Rough-Set-Based Decision Model for Incomplete Information Systems

Safiye Turgay
Sakarya University, Turkey

Orhan Torkul
Sakarya University, Turkey

Tahsin Turgay
Sakarya University, Turkey

INTRODUCTION

The increasing use of computers and information are getting necessity with increased expertise and digital data storage, that becomes compulsory and importance for usage. Rapidly increasing data traffic has revealed a major case for efficient manner with the use of the big data. Developed algorithm and suggested model can help using of the data in database structure and evaluate and process of the data for taking managerial decisions with rough sets approach. Rough sets derived from the fuzzy logic approach to perform the analysis of the incomplete information and uncertain structure. In 1982, this approach proposed by Pawlak, for discover the knowledge from big databases which is used in classification of the attributes recently. Also, Rough set is made as incomplete, inadequate and vague information organizing; it makes it suitable for data analysis (Pawlak, 1994, 1995).

Databases use this data and evaluate managerial decisions in the process of data mining has become imperative that we give the name of the emergence of the field. The rough set is a concept derived from the fuzzy logic approach to carry out the analysis of structures with uncertain data mining techniques. The decision will be developed in conjunction with computerized decision support model, giving more efficient automation systems with algorithms that are targeted. Our suggested decision support system covers the inputs, user knowledge and expertise, outputs and decision components. In addition, data access, interactive mode, adaptability and flexible mode provides the solve problems and make decision process for certain and uncertain data with suggested rough set based algorithm structure.

This paper presents rough set based decision model, a process in which the suggested algorithm and decision support model and evaluate with the knowledge in databases and the knowledge received externally. The following sections include some necessary literature review and the rough based decision model approach. Then follow the future trends and the conclusion.

BACKGROUND

Rough set theory is an extension of set theory which proposed by Pawlak (1991) for describe and classify the incomplete or insufficient information. Besides it is mathematical tool that overcome the uncertainties and doubts. Also it verifies logic, and allows inconsistent data and no certainty to the discovery of incomplete implications. It is made as incomplete, inadequate and vague information by organizing. Rough set organizes the suitable data for analysis.

In real-world applications may includes the some uncertain and incomplete attributes in the knowledge representation systems in dynamic

situation, for this reason knowledge discovery and processing is very important for decision system. Meanwhile it is supported as a framework for conceptualizing and analyzing certain and uncertain types of data that is a powerful tool for discovering patterns with upper and lower approximations. Some of the studies used the rough set theory with minimum vertex cover problem (Chen et al.2015; Chen et al.2016); interval-valued information systems (Leung et al. 2008); intuitionistic fuzzy sets (Zhang et al. 2016; Huang et al, 2016) for knowledge discovery in feature selection (Huang et al. 2016) and rule induction (Lin et al. 2015). Shu & Qian (2015) and Yao & Zhao (2008) used the rough set theory for attribute reduction in pre-processing of the data mining and knowledge discovery. Macia-Perez et al. (2015) proposed the formal expansion of the rough set theory based algorithm for detection of the abnormal behaviour in outlier.

Nowadays, rough set theory has been demonstrated to be useful in many research areas such as knowledge discovery (Polkowski et al., 2010, Zhong, 1998; Sun et al., 2012), machine learning (Ananthanarayana et al., 2003; Pedrycz, 2013), decision analysis and support (Yao, 2010; Yao and Zhao, 2008; Pedrycz, 2014), expert systems (Tsumoto, 1998), and pattern recognition (Swiniarski and Skowron, 2003). Rough set theory is also seen in the literature, which is used in conjunction with some heuristic algorithms with optimization applications (Changseok et al. 2010 and Yumin et al. 2010). Liu et al (2011) and (Nauman et al. 2016) used the probabilistic model to evaluate the clusters with rough sets approach. Zhong and Skowron (2001) proposed a rule of database in data mining. Liu et al (2011) and Fang et al. (2016) used the rough probabilistic model to evaluate the cluster approach with rough sets approach. As an example of feature extraction, Salamon and Lopez-Sanchez (2012) proposed the state-based classifier with the rough set theory for inference feature. Derrac et al (2012) used the snapshot feature in the selection process of selecting fuzzy rough set theory and proposed the algorithm with amplifi-

ers. Also rough sets used in wide applications in real life, such as evaluating of the credit ratings in the global banking industry (Chen, 2012) and developed the decision-making aid with hybrid models; tourism demand assessment (Carey et al., 2008;), identifying customer behaviours (James and Hshiung, 2010; Spiric et al, 2014) and medical applications (Tseng(Bill) et al., 2016).

Cuckoo based optimization approach is the new method for the global optimization. It inspired from the Cuckoo bird family life style. It has been proposed by Yang and Deb (2009). Rajabiou (2011) reviewed the cuckoo based optimization algorithm; Ouaarab et al. (2014) developed and the realized the initial test model for the discrete form. This study combined the rough set theory and cuckoo search algorithm for decision making model with usable and correct rules.

ROUGH SET BASED DECISION MODEL

Rough set theory is a mathematical method which used in reasoning and expert systems for information extraction. As in rough set theory is a structure in which to accept certain restrictions.

Rough set theory comes about of the incomplete, inadequate and vague information which is organizing the data for analysis. This study reviews the rough set based containing data sets that both types of missing attribute values in the trivial losses and obtains the rules, recommends issuing a new algorithm. This algorithm can be implemented the dataset and lead to obtaining appropriate rules. Rough sets, data reduction, feature selection, identification of hidden relationships in data and the conversion of the decision rule is concerned with the suggested model. In particular, machine learning, decision analysis used by obtaining information and data from databases, expert systems, decision support systems in which, wide range application areas. In particular, data evaluation and analysis of process uses the incomplete and uncertain data as fuzzy logic not statistical probability

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