A New Optimization Problem Constituting the Best Rank Order

Ali Hakan Tor[1,*]

[1] *Department of Engineering Science, Faculty of Engineering, Abdullah Gül University, Kayseri, Türkiye*

Abstract

Rank order is a scaling technique commonly used in social sciences. In this approach, participants are expected to order given stimuli based on various criteria such as importance, usefulness, necessity, or preference. For example, in a study conducted to determine the purposes for using the Internet, observers are asked to rank the predefined stimuli such as Researching, Shopping, Social Media, Listening to Music, Watching Videos, and Electronic Banking according to the frequency of their use. In this example, although observers were asked to rank 6 stimuli according to a criterion, they were forced to make a distinction. It is more difficult to make this distinction in rankings that are expected to be made considering more than one criterion, but the observer is forced to make this distinction. In this method, the validity of rank order scaling is very high, as observers have to make as many discriminations as possible between the stimuli.

The data from observers is then utilized to establish a rank order that best represents the information. Although there is a statistical-based ranking method [4, 6] in the literature, there is no optimization-based ranking method. Optimization theory sometimes deals with finding the center of data classes, which is called the data classification [1, 3] or the best curve representing the data, which is called the curve fitting [2, 5]. Considering the similarities of the ranking order with these two problems, an optimization problem will be proposed to find the mentioned rank order. The reasons for searching for a new ranking order method are that different stimuli can share the same order in the statistics-based ranking order scale, and a stimulus that has never been in the first place can be placed in the first place in the best order. The proposed new method is planned to overcome these problems.

***K*eywords** Rank Order · Optimization · Machine Learning

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[*] *Corresponding Author's E-mail: abc@hbv.edu.tr*