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Brno Local Chapter of Union of Czech Mathematicians and Physicists

XX International Conference

PROBLEMS OF DECISION MAKING UNDER UNCERTAINTIES (PDMU-2012)

ABSTRACTS

September 17-21, 2012
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УДК 007 (100)(06)
ББК 32.81я43

ISBN 978-966-8725-07-4

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СОДЕРЖАНИЕ

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[1] *The abstracts are publishing in authors edition*
Тезисы печатаются в авторской редакции

ABOUT THE PROBLEM OF GROWING OF A DISCRETE FUZZY NUMBER CARRIER DURING ALGEBRAIC OPERATIONS

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During performing of a number of operations with fuzzy numbers [1], growing of the carrier of a discrete fuzzy number occurs. However several gradations are enough for describing qualitative phenomena. Therefore let set the problem of the reduction of the number of carrier elements with the realization of an opportunity to save the information about values. It is proposed that the information is given by the fuzzy number. One of methods is presented in the report.

Let we have a fuzzy number $A = \{(a_1 \mid \mu_1),...,(a_n \mid \mu_n)\}$ for describing a variable. It is necessary to describe this variable by a fuzzy number with a carrier which has $k < n$ carrier elements

Describe this procedure by reduction A to B in a general view. Let $A = \{(a_1 \mid \mu_1),...,(a_n \mid \mu_n)\}$, without restricting the generality, consider $a_1 < a_2 < ... < a_n$. It is necessary to get the reduction of the number A down to the number B (corresponding A) with k elements. Denote $B = \{(b_1 \mid \eta_1),...,(b_n \mid \eta_k)\}$. Split the interval $[a_1, a_n]$ into k intervals $\Delta_i = [a_1 + h(i-1), a_1 + hi]$, where $h = \frac{a_n - a_1}{k}$, $i = 1,2,...,k$ (for $i = k$ the right end of interval is included: $[a_1 + h(k-1); a_1 + hk]$). Find their middles: $b_i = a_1 + h(i - \frac{1}{2}) = a_1 + \frac{a_n - a_1}{k}(i - \frac{1}{2})$, $i = 1,2,...,k$. Find the value η_i of membership function for each b_i: $\eta_i = \sum_{j: a_j \in \Delta_i} a_j \mu_j / \sum_{j: a_j \in \Delta_i} a_j$, $i = 1,2,...,k$. Thereby B is defined.

It is proposed to investigate the properties of the operation of reduction in further researches.

References

1. Oleg Iemets, Oleksandra Yemets`. Solving of combinatorial optimization problems on fuzzy sets: Monograph. PUET. Poltava, 2011. 239 p. (in Ukrainian).