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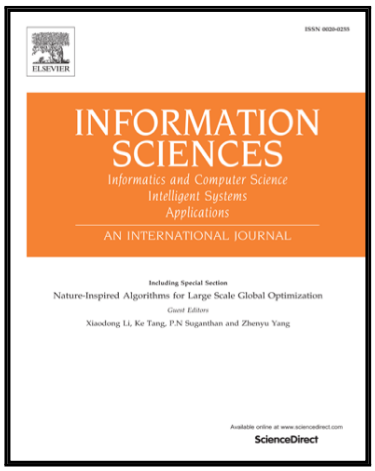

Categorization in Multi-Criteria Decision Making

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PII: S0020-0255(17)30868-X
DOI: 10.1016/j.ins.2017.08.011
Reference: INS 13015

To appear in: *Information Sciences*

Received date: 29 March 2017
Revised date: 31 July 2017
Accepted date: 4 August 2017

Please cite this article as: Ronald R. Yager , Categorization in Multi-Criteria Decision Making, *Information Sciences* (2017), doi: 10.1016/j.ins.2017.08.011

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Categorization in Multi-Criteria Decision Making

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Technical Report #MII-3715R2

Abstract

We discuss the use of monotonic measures for the representation criteria importance information in multi-criteria decision-making. We show that the Choquet integral provides an appropriate method for the aggregation of the individual criteria satisfactions in the case where the relationship between criteria importance's is expressed using a measure. We describe the use of categories and the related idea of a categorization in formulating the structural relationship between multiple criteria. We show how we can model this categorization using a measure on the space of criteria, which in turn allows us to use the Choquet integral to evaluate an alternative's satisfaction to this type of multi-criteria decision problem. We look at a special categorization of the criteria that is closely to a prioritization of the criteria.

Keywords: Multi-Criteria, Set Measure, Aggregation, Categorization, Priority

1. Introduction

Multi-criteria appear in many modern technological tasks such as medical diagnosis, information retrieval, financial decision making and pattern recognition [1-5]. Collectively we shall refer to these as multi-criteria decision problems. Professor Janusz Kacprzyk has made important contributions this field [6-9]. In multi-criteria decision problems our interest is in selecting from some set of alternatives the one that best satisfies the criteria. Since it is generally difficult to rank alternatives based on their satisfaction's to multiple individual criteria a standard approach is to aggregate an alternative's satisfaction to the individual criteria to obtain a single scalar value corresponding to the alternative's overall satisfaction to the collection of criteria. These scalar values can then be used to rank the alternatives and enable a choice to be made. The aggregation of these multi-criteria satisfactions generally requires the use of some information

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