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BIG DATA ANALYSIS AND DATA MINING

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Effective choice and ranking of alternatives in search and recommendation problems

The problem of the high computational complexity of most accurate algorithms in search, rank, and recommendation applications is critical when we deal with large datasets. The quadratic complexity may be unadmissible. Thus, the task is to develop efficient algorithms by consistent reduction of information and by the use of linear algorithms on the first steps. The problem of whether functions of several variables can be expressed as superposition of functions of fewer variables was firstly formulated by Hilbert in 1900 as the Hilbert's thirteenth problem. The answer to this general question for the class of continuous functions was given in 1957 by Arnold and Kolmogorov. For the class of choice functions, this matter was studied only by our team. A new effective method for search, ranking, and recommendation problems in large datasets is proposed based on superposition of choice functions. The developed algorithms have low computational complexity so they can be applied on big data. One of the main features of the method is the ability to identify the set of efficient options when one deals with large number of options or criteria. Another feature of the method is the ability to adjust its computational complexity. The application of the developed algorithms to the Microsoft LETOR dataset showed 35% higher efficiency comparing to the standard techniques (for instance, SVM). The proposed methods can be applied, for instance, for the selection of effective options in search and recommendation systems, decision support systems, Internet networks, traffic classification systems and other relevant fields.

Biography

Fuad Aleskerov is a leading Scientist in Mathematics and multicriterial choice and decision making theory. He is the Head of the International Laboratory of Decision Choice and Analysis and the Head of the Department of Mathematics for Economics of National Research University Higher School of Economics (Moscow, Russia). He has published 10 books, many articles in leading academic journals. He is a member of several scientific societies, Editorial Board Member of several journals, founder and head of many conferences and workshops. He has been an invited speaker on numerous international conferences, workshops and seminars.

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