

Knowledge Service Pattern of New Digital Library Combining Altmetrics

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Abstract. Starting from the influence of online scientific research era on digital library knowledge service, the paper expounds the new requirements of digital library users, which needs individualized service integrating relevant resources and combining swarm intelligence, and the academic achievements of academic social network relationship. The paper points out that digital library should obey new idea which means to provide academic social network service, knowledge service based on big data and resource filtering mechanism based on swarm intelligence. Based on analyzing the positioning of digital library in altmetricecosystem, the paper proposes novel knowledge service pattern of digital library. The pattern improves knowledge service capability from the perspective of user retrieval and personal push. Lastly, compared with the traditional digital library knowledge service pattern, the new knowledge service pattern has the characteristics of automation, dynamic, networked and transiting towards knowledge communicator, which is inherent with the concept of digital library.

Introduction

In recent years, under the support of Ministry of Culture and the friends of the circles, the digital library has developed rapidly in China [1]. Digital library is the information institution which not only saves electronic documents with the number format and transfers the digital information by computer and network, but also makes virtual link for the network information and provides service [2]. The normal format has transferred from digital library based on digital resource into digital library based on user information activities [3]. It can organize, integrate and embed digital information resource and information service around user information activity and user information system. The essential feature is to implement personalized customization, customizing and integration information according to user cluster or program, dynamic literature and dynamic digital library mechanism, supporting academic communication mechanism based on digital library and being embedded into user information environment. However, while transforming into digital library based on user information activities, the present personalized customization is mainly based on the analysis of the data for the users without considering the social network background of the scholars. Academic communication mechanism based on digital library has not formed, and there is contrast with the tendency of online scientific research and the popularity of academic social network. As the important features of the contemporary scientific community, social network and online scientific research has had deep influence on literature filtering mechanism and academic transmission mechanism, which brings new opportunities for knowledge service pattern of digital library. The writer starts from the influence of online scientific research on digital library, and excavates the new requirements and new idea of digital library user, and analyzes the functions and positioning of alter-metric ecosystem, based on which, the paper proposes novel knowledge service pattern of digital library combined with altermetrics. And the paper compares the new patter with traditional digital library knowledge service, for providing reference for the development of digital library in the future.

Influence of Online Scientific Research Era on Knowledge Service of Digital Library

In online scientific era, more and more scholars use online scientific research tools and communication platform to propagate, achieve and use academic achievements. The data of online scientific research process is recorded, analyzed and used for knowledge service. And only paying attention to the data used by the users for using digital library resources is not comprehensive.

New requirements of digital library users. User requirement is the source power and starting point for the digital library to improve knowledge service [7]. The emergence of online scientific research reflects the transformation of scientific research behavior pattern of users. (1) The users doesn't only require a literature or archives but the set of the relevant resources. For the retrieval of particular subjects, the resource collection expected by the users not only includes traditional literature such as paper and book, but also includes other types of academic achievements such as PPT, academic video, blogs and commentaries of well-known scholars. The resource network consisting of the resource set is good for the users to master the progress of the research comprehensively. (2) The users not only demands simple retrieval service, but also requires the service combining swarm intelligence. (3) The users not only need the retrieval results based on similarity matching algorithm, but also need academic results in social network relationship. The invisible academic communication of scientists is an important part of scientific research. The intangible academic communication is explicit now, that is, academic network of scientists. In the academic network, all academic achievements are positioned again. It is not a record in a specific database, but is a property of scholars. Therefore, while retrieving academic achievements, the digital library users need to embody the data of social network relationship for helping them to develop deep scientific cooperation. The new requirements of digital library users requires concept upgrade and pattern transformation of knowledge service of digital library.

New idea of digital library service. For the above new requirements of the users, digital library service should keep pace with the times. (1) Providing social network service for the scholars. (2) Providing knowledge service based on big data. (3) Providing the service of swarm intelligence as resource filtering mechanism.

Digital Library in Alter-metric Ecosystem

After knowing the new requirements of digital library users in online scientific research era, and the new service idea of digital library, the paper focuses on observing how to meet the new requirements of the users and realize new service idea of digital library. Altermetrics is the new research field of the transformation of the scientific research behavioral transformation of scientists in online scientific research era, and is the result of network metrology and science metrology. The research results provide good ways for achieving the above objectives. Based on expounding the connotation of altermetrics and alter-metric indicators, the paper analyzes the positioning of digital library in alter-metric ecosystem for the starting point of applying research achievements of altermetrics into knowledge service of digital library.

Content of altermetrics and alter-metric indicators. Altermetrics selects academic achievements under network environment as the research object, and achieves the objective of evaluating comprehensive influence of academic achievements and improving filtering efficiency of academic achievements by collecting many types of data to construct indicators. Altermetrics has the difference of narrow sense and broad sense [8]. Compared with new online metric indicators based on traditional citation index, the narrow altermetrics focuses on metric indicators based on social network data. The broad altermetrics emphasizes the variation of research perspective, which means comprehensive influence evaluation indicator system based on academic achievements. It aims at replacing traditional quantitative scientific research evaluation system depending on citation indicator, and promoting comprehensive development of science and online communication. Altermetrics is not the pure supplement of the existing citation indicator, the reason for which is that alter-metric indicators can measure the fields which can't be researched by citation indicators, such as the reusing ration of data set, influence of academic video and social influence of academic

blog. Altermetrics is not only totally negating traditional indicators based on citation. It replaces academic evaluation system only depending on citation. So we can see that quotation is an important type in the classification of Plum X for alter-metric indicators. According to the hierarchical system of Yu Houqiang [9], alter-metric indicators can be divided into transmission-level indicator, access-level indicator and application-level indicator. The alter-metric indicators relating to digital library cover the above layers. In transmission layer, there is downloading and clicking. In achievement layer, there is collecting, grouping and grading. In application layer, there is comment and quotation. And some indicators have been applied in digital library.

Positioning of digital library in alter-metric ecosystem. Observing the positioning of digital library from the perspective of alter-metric ecosystem is good for fully applying research achievements of altermetrics into knowledge service of digital library. Alter-metric ecosystem has six subjects [10], stakeholder, scientific research achievements, many types of platforms, alter-metric data source, manifestation of influence and alter-metric data integration platform [10]. Digital library involves five subjects. And stakeholder is the first. As one of the main forms of the current library, digital library plays the role of knowledge storage, transmission and process in scientific communication. It not only is the provider of alter-metric indicator data, but also is the user of alter-metric indicator service. PLoS(Public Library of Science) is a digital library. IEEE is also a member of actively using alter-metric indicators in digital library. Digital library stores many types of scientific research achievements including journal paper, which is richer compared with that stored in traditional library. For various scientific research achievements, as one of the user platforms, digital library provides some types of data source of alter-metric indicators. The main users of digital library are scholars. And the resources of digital library are not public, so the data only reflects the academic influence. Digital library is the key part in the alter-metric ecosystem, which is more helpful for digital library research and using alter-metric achievements.

Knowledge Service Pattern Combing Alter-metric Indicators

The above analysis has proposed that digital library not only is the data provider in alter-metric ecosystem, but also is the service user, which determines that digital library is effective to develop new knowledge service pattern fusing alter-metric indicators.

Functions analysis of altermetrics in knowledge service of digital library.Applying altermetrics into knowledge service of digital library has three main functions. (1) Applying altermetrics can improve the efficiency of literature retrieval [11]. (2) Applying altermetrics can improve literature evaluation mechanism. (3) Applying altermetrics can improve the literature recommendation accuracy. Realizing accurate recommendation of resources is an important objective of knowledge service of digital library. Big data level of alter-metric data provides basis for the digital library to excavate the personalized requirements of users. For the past accurate recommendation, the bibliographic data has no semantic hierarchy. Alter-metric data is different from the features, and it can deepen into the content feature of resources such as label, comment and reading notes, which includes the interpretation of digital library users for the connotation of academic achievements. And the recommendation based on semantic construction is more accurate. In addition, under the situation of social network, alter-metric data can be related to the academic background and scientific research network of scholars, and provide situation data and expansion dimension of recommendation.

New knowledge service pattern of digital library fusing alter-metric indicators.For the function of applying altermetrics to knowledge service of digital library, the writer integrating it into the knowledge service pattern of the original digital library, which can get the knowledge service pattern of digital library fusing later-metric indicators, as shown in Figure 1. In order to emphasize the importance, there is no other details in the diagram, and it focuses on showing the content of altermetrics.

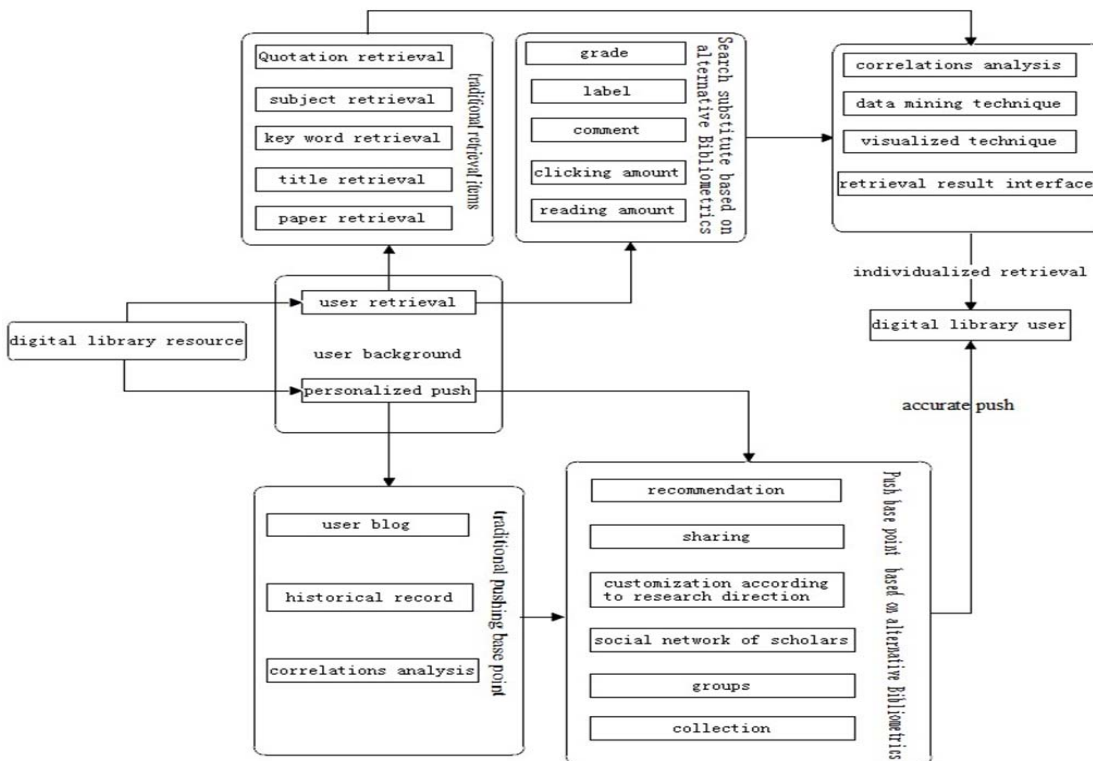


Fig. 1 Knowledge service pattern of digital library fusing alter-metric indicators

As shown in Fig. 1, new knowledge service pattern of digital library still starts from user retrieval and personalized push. User retrieval is that the users actively achieve the knowledge from the digital library according to explicit requirements. And personalized push is that the digital library excavates the implicit requirements of the users, and matches the resources of digital library with the user requirements, and recommends useful knowledge for the users. User context plays the function from two perspectives, which is the manifestation of digital library facing user service.

Analysis on comparison with knowledge service of traditional digital library. The knowledge service fusing alter-metric indicators has the following characteristics.

Transforming from passivity to activity. Firstly, the passive push of the users is transformed into the active push of the users, which is manifested by group collection and recommendation based on research direction. Secondly, the comment, grade and notes of the users for academic achievements is recorded and organized for providing situation knowledge for the users, which changes passivity of the content into active reading. Lastly, digital library positively establishes relationship with academic network.

Transforming from static to dynamic. Traditional digital library integrates various digital resources, but the management is static, which means to use the existing resources to provide for the users as knowledge base. After fusing alter-metric research achievements, digital library resource is enriched with the external application interfaces. The attention and utilization degree of the users for the digital resources provides reference for digital resource purchase, which is a dynamic process.

Transforming from single point to network upgrade. Traditional digital library is isolated. The resource integration of digital libraries is implemented by external link and integration retrieval, but the effect is not ideal. The introduction of altermetrics emphasizes opening science and online scientific research environment, which can stimulate digital libraries to realize interconnection by opening interfaces. In the past, the obstacle of the interconnection is that the library resource is not even, and the large-scale digital library is not willing to share the resources. And the interconnection doesn't use digital library as the subject, but uses the user as the subject, which can eliminate the obstacle of uneven resources.

Transforming from knowledge provider to knowledge communicator. The positioning of knowledge service of traditional digital library is to provide definite knowledge for the users.

Knowledge service of digital library fusing alter-metric indicators not only provides accurate and personalized service, but also is positioned as the important platform and channel of scientific communication for scientists, which can improve the efficiency of scientific communication. The transformation of the positioning not only is the transformation of working pattern, but also is the upgrade of service consciousness of digital library servers.

From the comparison, we can see that the knowledge service pattern of digital library fusing alter-metric indicators is incoherent with the content of digital library. No matter for providing intelligence and individualization of knowledge or improving efficiency of scientific communication, it has evident advantages.

Conclusions

The conclusions are as follows. ① Online scientific research era has new requirements for the digital library users. The users need to integrate the relevant resources, and combine the personalized service of group intelligence and academic achievements in social network relationship. ② The idea of digital library service should keep pace with the times, and provides social network service, knowledge service based on big data and group intelligence as resource filtering mechanism for the scholars. ③ In the alter-metric ecosystem, digital library not only is the provider of alter-metric indicator data, but also is the user of alter-metric indicator service, which is good for digital library research and using alter-metric achievements. ④ The main function of altermetric in digital library is to improve literature retrieval efficiency, improve literature evaluation mechanism and improve literature recommendation accuracy. ⑤ The new knowledge service pattern of digital library combing alter-metric indicators meets the new requirements of digital library user from the perspectives of user retrieval and personalized push, which improves knowledge service capability. ⑥ Compared with the knowledge service pattern of traditional digital library, the new knowledge service pattern of the paper is active, dynamic, networked and transformation towards knowledge communication, which is more incoherent with the content of digital library. The present digital library has become the mainstream of the library, and plays an important role in scientific communication. Alter-metric research provides the change for the upgrading transformation of knowledge service. Some personnel of the libraries have realized the potential influence of alter-metric research, but the practice is backward. One reason is that it lacks of matured online academic communication platform in China. The other reason is that the actual application effect of alter-metric research has not been proved. The foreign digital libraries such as IEEE library and PLoS have begun to use alter-metric indicators. ImpactStory and Altmetric.com announce to establish the infrastructure of alter-metric research. The products of ImpactStory are the resumes of scholars, and the products of Altmetric.com are the report of utilization of academic achievements. The digital library in China needs the demonstrative practice research fusing alter-metric indicators, which can become a leader in the upgrade of knowledge service pattern.

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