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WEB SERVICE RECOMMENDATION SYSTEMS WITH REPUTATION EVALUATION AND MALICIOUS FEEDBACK ESTIMATION PREVENTION

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Abstract: - Reputation of Web services is a broadly-active metric that defines whether the service should be suggested to a user. Web service recommendation systems can help service clients to discover the exact service from the huge number of accessible Web services. The service reputation mark is usually considered using response ratings delivered by users. The system proposes a unique reputation measurement method for Web service recommendations. The experimental outcomes confirm that the proposed measurement method can decrease the deviance of the reputation measurement and improve the success percentage of the Web service recommendation. We also present a system which identifies malicious feedback ratings by assuming the Cumulative Sum Control Chart, and then it diminishes the effect of individual user feedback references retaining the Pearson Correlation Coefficient. This system gives demand to preserve malicious feedback ratings and it suggestion for malicious feedback rating prevention scheme employing Bloom filtering to increase the recommendation achievement. The consequences show that the planned measurement method can lessen the deviance of the reputation measurement and improve the success ratio of the Web service recommendation. Reputation of Web services is a widely-employed metric that determines whether the service should be recommended to a user. Experiments are conducted by employing a real feedback rating dataset service records. Results show that our proposed measurement approach can reduce the deviation of the reputation measurement and enhance the success ratio of the Web service recommendation.

Keywords: Bloom Filter, prefix span, Quality of Service, feedback rating

1. Introduction

Authors Reputation is a subjective assessment of a characteristic or an attribute ascribed to one entity by another based on observations or past experiences. In social networks, experiences from more than one source are assimilated to derive the reputation. Similarly, in-service-oriented environments, we refer to the aggregated perceptions that the community of service requesters have for a given Web service as service reputation. However, requesters 'perceptions may not be always available [1]. For example, when a service is initially registered for business, no service has interacted with it and there is no record of its past behaviour.

In service-oriented environments where honest and malicious service providers co-exist, finding the exact balance between fairness and accuracy for reputation bootstrapping is non-trivial [2]. For instance, a malicious service provider may attempt to clear its (negative) reputation history by discarding its original identity and entering the system with a new one. In contrast, a service provider may be entering the system for the first time without any malicious motives.

Web Service recommendation systems can be employed to recommend the optimal Web service for satisfying user's requirements [3]. Service recommendation is helpful for users when two or more Web services have the same functionality but different Quality-of-Service (QoS) performance. QoS is defined as a set of non-functional properties, including reputation, response time, reliability, etc. Web service recommendation can provide the user with necessary information to help decide which Web service should be selected. Web service technologies create an environment where users and applications can search and compose services in an automatic and seamless manner [4]. In the service-oriented environment where everybody is allowed to offer services, it is natural that there will be numerous offers of services providing equivalent or similar functionality. Most QoS-aware Web service recommendation schemes are based on the qualities promised by service providers. However, service providers may fail partially or fully in delivering the promised quality at runtime. It is not an easy task since some service providers may not fulfil their promised service quality.

The reputation of Web service needs to be considered when making a service selection. Web service reputation is regarded as a metric of its future behaviour [5]. It is a collective measurement of the opinions of a community of users regarding their actual experience with the Web service. It is computed as an aggregation of users' feedback ratings over a specific period of time (a sample interval) and reflects the reliability, trustworthiness, and credibility of the Web service and its provider. With the Web service reputation taken into consideration, the probability of recommending the optimal service and the success ratio of the composite services can be increased [6]. However, as it is not realistic to assure that the user feedback ratings are fairly accurate and non-malicious; several studies have recognized the importance of reputation measurements of Web services. The proposed solutions employ different techniques to measure Web service reputations based on user feedback ratings.

Web services that span diverse organizations and computing platforms can be composed to create new, value-added service oriented applications efficiently. However, some Web services may act maliciously. Hence, a key requirement is to provide an effective mechanism in recommending trustworthy services for users. In our precedent systems with an increasing number of Web services providing similar functionalities, Quality of Service (QoS) is becoming an important criteria on for selection of the best service. The whole Description, Discovery and Integration (UDDI) registries do not have the ability to publish the QoS [7]. If multiple Web services provide the same functionality, then a Quality of Service (QoS) requirement can be used as a secondary criterion for service selection.

The system proposes a Web services discovery model that contains an extended UDDI to accommodate the QoS information, a reputation management system to build and maintain service reputations, and a discovery agent to facilitate the service discovery. This algorithm finds a set of services that match the consumer and reputation scores, and finally returns the top M services (M indicates the maximum number of services to be returned) based on the consumer's preferences in the service discovery request.

The system proposes a model of reputation-enhanced QoS based Web services discovery that combines an augmented UDDI registry to publish the QoS information and a reputation manager to assign reputation scores to the services based on customer feedback of their performance. Reputation scores in a service matching, ranking and selection algorithm discovers agent facilities which is QoS based. Malicious and subjective user feedback ratings often lead to a bias that degrades the performance of the service recommendation system [8]. It is difficult to ensure the purity of user feedback ratings because of the existence of malicious users. Existing malicious feedback behaviours then, the model cannot obtain the deserved reputation value.

- For mischievous feedback ratings, malicious clients often conspire with other users, so TMS cannot discover malicious feedback scores.
- The proposed prevention scheme cannot block malicious feedback rating with 100% probability because of these existing factors such as dynamic IP addresses.
- A feedback user with high trustworthiness is not consistently reliable and it also provides malicious feedback ratings for the illegal acquisition of economic benefits.

2. DIAGNOSING REPUTATION FEEDBACK USING BLOOM FILTER

Bloom filters are compact data structures for probabilistic representation of a set in order to support membership queries [9]. It's an algorithm helps to detect reputation feedback from online user. Our measurement approach can reduce the deviation of the reputation measurement and enhance the success ratio. The proposed solutions employ different techniques to measure Web service reputations based on user feedback ratings. We validate our proposed malicious feedback rating prevention scheme by providing theoretical analysis.

A reputation derivation model had also been proposed to aggregate feedbacks into a reputation value that better reflects the behaviour of the service at selection time. The Repository stores the reputation measured marks and provides the scores when requested by the recommendation method. The reputation represents a collective perception of the users in the community about a Web service, that is, the reputation of a given service is a collective feedback rating of the users that have interacted with or used the service in the past. Feedback rating is the perception of each user about invoked services. It could be a single value representing an overall perception or a vector representing a value for each QoS attribute of a Web service, such as a response time.

Our proposed measurement approach mainly contains two phases, i.e., a malicious feedback rating detection and a feedback rating adjustment. The first phase involves detecting malicious feedback ratings collected by a Data Collector using the Cumulative Sum Control Chart (called CUSUM).The second phase involves computing the feedback similarity of different users using the Pearson Correlation Coefficient to adjust the feedback ratings [10]. Finally, the Repository stores the reputation measured scores and provides the scores when requested by their commendation system.

Preventing the malicious feedback from the repository and providing a rating it also provides a prevention scheme. The main aim is it will cooperate to the proposed reputation measurement approach and enhance the recommendation system performance. In this identifying the IP addresses with the offending rating and filter them out. While achieving this, we employ a Bloom filter to prevent the anomalous feedback ratings. Bloom Filter is a data structure used for representing a set of messages succinctly, and is widely used for different purposes of Internet applications.

The key of the prevention is to identify the IP addresses that are associated with malicious feedback ratings, and then inform the service broker to block malicious users from rating these Web services. The system first detects malicious feedback ratings by adopting the Cumulative Sum Chart which then we reduce the subjective user feedback preferences employing the Pearson Correlation Coefficient. In order for malicious feedback rating to defend, a proposed malicious feedback rating prevention scheme employed Bloom filtering to enhance the recommendation performance. If the Web service recommendation system cannot prevent malicious feedback ratings if it causes any effective reputation measurement approach then the process will become invalid since these malicious feedback ratings suppress being feedback ratings. Hence, an effective malicious feedback rating prevention scheme is very essential for the reputation measurement of Web services [11].

The system proposes a reputation measurement approach to reduce the deviation of the reputation measurement of Web services and to improve the success ratio of the service recommendation. Our proposed measurement approach can reduce the deviation of the reputation measurement and enhance the success [12]. We validate our proposed malicious feedback rating prevention scheme through analysing the proposed measurement.

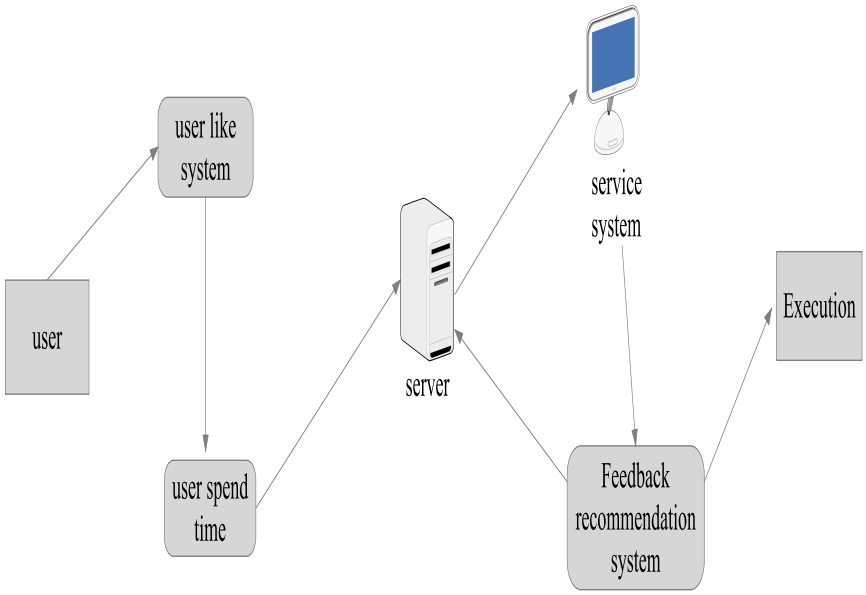

Figure. 1. Feedback Recommendation Architecture.

3. TESTING TECHNIQUES USED FOR DETECTING REPUTATION

The purpose of testing is to find bugs. Every conceivable fault or weakness in a work product can be tested. A way to check the functionality of components is a complete sub-assembly, assemblies and finished product. The process of exercising the software ensuring system meets its requirements and user expectations and does not fail in an unacceptable manner [13]. We have also used some testing techniques to be followed for detecting the major reputation and perpetual applications. Some of various tests are.

3.1 Unit Testing

Unit testing involves the design of test cases that validate that the internal program logic functions in proper way and that program inputs produce valid outputs. Each and every decision branches and internal code flow should be validated [14]. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration.

3.2 Functional Testing

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals. Functional testing is centred on the following items like valid Input that is identified classes of valid input must be accepted. Invalid Input is identified classes of invalid input should get rejected. Function should be identified and exercised. Application output is identified classes of outputs are exposed. Systems/Procedures have interfacing systems or procedures must be invoked.

3.3 White Box testing

White Box Testing is a testing in which in which the software tester knows about the software, structure and language of the software, or at least its purpose. The test areas cannot be as inner workings language of module is being built

4. Measuring, Detecting and comparing of feedback

The reputation of a given service is a collective feedback rating of the users that have interacted with or used the service in the past. It could be a single value representing an overall perception or a vector representing a value for each QoS attribute service request to the recommendation system. With a Service Level Agreement (SLA) between a user and a service provider, the recommendation system collects the feedback rating and other feedback ratings from other users with a Data Collector.

To detect and handle the malicious feedback ratings, including positive malicious feedback ratings. A negative malicious feedback rating detection is similar to a positive malicious feedback rating. According to the literature assume that the change feedback rating traffic is an independent Gaussian distribution with a known variance. The assumption remains the same after the change. The proposed measurement approach, to actually measure the reputation of each, the feedback ratings associated detecting malicious feedback ratings and adjusting the subjective feedback ratings. This ensures that detects malicious feedback ratings in a timely manner. When the number of feedback ratings is very little or none it is impossible to obtain an ideal reputation for each service.

When the positive malicious feedback rating percentage increases then the deviations will be larger than this relationship that exaggerates the actual reputation value of the service and deceive or mislead users. Increasing number of positive malicious feedback ratings, it still has good performance. The deviation of our approach is much smaller than those of the other approaches. We also choose to use simulation to generate feedback ratings because it enables us to study large-scale malicious and subjective feedback ratings of the reputation measurements. To investigate the performance of the reputation measurement for different feedback ratings the theoretical analysis indicates the efficiency of the proposed prevention scheme in blocking malicious feedback ratings.

A model of reputation-enhanced Web services discovery which is QoS based. Augmented UDDI registry to publish the QoS information and a reputation manager to assign reputation scores to the services based on customer feedback of their performance. The algorithm used finds a set of services that match the consumer. Finally returns the top M services based on the consumer's preferences in the service discovery request.

The system assumes service markets where services are accessed according to service-level agreements (SLAs).SLAs are advertised in directories by service providers. ASLA identifies the service provider and includes information concerning service functionality and grounding, which maybe specified in formalism such as WSDL, OWL-S, or WSMO. Moreover, a SLA specifies the conditions of service delivery as well as Quality

of Service (QoS) parameters (e.g., maxi-mum response time). Languages such as Web Service Level Agreements (WSLA3) or WS-Agreement may be used to specify such non-functional properties. In this paper they introduce an alternative QoS monitoring mechanisms based on feedback provided by clients. In this solution, the clients are running the monitoring code, and periodically report feedback to a trusted centre (referred to as the reputation mechanism or RM). The RM aggregates the reports and estimates the delivered QoS for each provider.

The Software as a Service (SaaS) model, where software is delivered on-demand and priced on-use, has been made possible by the widespread adoption of fast Internet access provider, which is combined acceptance of SOA based solutions. By reducing the cost of ownership and alleviating the burden of software installation and maintenance, SaaS has gained popularity in recent years

This paper introduces a framework for reputation-aware software service selection and rating. The key characteristic of the proposed framework is to automate both the selection and the rating of software services, in this way not only alleviating a potentially tedious and time-consuming task, but also increasing the objectivity of the service quality reports. The ultimate aim underlying the development of the framework is to reduce at selection time the risk associated with the utilization of external software services in development projects. The service selection algorithm acts as a user-centric and reputation-aware service recommender while determining a service's suitability to a particular user's preferences in terms of quality and cost.

In this paper they describe a recommender system for online dating agency, benchmark algorithms on real world dataset and perform a study with real users to evaluate the quality of recommendations. Presented improvement in online dating and matchmaking has many benefits for users of the service as well as for the owners. These benefits include higher user satisfaction and loyalty, and also a better monetization of the service. Users of online dating sites are facing information over load that requires them to manually construct queries and browse huge amount of matching user profiles.

5. CONCLUSION

The service reputation score is usually calculated using feedback ratings provided by users. Although the reputation measurement of Web service has been studied in the recent literature, existing malicious and subjective user feedback ratings often lead to a bias that degrades the performance of the service recommendation system. In this paper a novel reputation measurement approach for Web service recommendations is possessed. The proposed reputation measurement approach utilizes malicious feedback rating detection and feedback similarity computation to measure the reputation of Web services. The efficiency of our proposed approach is evaluated and validated by the theoretical analysis and extensive experiments. Through the experimental results we show that our proposed approach can accomplish a trust worthy reputation measurement of Web services and greatly improve the service recommendation process.

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