

# Fuzzy Rule Miner: A Software Library Used in Project Based Teaching of Topics Related to Knowledge Discovery in Databases

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**Abstract**

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**Abstract:** A group of fuzzy rules is a human-interpretable knowledge representation which is used in various fields of study such as control and knowledge discovery in databases, e.... [View more](#)

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**Abstract:**  
A group of fuzzy rules is a human-interpretable knowledge representation which is used in various fields of study such as control and knowledge discovery in databases, e.g. for inferring on output based on input variables. It makes use of the notions of fuzzy logic such as fuzzy sets, membership functions and membership degrees. Truth values represented by membership degrees may be any real number between 0 and 1. Effective definition of membership degrees through membership functions for particular applications requires a tool able to set membership functions and to generate inputs for various knowledge discovery algorithms. Similarly, various algorithms for making fuzzy rules and validating are required as well. In addition, modifications have to be possible as research in this scientific area is active. Since many fuzzy rule related algorithms and their modifications are not available for development of programs, software library Fuzzy Rule Miner is presented in this paper. This software library is written in Java and it can be used for helping students with fuzzy logic related calculations, fuzzy rule discovery and the use of fuzzy rules. It can also serve as a support library for complex software programs working with fuzzy rules.

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**I. Introduction**

Fuzzy rule based systems are used in control systems when it is difficult to create a mathematical model with proper evaluation functions due to a too complicated controlled object [1]. Instead of a mathematical model, fuzzy rules are formed on the basis of experience and intuition of professionals. These fuzzy rules are then incorporated into the control system. The control system also has a fuzzification module which fuzzifies input values coming to the system and a defuzzification module which produces its final output values. Fuzzy rule based systems have been introduced to knowledge discovery in databases for classification [2] and association [3] too. Classification allows to determine the class of a new instance based on a mapping induced from instances with known classes [4]. Incorporating fuzzy rules into classification provides an easily interpretable mapping consisting of a group of fuzzy rules. Association rules show dependences among items in a database as  $X \rightarrow Y$  where  $X, Y$  are sets of items and  $X \cap Y = \emptyset$  [5]. The meaning of these dependences is that if a transaction contains all items in  $X$ , then it likely contains all items in  $Y$  as well. Incorporation of fuzzy rules into association allows the use of numerical values in addition to items who either are in particular transactions or are not. In both classification and association, real-world data is usually fuzzified before its use for the creation of fuzzy rules.

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