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Topic	An Investigation into Applications of Recommendation Systems during Software Requirements Elicitation
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Findings	1. A goal-oriented method is presented for the identification of requirements in which the similarity of stakeholders is computed by using the proposed Fuzzy Based Adjusted Cosine Similarity Measure (FBACSM). 2. Fuzzy and rough-set theory-based approach has been developed for the detection of discordances among the stakeholders. 3. A recommendation system ($PRecSys$) based approach is developed for computing the ranking order of the requirements of an information system using proposed FBACSM and collaborative filtering to recommend the requirements to stakeholders with similar interests.
Abstract	The objective of our research work is to investigate the recommendation system-based Software Requirements Elicitation Process (SREP) in which stakeholders having similar interest in terms of their needs are identified for eliciting the functional and non-functional requirements of an information system without any discordances among them. For the elicitation of the requirements of an information system, the goal-oriented method has been applied in which an AND/OR graph is constructed for the representation of different types of goals and requirements. In practical applications, decision makers specify their opinions on requirements using linguistic variables rather than crisp values and choosing the requirements based on various criteria creates a multi-criteria decision-making problem. Thus, in this Thesis three methodologies have been proposed to strengthen the recommendation system-based requirements elicitation process. The first methodology is a goal-oriented method for eliciting the functional and non-functional goals and requirements of an information system in which similar stakeholders have been identified using FBACSM. Based on the similarities of stakeholders, the requirements of an information system are identified after decomposing the high-level objectives into sub-goals. These sub-goals are then further decomposed and refined into sub-goals and as a result an AND/OR graph is constructed to identify the dependencies among the sub-goals and requirements. The usefulness of the proposed method is explained by considering the stakeholders and goals of Library Information System (LIS). The fuzzy and rough-set theory have been applied in the second methodology for the detection of discordances among the stakeholders during the requirements elicitation process of an information system. The applicability of the proposed method is discussed by considering the two case-studies. The first case study emphasises on the detection of requirements discordances among the stakeholders of LIS using $L^{-1}R^{-1}$ inverse arithmetic principle and the "graded mean integration representation" using triangular fuzzy numbers. In the second case study, the rough numbers are generated for detecting discordances among the stakeholders and also to compute the ranking order of the requirements of LIS. The proposed method is compared with the state-of-the-art methods based on (a) agreement measure and (b) computational complexity. The third methodology focusses on the development of a recommendation system. i.e., $PRecSys$, for identifying the ranking order of requirements of an information system in which FBACSM and collaborative filtering have been used for suggesting the requirements to stakeholders with similar interests. The order of information systems requirements in $PRecSys$ is determined by applying the fuzzy Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). The importance of $PRecSys$ is discussed by considering the requirements of LIS and the results are compared with PHandler, an expert system for requirement selection, using the following criteria: (a) agreement measure, (b) quantity of judgments by decision-makers, and (c) time complexity.