An Improved Recommender System for Requirement Engineering Using an Efficient Semantical Method Integrated with a Novel Unified Requirement Writing Style

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Abstract

Requirement gathering process is the foundation of the construction of any system and it is a critical step in software engineering. However, this task is still a challenge to the success of the system, due to the fact that the high quality of gathered requirements will lead to an increase in the chance of the system's success. Many works proposed solutions to improve requirement gathering, but it is important to further improve the requirement gathering completeness. Recently, some works included artificial intelligence techniques, however, they did not consider the semantical relationship between the requirements. In addition, their works were only limited to dealing with words and nouns. no consideration was given to dealing with full sentences or adjectives. Furthermore, all the previous studies were utilizing the classical Apriori algorithm as known for its suffering from many negative aspects and limitations. Recommendation systems for requirements engineering will help

requirements engineers to get the right details at the right time. In this thesis, a novel efficient recommender system for requirement engineering was proposed, such a recommender system would contribute to considering the semantical relationships between requirements and, will handle with the full sentences and adjectives. In addition, as a part of this work this thesis improved the Apriori algorithm. Moreover, to increase the accuracy of the obtained requirements and produce more comprehensive results two novel similarities used the first one is the System-System Similarity, and the second one is the Requirement-System Max Similarity. In order to calculate these two similarities, two base similarities, which are cosine similarity and semantic similarity are using. This thesis also proposed a unified novel writing style for requirements. Conducted experiments in this work prove that the improved Apriori outperformed Apriori in terms of execution time and the number of requirements scanned, while our recommender system was efficient in terms of training time and accuracy, and can be widely implemented.