METHODS FOR DATA MINING FROM FUZZY KNOWLEDGE BASES

Oleksandr Siedushev, Eugene Burov

Information Systems and Networks Department, Institute of Computer Science and Information Technology, Lviv Polytechnic National University, S. Bandery Str., 12, Lviv, 79013, UKRAINE

Fuzziness is an undeniable feature of real-world data captured and used as an input for information bases. Modeling of complex fuzzy dependencies is the main goal of using fuzzy knowledge bases. Intelligent analysis of such knowledge bases is impossible without special, fuzzy data mining methods and techniques. With their assistance, hidden knowledge, rules and patterns can be uncovered, internal contents can be refined and optimized. The paper aims to study and generalize such fuzzy methods and techniques, analyze their strengths and usage patterns, constraints, pros and cons compared with direct fuzzy knowledge bases mining, show simple examples of their usage and the output they produce. This work does not consider all existing fuzzy methods for data mining, but rather focuses on the set of the most effective and appropriate for paper's purpose. Therefore, an emphasis is put on fuzzy clustering, fuzzy decisions trees, fuzzy associative analysis, neuro-fuzzy networks and genetic fuzzy techniques. All of them are popular and definitely important for data mining problems nowadays. Paper describes in detail those methods, their usage patterns and applicability. It is shown that they are fully usable for specified tasks of mining fuzzy knowledge bases. As a recommendation, every fuzzy method and technique considered here has to be used with prior analysis due to always specific user needs, changeable data domains and environments, and dissimilar tasks. There is no universal method to solve every possible issue concerning intelligent analysis of fuzzy knowledge bases. As a result of this paper, generalized comparison of fuzzy models is provided, including the purpose and features of every model type, and also common use cases in the context of mining fuzzy knowledge bases. In general, these models can be utilized to accomplish a great variety of objectives such as building fuzzy clusters and fuzzy associative rules to reveal complex patterns of customer activities from sales databases.

Keywords – fuzzy data mining methods, fuzzy rule base, fuzzy logic, knowledge base.