Fuzzy Neighborhood Operators based on Fuzzy Coverings

In many data mining processes, neighborhood operators play an important role as they are generalizations of equivalence classes which were used in the original rough set model of Pawlak. In this article, we introduce the notion of fuzzy neighborhood system of an object based on a given fuzzy covering, as well as the notion of the fuzzy minimal and maximal descriptions of an object. Moreover, we extend the definition of four covering-based neighborhood operators as well as six derived coverings discussed by Yao and Yao to the fuzzy setting. We combine these fuzzy neighborhood operators and fuzzy coverings and prove that only sixteen different fuzzy neighborhood operators are obtained. Moreover, we study the partial order relations between those sixteen operators.

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