Data Analytics and Artificial Intelligence
Vol: 2(5), 2022
REST Publisher; ISBN: 978-81-948459-4-2
Website: http://restpublisher.com/book-series/data-analytics-and-artificial-intelligence/

Big data-Space Service Selection Using Stression Matrix Multiplication and Weight Related Measures with Qos Preferences

* **L. Thenmozhi, N. Chandrakala**
MGR College, Hosur, Tamilnadu, India
*Corresponding author Email: thenmozhilakshmanan@gmail.com

Abstract. As the variety of Cloud offerings is developing at a brilliant speed, there's increasingly provider vendors providing comparable functionalities. It becomes significantly important to choose products with consumer- preferred non-functional features (NFPs), yet doing so raises several Big Data-related research issues. First, a significant amount of provider NFP information must be taken into account during the choice selection process. Second, both qualitative and quantitative options from the perspective of the provider should be reflected in the choice of the consumer. Third, there is an excessive amount of unpredictability in NFPs as a result of the community's and providers' load uncertainty. Fourth, it adds a veracity measurement to the NFPs of offerings since they think that values of provider NFPs are obtained through historical customer feedbacks. Fifth, many selection targets, occasionally at odds with one another, must be balanced to choose the most advantageous supplier. An effective provider selection method is required that can manage all of the aforementioned Big Data challenges in a comprehensive manner in order to address the extremely many QoS issues with significant unpredictability as well as the trust-related issues promoting statistics accuracy. Existing studies are aware of users' QoS options and their belief concerns, but they are unable to provide a scientific method to incorporate both standards into the decision- making process. In this paper, we address heterogeneous preference and belief-based provider selection by developing a novel multi-goal optimization method with inclusion of stression matrix and alternative stression matrix selection among provider's belief rate and customer's QoS choice to rank candidate Cloud offerings based entirely on their levels of compliance with users' requirements. For the purpose of evaluating the performance and efficacy of the suggested method, we conducted a number of extensive experiments.
Keywords: Bigdata, Cloud computing, Stression matrix, noval stression, QoS Preferences

1. Introduction

With the arrival of Cloud computing, swiftly growing internet-primarily based totally utility programming interfaces (APIs) play a substantial position with inside the impending Big Data Web environment [1]. More and greater enterprise packages are migrated to the Cloud stimulated with the aid of using the booming cloud computing [2].The Cloud offerings have a huge sort of features with inside the API economy. Even for the Cloud offerings retaining similar (or maybe identical) functionalities, the Quality of Service (QoS) is pretty one-of-a-kind and ranging with time. The authenticity of QoS declared through provider companies is likewise pretty tough to be identified [3]. The Cloud provider software dreams for making certain the long-time period QoS through provider selection [4]. Consequently, some of normal Big Data demanding situations get up for a carrier person, functionality-primarily based totally carrier choice trouble has been intensively investigated [9], [10]. Nonetheless, the hastily boom of offerings competing to provide fast-developing provider data, which make it's far a hard and complicated mission for a user (e.g., carrier consumer, a service based utility developer, etc.) to pick a maximum suitable carrier below the large carrier space [5], [6], [7]. When a person asks for a Cloud carrier, the necessities are normally diverse [8]. After purposeful necessities are satisfied, a person may also pay extra interest to NFPs associated necessities. Specifically, the NFPs of a Cloud carrier particularly comprise QoS and person comments for carrier accept as true with. In unique carrier choice scenarios, a few customers pay extra interest to their QoS possibilities even as others care extra approximately carrier's accept as true with. More often, maximum customers positioned the equal emphasis on QoS possibilities and accept as true with residences in carrier choice. To choose the maximum suitable Cloud offerings comparable functionalities poses essential Big Data demanding situations for carrier choice which want to address numerous person necessities with large scale enormously numerous QoS data, even as the veracity of accept as true with is difficult to be guaranteed [11], [12], [13], [14], [15], [16], [17]. Existing NFPs-orientated provider choice methods especially awareness on: (1) user's choice for QoS and (2) provider's believe residences, separately. These methods seldom concurrently take the above styles of NFPs into consideration, that's preferred through maximum provider users [18], [19], [20]. Specially, choice-primarily based totally provider choice methods especially guide user's qualitative or quantitative QoS preferences [21], [22], [23], [24]. However, qualitative and quantitative QoS residences are commonly modeled and taken into consideration separately. Due to constrained quantity of QoS residences with comparable size strategies below consideration, the requirement models, QoS metrics, in addition to the provider choice methods will fall brief whilst a huge range of QoS attributes been taken into consideration. On the opposite hand, trust based carrier choice [25], [26], [27], [28], [29], [30], as some other warm subject matter extensively investigated through carrier computing researchers, has evolved a few metrics for setting up agree with, reputation, and referral among buying and selling partners. However, agree with is normally taken into consideration independently from consumer's QoS choice whilst managing their requests. The Big Data Cloud carrier surroundings makes powerful carrier choice extra challenging. First, a consumer can also additionally pick a carrier maintaining a excessive agree with value, however s/he can also additionally dislike the carrier as its fee may match past his/her price range or different QoS properties (e.g., reaction time or platform style) couldn't satisfy the consumer's choice. Second, despite the fact that a carrier fulfills the consumer's QoS choice, it can now no longer be decided on through a consumer if it isn't trustworthy. Third, because of the excessive variability of QoS and unsure veracity of agree with, best through together thinking about the 2 dimensions of QoS and agree with, are we able to assure the worldwide optimization of a Cloud carrier choice decision. As a result, a possible carrier choice answer needs to take each QoS choice and carrier agree with into account. We gift the subsequent Cloud carrier choice situation to encourage the proposed work. In short, we should always take into account each of the user's qualitative and quantitative preferences at the side of the trust of services within the service choice method as solely via this manner will we decide the most effective service to fulfill user necessities. Cloud service selection once integration service trust with user QoS preference faces the subsequent huge information challenges that existing approaches fail to address:

- Volume: the amount of competitory functionally similar Cloud services is quick increasing. In addition, a lot of advanced user requirements on numerous side of NFPs of services can more expand the dimensions of information to be processed and lead to a high procedure quality for service choice;
- Variety: the various qualitative/quantitative QoS properties and repair trust demand a consistent metric to mixture various NFPs necessities;
- Variability/Veracity: The variability of QoS and unsure truthfulness of trust values create it difficult to come to a decision what information to use, that more complicates the service selection process. There might also be some conflicts among multiple user requirements in QoS properties and services' trust;
- Multi-objective Decision: The preceding "4V" options make it tough to be addressed via single objective decision for Cloud service selection. Trade- off choices need to be created to balance the multiple and generally conflicting objectives. it'll end in a high procedure overhead.

To handle the highlighted huge information challenges, we have a tendency to propose a unique approach that integrates trust with QoS preference (involving each qualitative and quantitative ones) via multi-objective improvement for effective service selection. we have a tendency to establish the subsequent contributions. we have a tendency to propose a scientific technique to process heterogeneous data of QoS preferences and repair trust. totally different NFPs may be evaluated by "QoS match degree" employing a uniform metric to evaluate however every property matches user requirements. Specifically, our method will deal with qualitative conditional preferences. we have a tendency to propose a multi-objective constrained technique for Cloud service choice, which might balance multiple call objectives of preference-, and trust-based service selection and handle conflicts among the various user necessities and decision objectives. we have a tendency to perform experiments on each artificial and real information sets to judge the effectiveness and potency of the projected approach. This paper was initial given in an exceedingly shortened kind as a conference paper in [30]. we have a tendency to more extend the theoretical analysis and gift a comprehensive framework for effective service selection below huge information environment. the rest of the paper is organized as follows.

Section 2: we have a tendency to offer the preliminary knowledge

Section 3: we have a tendency to introduce the projected service choice approach

Section 4: we gift our experimental studies

Section 5: we conclude and layout some vital future works.

2. Preliminary Knowledge

Finding of (Decision Matrix). The Decision Matrix [13] is a matrix that encompass all candidate services' QoS values,. In this paper, person choices include 3 aspects: (1) the restrictions on quantitative QoS belongings, (2) the conditional choice on qualitative QoS belongings, and (3) the relative significance approximately one QoS belongings to another. First, for quantitative QoS belongings, person regularly has constraint on every QoS belongings, which include reaction time [100ms, 200ms]. We count on the person's, this means that constraints on quantitative QoS belongings.

A Weight and Relevant feature calculation:

Web services W={w1,w2,w3 . ..wi}Qos attributes Q={a1,a2,a3,. aj}

For multiply the QoS matrix here we are usingstrassen multiplication

$$\begin{bmatrix} q_{1,1} q_{1,2} & \cdots & q_{i,j} \\ q_{2,1} q_{2,2} & \cdots & q_{2,j} \end{bmatrix}$$

$$E=\begin{bmatrix} q_{1,1} q_{1,2} & \cdots & q_{i,j} \\ q_{2,1} q_{2,2} & \cdots & q_{2,j} \\ . & . & . \\ . & . & . \\ . & . & . \\ q_{i,1} q_{i,2} & \cdots & q_{i,j} \end{bmatrix} \quad (1)$$

To calculate web service relevent_feature so We need the maximum normalized value of $Q_j$column Let L be the array where L={$l_1, l_2, l_3, \ldots, l_m$} with $1 \leq m \leq$ i

$$L(j) = \sum_{m}^{i} q_{m,i} \quad \text{.............................. (2)}$$

$$M_{i,j} = \frac{q_{i,j}}{\max (L(j))} \quad \text{.............................(3)}$$

$M_{i,j}$ *measures the difference from the maximum* Different Weight contribution denoted by {e1,e2,e3,.... ,e_j}

$$x_{i,j} = e_j \left| \frac{q_{i,j}}{\max (L(j))} \right| \quad \text{...................... (4)}$$

Weighted matrix denoted by E′

$$E' = \begin{bmatrix} e_{1,1} e_{1,2} & \cdots & e_{i,j} \\ e_{2,1} e_{2,2} & \cdots & e_{2,j} \\ . & . & . \\ . & . & . \\ . & . & . \\ e_{i,1} e_{i,2} & \cdots & e_{i,j} \end{bmatrix} \quad \text{......................(5)}$$

Depending upon the weighted matrix then the relevent feature will be calculated

$$\text{Relevent\_feature } (w)_i = \sum_{i=1}^{L} x_{i,j} \text{.............................. (6)}$$

Decision matrix selection based on the 2X2 matrixwhich will belongs to the concept has been givenbelow Stression method

m1=(a[0][0]+a[1][1])*(b[0][0]+b[1][1]);
m2=(a[1][0]+a[1][1])*b[0][0];
m3=a[0][0]*(b[0][1]-b[1][1]);
m4=a[1][1]*(b[1][0]-b[0][0]);
m5=b[1][1]*(a[0][0]+a[0][1]); m6=(a[1][0]-a[0][0])*(b[0][0]+b[0][1]);c[0][0]=m1-m4-m5+m7;
c[0][1]=m3+m5;
c[1][0]=m2+m4; c[1][1]=m1+m3-m2+m6;
naive stression methodc[0][0]=m1-m5-m6;
c[0][1]=m3+m5;
c[1][0]=m2+m4; c[1][1]=m1+m3-m2+m6;

comparing to the stression and naïve stression weknow the following results

1. number of multiplication reduced from 8 to 7
2. number of addition and subtraction also reduced

3. Experimental Studies

In this section, we carried out a few experiments to assess the carrier choice method proposed on this paper. To look at the applicability of our method in Big Data Cloud carrier-primarily based totally applications, the experiments goal at answering the subsequent studies questions (RQ).

- RQ 1: How approximately the effectiveness of the *norma*proposed method in phrases of consumer particularly whilst in comparison with aggressivemethods?
- RQ 2: How approximately the computationalcomplexity of such an incorporated carrier choice method?
- RQ 3: How approximately the computational complexity with decision matrix used?

4. Conclusion and Future Work

Cloud provider choice which bear in mind each consumer desire and provider poses some of Big Data demanding situations that current methods fail to address. To this end, this paper proposes an answer that takes into consideration each qualitative and quantitative consumer QoS desire with the provider accept as true with. To obtain the incorporated provider choice method and address the heterogeneous statistics, firstly, we suggest an powerful method to clear up inconsistencies of QoS properties; secondly, we element QoS Match Degree in each qualitative and quantitative preferences; lastly, we outline a linear weighting characteristic to rank how every provider fits the consumer's necessities and we estimate the variables of this characteristic thru a Multi-goal Constrained Model. We have additionally performed an experimental assessment to recognize the effect of the proposed answer at the execution of the application. The experimental outcomes exhibit that they're greater powerful than aggressive ones. This paintings may be prolonged withinside the following destiny directions: For actual life, servable provider carriers can also additionally lease a few malicious customers to offer very low rankings to different offerings that offer comparable functionalities, even as offering very excessive rankings to their personal offerings. The methods used for stopping malicious feedbacks in accept as true with and recognition primarily based totally provider choice (e.g., [11], [12]) ought to be incorporated with our method. The consumer profile (comparable customers) and utilization profile (invoked offerings) ought to additionally be taken into consideration. Some associated collaborative filtering methods may be taken into consideration to combine with our provider choice method. In future we planned to implement natural inspired algorithm for finding distance between web services with QoS factors such as throughput, response time and so on.

References

[1]. X. Huang, "Usageqos: Estimating the qos of web services through online user communities," ACM Transactions on the Web (TWEB), vol. 8, no. 1, p. 1, 2013.

[2]. Z. Wan, F. J. Meng, J. M. Xu, and P. Wang, "Service composition pattern generation for cloud migration: A graph similarity analysis approach," in 2014 IEEE International Conference on Web Services (ICWS). IEEE, 2014, pp. 321–328.

[3]. W. Dou, X. Zhang, J. Liu, and J. Chen, "Hiresome-ii: Towards privacy-aware cross-cloud service composition for big data applications," IEEE Transactions on Parallel and Distributed Systems, vol. 26, no. 2, pp. 455–466, 2015.

[4]. Z. Ye, A. Bouguettaya, and X. Zhou, "Economic model-driven cloud service composition," ACM Transactions on Internet Technology (TOIT), vol. 14,no. 2-3, p. 20, 2014.

[5]. S. Dustdar, R. Pichler, V. Savenkov, and H.-L. Truong, "Qualityaware service-oriented data integration: requirements, state of the art and open challenges," ACM SIGMOD Record, vol. 41, no. 1, pp. 11–19, 2012.

[6]. L. Sun, H. Dong, F. K. Hussain, O. K. Hussain, and E. Chang, "Cloud service selection: State-of-the- art and future research directions," Journal ofNetwork and Computer Applications, vol. 45, pp. 134–150, 2014.

[7]. C. R. Rivero and H. M. Jamil, "Towards a novel model for distributed big data service composition using functional graph matching," in 2014 IEEE International Congress on Big Data (BigData Congress). IEEE, 2014, pp. 794–795.

[8]. A. V. Dastjerdi and R. Buyya, "Compatibility- aware cloud service composition under fuzzy preferences of users," IEEE Transactions on Cloud Computing, vol. 2, no. 1, pp. 1–13, 2014.

[9]. A. Bouguettaya, S. Nepal, W. Sherchan, X. Zhou, J. Wu, S. Chen, D. Liu, L. Li, H. Wang, and X. Liu, "End-to-end service support for mashups," IEEETransactions on Services Computing, vol. 3, no. 3, pp. 250–263, 2010.

[10]. Q. Yu, "Sparse functional representation for large scale service clustering," in ICSOC, 2012, pp. 468–483.

[11]. N. Limam and R. Boutaba, "Assessing software service quality and trustworthiness at selection time," IEEE Transactions on Software Engineering, vol. 36, no. 4, pp. 559–574, 2010.

[12]. M. Mehdi, N. Bouguila, and J. Bentahar, "Trust and reputation of web services through qos correlation lens (early access article)," IEEETransactions on Services Computing, 2015.

[13]. Y. Liu, A. H. H. Ngu, and L. Zeng, "Qos computation and policing in dynamic web service selection," in Proceedings of the 13th international conference on World Wide Web, 2004, pp. 66–73.

[14]. D. A. D'Mello and V. S. Ananthanarayana, "Dynamic selection mechanism for quality-of-service aware web services," Enterprise IS, vol. 4, no. 1, pp. 23–60, 2010.

[15]. C.-W. Hang and M. P. Singh, "Trustworthyserviceselection and composition,"ACM Transactions on Autonomous and Adaptive Systems (TAAS), vol. 6, no. 1, p. 5, 2011.

[16]. L. Li, Y. Wang et al., "Subjective trust inferencein composite services." in AAAI, 2010, pp. 1377– 1384.

[17]. T. Wu, W. Dou, C. Hu, and J. Chen, "Service mining for trusted service composition in cross-cloud environment (early access article)," IEEE SystemsJournal, 2014.

[18]. Z. Noorian, M. Fleming, and S. Marsh, "Preference-oriented qosbased service discovery with dynamic trust and reputation management," in Proceedings of the 27th Annual ACM Symposium on Applied Computing, 2012, pp. 2014–2021.

[19]. H. Gao, J. Yan, and Y. Mu, "Trust-oriented qos- aware composite service selection based on genetic algorithms," Concurrency and Computation: Practice and Experience, vol. 26, no. 2, pp. 500–515, 2014.

[20]. B. Ye, A. Pervez, M. Ghavami, and M. Nekovee, "A trust-based model for quality of web service," in The Fifth International Conferences on Advanced Service Computing, SERVICE COMPUTATION 2013, 2013, pp. 39–45.

[21]. M. Palmonari, M. Comerio, and F. De Paoli, "Effective and flexible nfp-based ranking of web services," in 7th International Joint Conference,ICSOC-ServiceWave 2009, 2009, pp. 546–560.

[22]. S. Lamparter, A. Ankolekar, R. Studer, and S. Grimm, "Preference based selection of highly configurable web

services," in Proceedings of the 16th international conference on World Wide Web, 2007, pp. 1013–1022.

[23]. J. El Hadad, M. Manouvrier, and M. Rukoz, "Tqos: Transactional and qos-aware selection algorithm for automatic web service composition," IEEE Transactions on Services Computing, vol. 3,no. 1, pp. 73–85, 2010.

[24]. L. Zeng, B. Benatallah, A. H. Ngu, M. Dumas, J. Kalagnanam, and H. Chang, "Qos-aware middleware for web services composition," IEEE Transactions onSoftware Engineering, vol. 30, no. 5, pp. 311–327, 2004.

[25]. O. A. Wahab, J. Bentahar, H. Otrok, and A. Mourad, "A survey on trust and reputation models for web services: Single, composite, and communities," Decision Support Systems, vol. 74, pp. 121–134, 2015.

[26]. J. Bentahar, B. Khosravifar, M. A. Serhani, and M. Alishahi, "On the analysis of reputation for agent- based web services," Expert Syst. Appl., vol. 39, no. 16, pp. 12 438–12 450, 2012.

[27]. C. Hang and M. Singh, "Selecting trustworthy service in serviceoriented environments," in 12th AAMAS Workshop on Trust in Agent Societies, 2009.

[28]. E. Maximilien and M. Singh, "Toward autonomic web services trust and selection," in Proceedings of the 2nd international conference on Service oriented computing, 2004, pp. 212–221.

[29]. G. Liu, Y. Wang, M. A. Orgun, and E.-P. Lim, "Finding the optimal social trust path for the selection of trustworthy service providers in complex social networks," IEEE Transactions on Services Computing, vol. 6, no. 2, pp. 152–167, April 2013.

[30]. Y. Wang and J. Vassileva, "Toward trust and reputation based web service selection: A survey," International Transactions on Systems Science and Applications, vol. 3, no. 2, pp. 118–132, 2007.

