

# Fuzzy environment application in different MCDM. New fuzzy sets and aggregation operators

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Multiple criteria decision making (MCDM) systems are widely used in daily routines. We consider the systems, when one or few experts are evaluating alternatives based on their knowledge. For such case fuzzy numbers are used. In different articles there are used fuzzy numbers of different complexity. Their purpose is gathering as much information as possible for describing object's or statement's positive, negative and neutral characteristics. Fuzzy numbers' scale is between 0 and 1, it gives an opportunity to use linguistic variables for expert evaluation.

Main processing unit in decision making system is single decision matrix that contains all the values for each alternative and criteria in fuzzy environment. Matrix processing is available using as methods like TOPSIS, ELECTRE, PROMETHEE, and also aggregation operators like weighted average, weighted geometric, Choquet finite integral and etc.

Each method and aggregation operator has its own advantages and disadvantages, but in some case it is possible to combine MCDM method and aggregation operator in such way, so their advantages overlap disadvantages and make new, advanced matrix processing algorithm.

In this work are discussed few MCDM methods, aggregation operators and their combinations.

Keywords: fuzzy set, expert based decision making systems, TOPSIS, aggregation operators, Choquet finite integral, MCDM, q-rung orthopair fuzzy set, decision making matrix.