Software Recommendation of Application Market by Semantic Network and Multi-Criteria Decision Analysis

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Abstract. In software as a service (SaaS) model, application market provides various software services for users to access. However, large amount of software services are difficult to choose because of few attributes and incomplete description to illustrate their functionality. Besides, the fetch results from application market may not match user preference and waste user much time to get the desired software service. In this work, we propose an approach to improve software service searching effectiveness in an application market. Several advanced techniques are enforced. Information retrieval technology analyzes the description of a software service to get its key concepts. The association rule mining technology discovers the hidden association between various software service key concepts. The relationships of software service key concepts and discovered association rules are built a semantic network to connect relevant key concepts of software services. After configuring the software service attributes for quality of service consideration, the multi-criteria decision analysis is used to get the ranking order of the candidate software services. The software services key concepts, discovered association rules, semantic network, and multi-criteria decision analysis approach are built a recommendation system. User gets the reasonable software service based the ranking order of candidates from the recommendation system. We hope the proposed approach facilitates user to get the software service effectively in a popular application market.

Keywords: software as a service, application market, semantic network, multi-criteria decision analysis, software recommendation.

1 Introduction

Application market [1], e.g., Apple store, Google Play, Windows Marketplace of Microsoft, provides various software services (Apps) for user to access. Huge amount of software services are produced and promoted day by day, e.g., over one million software services are appeared in Google Play nowadays. User access an application market to get software services promoting mobile commerce for society, education,
entertainment, and job, etc. However, an application market provides incomplete description and few attributes of a software service to illustrate its functionality. User may waste much time to search a software service and not easy to select a desired one. Getting a desired App from huge amount of software services in an application market becomes a challenge. The fetched software service which matches a user preference is also a key concern to keep the user loyalty of a specific application market.

Incomplete description of a software service requires more relevant information to reinforce its functionality representation. Information retrieval technology [2] analyzes the semi-structure of the incomplete description to get the key concepts of a specific software service. A semantic network is built to connect the key concepts of various software services. Besides, some relationship may hidden between the key concepts of various software services. Association rule mining [3, 4] discovers the hidden relationship between the key concepts of various software services. The discovered knowledge rules are used to reinforce the semantic network to construct more key concepts connection [5]. Attributes of software services are the clues for a user to search and get a desired software service. Based on the quality of service (QoS) consideration, a user may evaluate some attribute value as criteria to select a reasonable software service from various candidates. According to the various issues of interest, multi-criteria decision analysis (MCDA) helps user to select a reasonable software service from huge number of candidate software services [6]. A multi-criteria decision analysis is an approach which structures and solves the multi-dimensional and complicated problems, especially the decision and planning problems involving multiple criteria. Generally speaking, such problems do not own a unique optimal solution, so a decision maker needs to use his/her preferences to differentiate between various solutions. Therefore, a multi-criteria decision analysis approach formulates the selection order of the various candidate software services to optimize the user’s ability to get a reasonable software service [7].

This work presents an approach to improve software service searching effectiveness in an application market. Several advanced techniques are enforced. Information retrieval technology analyzes the incomplete description of a software service to get its key concepts. The association rule mining technology discovers the hidden relationship between key concepts of various software services. The key concepts of software services and discovered association rules are built a semantic network to connect relevant key concepts of software services. After configuring the software service attributes for quality of service (QoS) consideration, the multi-criteria decision analysis is used to evaluate the ranking order of the candidate software services. The key concepts of software services, discovered association rules, semantic network, and multi-criteria decision analysis approach are built a recommendation system. User searches and gets the reasonable software service based the ranking order of candidates from the recommendation system.

The rest of this paper is organized as follows. Section 2 reviews pertinent literature on cloud service, application market, association rule mining, and multi-criteria decision analysis. Section 3 then introduces the proposed approach to improve software service searching effectiveness in an application market. Conclusions are finally, drawn in Section 4, along with experiments for future research.