Preservation of Properties of Fuzzy Relations During Aggregation Processes

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Abstract: Diverse classes of fuzzy relations such as reflexive, irreflexive, symmetric, asymmetric, antisymmetric, connected, and transitive fuzzy relations are studied. Moreover, intersections of basic relation classes such as tolerances, tournaments, equivalences, and orders are regarded and the problem of preservation of these properties by n-ary operations is considered. Namely, with the use of fuzzy relations $R_1, \ldots, R_n$ and n-argument operation F on the interval $[0, 1]$, a new fuzzy relation $R_F = F(R_1, \ldots, R_n)$ is created. Characterization theorems concerning the problem of preservation of fuzzy relations properties are given. Some conditions on aggregation functions are weakened in comparison to those previously given by other authors.

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