Towards Human-Centric Aggregation via Ordered Weighted Aggregation Operators and Linguistic Data Summaries: A New Perspective on Zadeh's Inspirations

By: Kacprzyk, J (Kacprzyk, Janusz) [1] ; Yager, RR (Yager, Ronald R.) [2] ; Merigo, JM (Merigo, Jose M.) [3] , [4]

View Web of Science ResearcherID and ORCID (provided by Clarivate)

IEEE COMPUTATIONAL INTELLIGENCE MAGAZINE

Volume: 14 **Issue:** 1 **Page:** 16-30
DOI: 10.1109/MCI.2018.2881641
Published: FEB 2019
Indexed: 2019-02-05
Document Type: Article

Abstract

This work presents a new perspective on how Zadeh's ideas related to fuzzy logic and computing with words have influenced the crucial issue of information aggregation and have led to what may be called a human-centric aggregation. We indicate a need to develop tools and techniques to reflect some fine shades of meaning regarding what can be considered the very purpose of human-centric aggregation, notably stated by various modalities in natural language specifications, in particular the usuality. We advocate the use of the ordered weighted average (OWA) operator, which is a formidable tool that can easily be tailored to a user's intention as to the purpose and method of aggregation, generalizing many simple and natural aggregation types, such as the arithmetic mean, maximum and minimum, and probability. We show some of the most representative extensions and generalizations, including the induced OWA, the generalized OWA, the probabilistic OWA, and the OWA distance. We show their use in the basic case of the aggregation of numerical values and in social choice (voting) results. Then, we claim that linguistic data summaries in Yager's sense can be considered an "ultimately human-consistent" form of human-centric aggregation and show how the OWA operators can be used therein.

Keywords

Keywords Plus: GROUP DECISION-MAKING; FUZZY INFORMATION AGGREGATION; DISTANCE MEASURES; OWA OPERATORS; TIME-SERIES; AVERAGING OPERATOR; MOVING AVERAGES; NEURAL NETWORKS; MODEL; QUANTIFIERS