ABSTRACT

Software requirements engineering is the science and development that deals with analyzing and documenting requirements. Software requirements engineering must be determined and agreed by the users, suppliers and customers of a software product. The product development clearly and precisely achieves the software requirements. Requirement validation is the process of ensuring the requirement specification with the user needs, system requirements, document standards and suitable architecture design. A stakeholder is an organization or an individual or a team and having an interest in the system realization. The categories of stakeholder include end users, managers and others involved in the organizational processes, engineers responsible for system maintenance development.

A lot of preprocessing effort is required in software engineering to turn the raw character data into a sufficiently interpreted format. Generally, the requirement processing involves cleaning, normalization, transformation, feature extraction and selection. Feature selection plays an essential role in software requirements engineering. In this process, a subset of original features is selected, which includes the processes namely, subset generation, evaluation, stopping criterion and result validation. Feature selection is a process of identifying the most promising features in a given RALIC dataset and used to find the important attributes and remove the redundant ones. Moreover, the dimensionality reduction process is also performed during the feature selection process in order to reduce the feature cost. In this work, a hybrid approach is employed for selecting the reduced set of features, which takes the advantage of the filter and wrapper models by developing their different evaluation criteria at various stages.
After selecting the features, the classification process is performed according to the virtual content of the data. The key point of the classification process is to identify the issues of data owners. Here, a Fuzzy Rule Based Classification (FRBC) algorithm is applied to extract the required features. This classification system is included in this analysis for representing the software requirements. Hence, the Bayesian network formation is applied to assign the stakeholders as nodes. Bayesian networks are well-known artificial intelligence techniques suitable in handling decision-making problems involving ambiguity.

After forming the network, the cluster similarities among the stakeholders are determined based on the Jaccard similarity measure. The collected requirements from the stakeholders are decomposed based on the common characteristics by using a Stake Requirement Clustering Algorithm (SRCA). The resultant cluster of stakeholder’s requirements provides more accurate and well-organized requirements to model the cluster. Risk minimization in the context of software engineering requires the understanding of software assurance and security engineering. Here, a Direct Acyclic Graph (DAG) method is proposed to optimize the software requirements. Software risk management is an effective tool for analyzing and mitigating the risks in a software module. Finally, the performance of the research work is evaluated in terms of accuracy, precision, recall, scalability and reliability.