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Implicit averaging functions

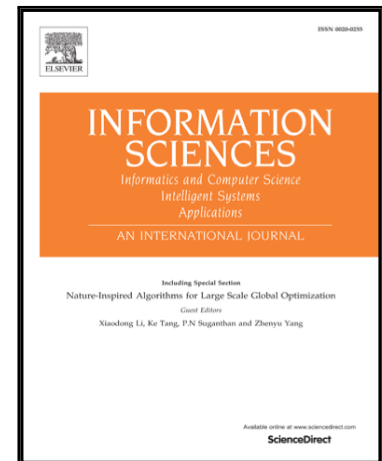
Gleb Beliakov, Tomasa Calvo, Pilar Fuster-Parra

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Implicit averaging functions

Gleb Beliakov^a, Tomasa Calvo^b, Pilar Fuster-Parra^{c,*}

^a*School of Information Technology, Deakin University, 221 Burwood Hwy, Burwood
3125, Australia*

^b*Department of Computer Sciences, Universidad de Alcalá, Alcalá de Henares, Madrid
E-28871, Spain*

^c*Department of Mathematics and Computer Sciences, Universitat Illes Balears, Palma
de Mallorca, Balears E-07122, Spain*

Abstract

We propose a new type of weighted averaging functions given implicitly as a solution to an algebraic equation. The main ingredient is incorporation of weights performed by using a function different to the product. Strict triangular norms are one example of such functions. We show that the weights should be normalized in this case differently to the usual sum to one condition. We establish the conditions under which the implicit averages are well defined, are idempotent, monotone and bounded by the minimum and maximum of their arguments. We present many examples of implicit averages, some of which recover the existing families of functions while others define new families. In particular we provide new generalizations of power means, density based averages and weighted OWA functions.

Keywords: Aggregation function, averaging function, mixture function, ordered weighted averaging, weighted quasi-arithmetic mean.

1. Introduction

Averaging functions provide one of the oldest ways to aggregate information [10]. Averaging is normally used in multicriteria and group decision making, decision support systems, statistical analysis, image processing, etc. The main characteristic of these aggregation functions is that the output

*Corresponding author

Email addresses: `gleb@deakin.edu.au` (Gleb Beliakov), `tomasa.calvo@uah.es` (Tomasa Calvo), `pilar.fuster@uib.es` (Pilar Fuster-Parra)

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