

## **Survey on Improving Web Service Selection Results Through Exploring Service Usage History**

PoojaKumbhar<sup>1</sup>, Prof. G. S. Mate<sup>2</sup>

<sup>1</sup>(Computer, RSCOE SavitribaiPhule Pune University, India)

<sup>2</sup>(Information Technology, RSCOE SavitribaiPhule Pune University, India)

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**Abstract:** *Web Service mining has become one of the predominant areas of Service Oriented Architecture. Web service discovery methods include syntactic based system and semantic based system. In the proposed work, both syntactic and semantic based approach is followed. The most widely used recommender technique is collaborative filtering. In this paper, author have a tendency to propose a novel net service recommendation approach incorporating a user's potential QoS preferences and variety feature of user interests on net services. User's interests and QoS preferences on net services area unit initial deep-mined by exploring the online service usage history. Then author have a tendency to cipher uncountable net service candidates by measure their connection with historical and potential user interests, and their QoS utility. Author have a tendency to conjointly construct an online service graph supported the purposeful similarity between net services. Finally, to have a tendency to gift an innovative diversity-aware net service ranking algorithmic rule to rank the online service candidates based on their scores, and variety degrees derived from the online service graph. In depth experiments area unit conducted based mostly on a true world net service dataset, indicating that our planned net service recommendation approach considerably improves the quality of the advice results compared with existing strategies.*

**Keywords:** *Web service recommendation, diversity, user interest, QoS preference, service usage history.*

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### **I Introduction**

The primary goal of recommender's is to supply personalized recommendations thus on satisfy users' interests. A decent recommender system would provide less common papers that additionally draw the user's interest. though the user is powerfully fascinated by the papers written on a subject and also the recommender system is incredibly smart at ranking them so as of preference, it's a poor recommender system as a result of it shows similar pages repeatedly and not the varied one. Net service recommendation might be a way of proactively discovering and recommending applicable net services to finish users. Form of works is completed on service recommendation supported quality of service (QoS). Most of them used cooperative Filtering (CF) techniques, variety of them applied content-based approach, and plenty of them combined CF approach with content-based techniques. In recommender systems, once the k best recommendations unit of measurement very reasonably likes each other, many of them may even be useless to the user, and so the standard of k recommendations may even be very low. It's fascinating for a recommender system to return back a varied set of cases so as to produce the user with optimum coverage of the knowledge space. Currently, diversity is taken into consideration as very important as similarity in many existing recommender systems.

In recommender systems, once the k best recommendations are terribly the same as one another, several of them could be useless to the user, and so the utility of k recommendations may be terribly low. It's fascinating for a recommender system to come back a various set of cases so as to provide the user with optimum coverage of the data space [8]. Currently, diversity is taken into account as important as similarity in several existing recommender systems [9-12]. As an example, Zhou et al. [9] mentioned the diversity-accuracy perplexity of recommender systems, showing that hybrid methodology with diversity will improve the recommendation performance. Karl Waldemar Ziegler et al. [10] planned that recommendation are often improved through topic diversification. Supported these facts, we tend to argue that diversity is additionally a crucial feature in internet service recommendation systems. During this paper, we tend to propose a completely unique service recommendation approach by taking diversity into thought. Author tend to incorporate the useful connectedness, QoS utility, and variety options of internet services for recommending well diversified top-k services to users.

Typically, a recommender system compares a user profile to some reference characteristics, and seeks to predict the 'rating' or 'preference' that a user would offer to associate item. These ratings or preference may be collected either actively or passively. Active user profile assortment includes: asking a user to rate associate

item or product once usage, presenting 2 different things or product and asking user to rate them on a scale of ten. Passive user profile assortment includes: Recording users' history, analyzing his/her product purchased, analyzing social network profiles and discovering his/her likes and dislikes, etc [1]. Since multiple internet Services give same practicality, another parameter should be introduced to be set as a deciding factor. QoS is that the appropriate deciding issue, set of non-functional necessities like time interval, accessibility, throughput, convenience, etc. Current Universal description, discovery and Integration (UDDI) give support of internet Service retrieval by functional-requirement solely. Web Service mining supported cooperative Filtering and QoS is gaining importance [2].

## **II. Related Work**

Guosheng Kang, Mingdong Tang, Jianxun Liu, Xiaoqing Liu[1] propose a novel Web service recommendation approach incorporating a user's potential QoS preferences and diversity feature of user interests on Web services. User's interests and QoS preferences on Web services are first mined by exploring the Web service usage history. Then author compute scores of Web service candidates by measuring their relevance with historical and potential user interests, and their QoS utility. Author construct a Web service graph based on the functional similarity between Web services. Finally, they present an innovative diversity-aware Web service ranking algorithm to rank the Web service candidates based on their scores, and diversity degrees derived from the Web service graph. Zibin Zheng, Jieming Zhu [3] presented, with the prevalence of service computing and cloud computing, more and more services are emerging on the Internet, generating huge volume of data, such as trace logs, QoS information, service relationship, etc. The overwhelming service-generated data become too large and complex to be effectively processed by traditional approaches. How to store, manage, and create values from the service-oriented big data become an important research problem. On the other hand, with the increasingly large amount of data, a single infrastructure which provides common functionality for managing and analyzing different types of service-generated big data is urgently required.

Guosheng Kang, Jianxun Liu proposed a survey on [2] Recommending Web services that users are interested in becomes an interesting and challenging research problem. In this paper, it present AWSR (Active Web Service Recommendation), an effective Web service recommendation system based on users' usage history to actively recommend Web services to users. AWSR extracts user's functional interests and QoS preferences from his/her usage history. Similarity between user's functional interests and a candidate Web service is calculated first.

Neil Hurley, Mi Zhang presented a theory [4], for recommender systems that base their product rankings primarily on a measure of similarity between items and the user query, it can often happen that products on the recommendation list are highly similar to each other and lack diversity. In this article it argue that the motivation of diversity research is to increase the probability of retrieving unusual or novel items which are relevant to the user and introduce a methodology to evaluate their performance in terms of novel item retrieval.

Kenneth K. Fletcher, Xiaoqing F. Liu [5] proposed, for service users to get the best service that meet their requirements, they prefer to personalize their nonfunctional attributes, such as reliability and price. However, the personalization makes it challenging for service providers to completely meet users' preferences, because they have to deal with conflicting nonfunctional attributes when selecting services for users. With this in mind, users may sometimes want to explicitly specify their trade-offs among nonfunctional attributes to make their preferences known to service providers. Amin Jula, Elankovan Sundararajan [6] presented a paper, utilizing a systematic literature review; important questions that can be raised about the research performed in addressing the above-mentioned problem have been extracted and put forth. Then, by dividing the research into four main groups based on the problem-solving approaches and identifying the investigated quality of service parameters, intended objectives, and developing environments, beneficial results and statistics are obtained that can contribute to future research.

Deivamani Mallayya, Baskaran Ramachandran proposed [7] Even if the user is strongly interested in the papers written on a topic and the recommender system is very good at ranking them in order of preference, it is a poor recommender system because it shows similar pages repeatedly and not the diverse one. Proposed the framework allows the user to specify the local and global constraints for composite web services which improves flexibility. UPWSR algorithm identifies best fit services for each task in the user request and, by choosing the number of candidate services for each task, reduces the time to generate the composition plans. To tackle the problem of web service composition, QoS aware automatic web service composition (QAWSC) algorithm proposed in this paper is based on the QoS aspects of the web services and user preferences. The

proposed framework allows user to provide feedback about the composite service which improves the reputation of the services.

Syed IrfanYaqoob presented a survey [8] on QoS rankings gives valuable information for selection of optimal cloud service from a set of functionally equivalent service candidates. To obtain QoS values, real-world invocations on the service candidates are usually required and it's time-consuming and expensive. To avoid this expensive and time consuming real world service invocations, a novel framework for ranking of cloud services is proposed by taking the advantage of the past service usage experiences of other consumers. Yuhai Zhao, Ying Yin proposed [9], Web services often run on highly dynamic and changing environments, which generate huge volumes of data. Thus, it is impractical to monitor the change of every QoS parameter for the timely trigger precaution due to high computational costs associated with the process. To address the problem, this paper proposes an active service quality prediction method based on extreme learning machine. First, it extracts web service trace logs and QoS information from the service log and converts them into feature vectors. Second, by the proposed EC rules, it enabled to trigger the precaution of Quos as soon as possible with high confidence.

XiongLuo, HaoLuo presented a theory [10], Most of the traditional web service QoS prediction approaches are implemented only using a set of static model parameters with the help of designer's a priori knowledge. Unlike the traditional QoS prediction approaches, our algorithm in this paper is realized by incorporating approximate dynamic programming- (ADP-) based online parameter tuning strategy into the QoS prediction approach. Through online learning and optimization, the proposed approach provides the QoS prediction with automatic parameter tuning capability, and prior knowledge or identification of the prediction model is not required.

Prakash Kulkarni and Jose Borges[11] propose the novel Semantic Variable Length Markov Chain Model (SVLMC) that combines the fields of Web Usage Mining and Semantic Web by enriching the Markov transition probability matrix with rich semantic information extracted from Web pages.

Mingdong Tang, Yechun Jiang, Jianxun Liu, Xiaoqing (Frank) Liu [12] propose a method of location aware collaborative filtering to recommend Web services to users by incorporating locations of both users and services. Different from existing user-based collaborative filtering for finding similar users for a target user, instead of searching entire set of users, we concentrate on users physically near to the target user.

M. Alrifai, D. Skoutas, T. Risse[17] propose an approach based on the notion of skyline to effectively and efficiently select services for composition, reducing the number of candidate services to be considered. They also discuss how a provider can improve its service to become more competitive and increase its potential of being included in composite applications. They evaluate their approach experimentally using both real and synthetically generated datasets.

M. Klusch, B. Fries, K. Sycara[18] display a way to deal with cross breed semantic Web administration coordinating that supplements rationale based prevailing upon surmised coordinating in view of syntactic IR based likeness calculations. The half breed go between, called OWLS-MX, applies this way to deal with administrations and solicitations determined in OWL-S. Test aftereffects of measuring execution and versatility of distinctive variations of OWLS-MX demonstrate that under certain imperatives rationale based just ways to deal with OWLS administration I/O coordinating can be altogether beaten by cross breed ones.

Y. Liu, A. H. Ngu, L. Z. Zeng[24] presented their open, fair and dynamic QoS computation model for web services selection through implementation of and experimentation with a QoS registry in a hypothetical phone service provisioning market place application.

D. Goldberg, D. Nichols, B. M. Oki, D. Terry[26] propose the Tapestry exploratory mail framework created at the Xerox Palo Alto Research Center is predicated on the conviction that data separating can be more successful when people are included in the separating procedure. Embroidered artwork was intended to bolster both substance based separating and synergistic separating, which involves individuals teaming up to encourage one another perform sifting by recording their responses to archives they read. The responses are called annotations; they can be gotten to by other individuals' channels. Embroidered artwork is expected to handle any approaching stream of electronic records and serves both as a mail channel and vault; its parts are the indexer, record store, annotation store, filterer, little box, remailer, appraiser and peruser/program. Embroidered artwork's customer/server construction modeling, its different segments, and the Tapestry inquiry dialect are portrayed.

J. S. Breese, D. Heckerman, C. Kadie [27] describe several algorithms designed for this task, including techniques based on correlation coefficients, vector-based similarity calculations, and statistical Bayesian methods. They compare the predictive accuracy of the various methods in a set of representative

problem domains. They use two basic classes of evaluation metrics. The first characterizes accuracy over a set of individual predictions in terms of average absolute deviation. The second estimates the utility of a ranked list of suggested items.

B. Sarwar, G. Karypis, J. Konstan, J. Reidl [28] dissect diverse thing based suggestion era calculations. They investigate distinctive strategies for registering thing similitudes (e.g., thing relationship versus cosine likenesses between thing vectors) and distinctive procedures for getting suggestions from them (e.g., weighted total versus relapse model). At last, they tentatively assess their outcomes and contrast them with the essential k-closest neighbor approach. Their investigations propose that thing based calculations give significantly preferred execution over client based calculations, while in the meantime giving preferred quality over the best accessible client based calculations.

L. Qin, J. X. Yu, L. Chang [29] think about the differentiated top-k look issue. They characterize a general enhanced top-k seek issue that just considers the similitude of the query items themselves. They propose a system, such that most existing answers for topk question preparing can be stretched out effectively to handle enhanced top-k look, by just applying three new capacities, an adequate stop condition adequate(), a vital stop condition fundamental(), what's more, a calculation for differentiated top-k seek on the present set of produced results, div-look current(). They propose three new calculations, specifically, div-astar, div-dp, and div-slice to unravel the div-look current() issue. Dev-star is an A\* based calculation, div-dp is a calculation that breaks down the outcomes into segments which are sought utilizing div-astar freely and joined utilizing element programming. div-cut further breaks down the current set of created results utilizing cut focuses and joins the outcomes utilizing complex operation.

R.-H.Li, J.X.Yu[30] propose another differentiated positioning measure on expansive charts, which catches both significance and differences, and define the enhanced positioning issue as a submodular set capacity boost issue. Taking into account the submodularity of the proposed measure, they add to a productive voracious calculation with straight time and space many-sided quality w.r.t. the span of the diagram to accomplish close ideal broadened positioning. What's more, they present a summed up differentiated positioning measure and give a close ideal randomized ravenous calculation with direct time and space multifaceted nature for upgrading it. They assess the proposed techniques through broad examinations on five genuine datasets. The exploratory results exhibit the viability and productivity of the proposed calculations.

R. Agrawal, S. Gollapudi, A. Halverson, S. Jeong[31] propose an algorithm that well approximates this objective in general, and is provably optimal for a natural special case. Furthermore, we generalize several classical IR metrics, including NDCG, MRR, and MAP, to explicitly account for the value of diversification. We demonstrate empirically that our algorithm scores higher in these generalized metrics compared to results produced by commercial search engines.

Paper Name	Author	Proposed Work	Advantages	Disadvantages
Location-Aware Collaborative Filtering for QoS-Based Service Recommendation	M. Tang, Y. Jiang, J. Liu, X. Liu, 2012	Presents a location-aware collaborative filtering method for QoS value prediction and QoS-based Web service recommendation.	Outperforms existing collaborative filtering based recommendation methods by a significant improvement of both prediction effectiveness and efficiency	Not work on relationships among QoS factors into consideration and study how to incorporate them into QoS prediction.
Solving the apparent diversity-accuracy dilemma of recommender systems	T. Zhou, Z. Kucsik, J.-G. Liu, M. Medo, J. R. Wakeling, Y.-C. Zhang , 2010	Introduce a new algorithm specifically to address the challenge of diversity and show how it can be used to resolve this apparent dilemma when combined in an elegant hybrid With an accuracy-focused algorithm.	By tuning the hybrid appropriately we are able to obtain, without relying on any semantic or context-specific information, simultaneous gains in both accuracy and diversity of recommendations.	Optimized the hybrid from a global perspective, there is no reason why it cannot be Tuned differently for each individual user— either by the system provider or by users themselves.
RegionKNN: A Scalable Hybrid Collaborative	X. Chen, X. Liu, Z. Huang, H. Sun, 2010	Present RegionKNN, a novel hybrid collaborative filtering	Highly scalable and provides considerable improvement on the	Need to investigate more QoS properties and their variation with time

Filtering Algorithm for Personalized Web Service Recommendation		algorithm that is designed for large scale web service recommendation.	recommendation accuracy by comparing with other well known collaborative filtering algorithms.	
Novelty and diversity in top-n recommendation--analysis and evaluation	N. Hurley, M. Zhang. , 2011	Propose an Information Retrieval approach to the evaluation and enhancement of novelty and diversity in Recommender Systems.	focuses in the enhancement and evaluation of novelty and diversity in RS	Need to complement these off-line experiments with on-line tests where the different metric configurations are contrasted to actual user feedback on the recommendation quality and utility aspects we seek to measure.
A personalised search approach for web service recommendation".	R. Hu, W. Dou, J. Liu.	Here propose personalized QoS value prediction for service users by employing the available past user experiences of Web services from different users.	Web service recommender system helps users to select services with optimal Quality-of-Service (QoS) performance	Sometimes error may occur due to change in system.

### III. Architectural View

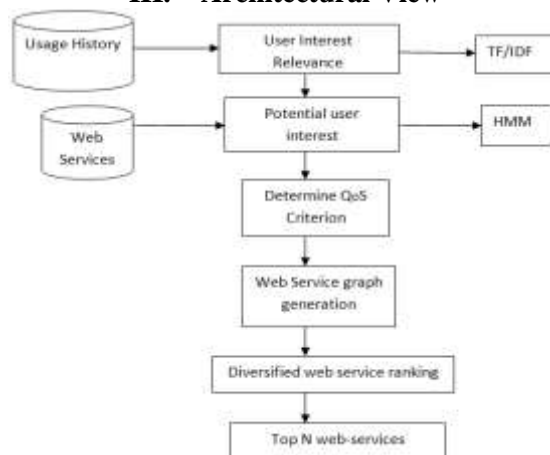


Figure. Architectural View of proposed system

The above diagram shows the architectural view of the proposed system, which we are proposed.

### IV. Conclusion

In this paper author bestowed net an internet an online Service recommendation approach with diversity to seek out desired web services for content users. Author's gives useful interest, QoS preference, and variety feature for recommending top-k heterogeneous net services. The top-k heterogeneous top-k services stratified list supported their useful connection and potential user interest connection, non useful connection like QoS quality and variety feature. Here shows that the projected approach improves the online service recommendation performance in terms of diversity, the mix of QoS utility, useful connection and therefore the heterogeneous ranking analysis. Web Service choice supported Hybrid cooperative Filtering and QoS-Trust analysis addresses numerous Collaborative Filtering issues specifically cold-start downside, gray sheep downside, word downside, ramp-up downside, shillings attack, information exiguity and measurability. Additionally it achieves improved precision-recall price, result accuracy and promising retrieval time. Author introduced a new QoS-based web service selection and ranking algorithm with trust and reputation management support. Author shown that our selection and ranking solution yields very good results in most cases. As the proposed reputation management mechanism is robust against various cheating behaviors, the results are

generally of good quality even in hostile situations in which many different types of cheaters make up a high percentage of the overall users and report values with remarkable variances.

### References

- [1] L. Zhang, J. Zhang, H. Cai. Services computing. Tsinghua University Press, Beijing, 2007.
- [2] Y. Jiang, J. Liu, M. Tang, X. Liu. "An effective Web service recommendation based on personalized collaborative filtering". Proceedings of International Conference on Web Services. IEEE Computer Society, pp. 211-218, 2011.
- [3] M. Tang, Y. Jiang, J. Liu, X. Liu. "Location-Aware Collaborative Filtering for QoS-Based Service Recommendation". Proceedings of International Conference on Web Services. IEEE Computer Society, pp. 202-209, 2012.
- [4] X. Chen, X. Liu, Z. Huang, H. Sun. "RegionKNN: a scalable hybrid collaborative filtering algorithm for personalized Web service recommendation". Proceedings of International Conference on Web Services. IEEE Computer Society, pp. 9-16, 2010.
- [5] Z. Zheng, H. Ma, M. R. Lyu, I. King. "Wsrec: a collaborative filtering based web service recommender system". Proceedings of International Conference on Web Services. IEEE Computer Society, pp. 437-444, 2009.
- [6] L. Shao, J. Zhang, Y. Wei, J. Zhao, B. Xie, H. Mei. "Personalized qos prediction for web services via collaborative filtering". Proceedings of International Conference on Web Services. IEEE Computer Society, pp. 439-446, 2007.
- [7] M. Gong, Z. Xu, L. Xu, Y. Li, L. Chen. "Recommending Web Service Based on User Relationships and Preferences". Proceedings of International Conference on Web Services. IEEE Computer Society, pp. 380-386, 2013.
- [8] S. M. Mcnee, J. Riedl, J. A. Konstan. "Being accurate is not enough: how accuracy metrics have hurt recommender systems". Proceedings of CHI06 extended abstracts on Human factors in computing systems. ACM, pp. 1097-1101, 2006.
- [9] T. Zhou, Z. Kuscisik, J.-G. Liu, M. Medo, J. R. Wakeling, Y.-C. Zhang. "Solving the apparent diversity-accuracy dilemma of recommender systems". Proceedings of the National Academy of Sciences, Vol. 107, No. 10, pp. 4511-4515, 2010.
- [10] C.-N. Ziegler, S. M. Mcnee, J. A. Konstan, G. Lausen. "Improving recommendation lists through topic diversification". Proceedings of Proceedings of the 14th international conference on World Wide Web. ACM, pp. 22-32, 2005.
- [11] B. Smyth, P. McClave. "Similarity vs. diversity". Case-Based Reasoning Research and Development Springer, pp. 347-361, 2001.
- [12] N. Hurley, M. Zhang. "Novelty and diversity in top-n recommendation--analysis and evaluation". ACM Transactions on Internet Technology (TOIT), Vol. 10, No. 4, pp. 14, 2011.
- [13] S. S. Yau, Y. Yin. "QoS-Based Service Ranking and Selection for Service-Based Systems". Proceedings of International Conference on Service Computing. IEEE Computer Society, pp. 56-63, 2011.
- [14] W. Lin, W. Dou, X. Luo, J. Chen. "A history record-based service optimization method for QoS-aware service composition". Proceedings of International Conference on Web Services. IEEE Computer Society, pp. 666-673, 2011.
- [15] G. Kang, J. Liu, M. Tang, X. F. Liu, K. K. Fletcher. "Web Service Selection for Resolving Conflicting Service Requests". Proceedings of International Conference on Web Services. IEEE Computer Society, pp. 387-394, 2011.
- [16] L. Qi, Y. Tang, W. Dou, J. Chen. "Combining local optimization and enumeration for QoS-aware Web service composition". Proceedings of International Conference on Web Services. IEEE Computer Society, pp. 34-41, 2010.
- [17] M. Alrifai, D. Skoutas, T. Risse. "Selecting skyline services for QoS-based web service composition". Proceedings of International World Wide Web Conference. ACM, pp. 11-20, 2010.
- [18] M. Klusch, B. Fries, K. Sycara. "Automated semantic web service discovery with OWLS-MX". Proceedings of Autonomous Agents and Multiagent Systems. ACM, pp. 915-922, 2006.
- [19] D. Lee, J. Kwon, S. Lee, S. Park, B. Hong. "Scalable and efficient web services composition based on a relational database". Journal of Systems and Software, Vol. 84, No. 12, pp. 2139-2155, 2011.
- [20] D. Ardagna, R. Mirandola. "Per-flow optimal service selection for Web services based processes". Journal of Systems and Software, Vol. 83, No. 8, pp. 1512-1523, 2010.
- [21] J. Wu, L. Chen, Z. Zheng, M. R. Lyu, Z. Wu. "Clustering Web services to facilitate service discovery". Knowledge and Information Systems, Vol. No., pp. 1-23, 2012.
- [22] G. Kang, J. Liu, M. Tang, X. Yu. "An Effective Dynamic Web Service Selection Strategy with Global Optimal QoS Based on Particle Swarm Optimization Algorithm". Proceedings of 2012 IEEE 26th International Parallel and Distributed Processing Symposium Workshops & PhD Forum (IPDPSW 2012). IEEE Computer Society, pp. 2274-2279, 2012.
- [23] G. Kang, J. Liu, M. Tang, B. Cao. "Web service selection algorithm based on principal component analysis". Journal of Electronics (China), Vol. 30, No. 2, pp. 1-9, 2012.
- [24] Y. Liu, A. H. Ngu, L. Z. Zeng. "QoS computation and policing in dynamic web service selection". Proceedings of In Proceedings of the International World Wide Web Conference. ACM, pp. 66-73, 2004.
- [25] S. Wang, C.-H. Hsu, Z. Liang, Q. Sun, F. Yang. "Multi-user web service selection based on multi-QoS prediction". Information Systems Frontiers, Vol. 16, No. 1, pp. 1-10, 2013.
- [26] D. Goldberg, D. Nichols, B. M. Oki, D. Terry. "Using collaborative filtering to weave an information tapestry". Communications of the ACM, Vol. 35, No. 12, pp. 61-70, 1992.
- [27] J. S. Breese, D. Heckerman, C. Kadie. "Empirical analysis of predictive algorithms for collaborative filtering". Proceedings of the Fourteenth conference on Uncertainty in artificial intelligence. Morgan Kaufmann Publishers Inc., pp. 43-52, 1998.
- [28] B. Sarwar, G. Karypis, J. Konstan, J. Reidl. "Item-based collaborative filtering recommendation algorithms". Proceedings of the 10th international conference on World Wide Web. ACM, pp. 285-295, 2001.
- [29] L. Qin, J. X. Yu, L. Chang. "Diversifying top-k results". the VLDB Endowment, Vol. 5, No. 11, pp. 1124-1135, 2012.
- [30] R.-H. Li, J. X. Yu. "Scalable diversified ranking on large graphs". Proceedings of 2011 IEEE 11th International Conference on Data Mining (ICDM). IEEE, pp. 1152-1157, 2011.
- [31] R. Agrawal, S. Gollapudi, A. Halverson, S. Ieong. "Diversifying search results". Proceedings of the Second ACM International Conference on Web Search and Data Mining. ACM, pp. 5-14, 2009.