bipolar integrals defined with respect to $\oplus$-decomposable bi-capacities. We consider the main properties of the discrete bipolar pseudo-integral. A characterization theorem for the discrete bipolar pseudo-integral is proven. Monotone convergence theorems and the Fatou type lemma for the discrete bipolar pseudo-integral are considered. In order to illustrate obtained results, many interesting examples are provided.

Keywords: bi-capacity, symmetric pseudo-operations, bipolar pseudo-integral, Fatou type lemma

1. Introduction

Most of the studies of non-additive set functions and integrals, with numerous applications in many disciplines of mathematics, engineering and economics, especially in machine learning, image processing, decision making and problems that involve some aggregation procedure and/or modeling uncertainty (see [2, 10, 13, 35, 44]), have been focused on the case when their values are in the non-negative interval ([1, 4, 11, 12, 17, 26, 34]). Besides the Choquet integral ([3]), some of the most popular non-linear integrals are the Sugeno integral ([39]), the Shilkret integral ([38]), the idempotent integral