Research on Dynamic Knowledge Map Service System Using Computer Big Data

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Abstract. The emergence of computer big data related data provides a new method for the construction of knowledge links in the knowledge map. This realizes an objective knowledge network with practical significance that is easier to be understood by machines. The article combines the four principles of linked data publishing content objects and their semantic characteristics, and uses the RDF data model to convert unstructured data on the Internet and structured data that adopts different standards into unified standard structured data for association. The system forms a huge knowledge map with semantics, intelligence, and dynamics.

Keywords: Knowledge Map, Service System, Computer Big Data, Linked Data, Structured.

1. Introduction
As one of the important concepts in knowledge management, the knowledge map is a group of concepts and the expression of their associated relationships. It can help users quickly find the concepts they need, and provide links to related knowledge sources (information or people). It was first applied The field of education and learning later developed into an important knowledge management tool. The knowledge map is the total distribution map of the organization's knowledge resources. Specifically, it mainly includes two parts: one is the knowledge resource catalog within the organization, and the other is the personnel expert network [1]. A knowledge map with a good interface, powerful functions and strong compatibility must not only reveal the location and relationship of relevant knowledge resources inside and outside the organization, but also reveal knowledge and people, people and knowledge, and people. The relationship can even reveal the business process and organizational structure of the enterprise.”

In this paper, from the perspective of linked data, the theory and method of knowledge link construction in knowledge map are studied. First, the related concepts and theories of linked data, knowledge maps and knowledge links are reviewed. Then, the relationship between the knowledge map and the knowledge link, the influencing factors of the construction of the knowledge link, and the mechanism of the related data in the knowledge link are discussed. Secondly, on the basis of analysing the methods and shortcomings of knowledge link construction in traditional knowledge maps, the principles of knowledge link construction in knowledge maps based on linked data, the constructed models and the characteristics of the models are described in detail, and based on The method of constructing knowledge element links in the knowledge map of related data, the process includes knowledge organization and integration, knowledge element extraction and indexing, knowledge
element description, knowledge element classification, knowledge metadata warehouse construction and knowledge element semantic link. The realization [2]. Finally, through case analysis—take the academic journal citation knowledge link model based on linked data as an example to test and perfect the theory and method of the knowledge link construction model proposed in this article.

2. Related definitions

2.1. Knowledge Map

The knowledge map uses visualization techniques and methods to show the various relationships between knowledge and knowledge, between knowledge and people, and between people, regardless of whether the knowledge items in the knowledge map are text, numbers, graphics, tables, frames, or models. Still audio. The knowledge map within the organization plays a pivotal role in enhancing the organization’s awareness of innovation and accumulation. It is the specific planning and reintegration of knowledge, which can achieve effective communication, circulation, and sharing within the organization, reducing the waste, and resetting of knowledge. Regardless of the specific definition and manifestation of the knowledge map, it can be roughly divided into the following layers: chart layer, description layer and resource layer (Figure 1).

![Figure 1. Conceptual model of knowledge map](image)

Among the various levels of the knowledge map, the chart layer is the top layer of the conceptual model of the knowledge map, displaying and expressing the status of all knowledge resources. The description layer describes a single knowledge object. The chart layer and the description layer must be based on knowledge. Based on the resource layer, they are the mapping of the actual knowledge resource layer on the visual interface.

2.2. Linked data

Linked data provides a new medium for the correlation between structured data, allowing machines to better understand these data. However, linked data itself does not add any semantic information to the data, but can carry semantic data for users to access. Therefore, although linked data itself does not have semantics, it can establish association relationships at the data level and lay the foundation for realizing
a true semantic web. Definition in Wikipedia: Linked data is an expression derived from the Semantic World Wide Web. It provides a way to use UIR to publish, link and share various resources on the Web.

3. The relationship between knowledge map and knowledge link

From the research results of various scholars at home and abroad on the knowledge map, most scholars tend to regard the knowledge map as a tool to establish various relationships between knowledge and knowledge, through the visual navigation tool of the knowledge map, Knowledge resources can be integrated and organized in a hierarchical manner. At the same time, users can find the required knowledge resources according to the hierarchical relationship between knowledge and the correlation between them when searching and acquiring knowledge, as shown in Figure 2. It is the knowledge link pattern diagram in the knowledge map [3]. It can be seen from the figure that the knowledge map gives a navigation path between the knowledge, which is equivalent to a directed graph containing nodes and links, and each node represents a knowledge item, each link also represents the forward or backward relationship between knowledge.

![Knowledge Link Diagram](image)

Figure 2. Knowledge link pattern in the knowledge map

The knowledge link is the key element of the knowledge map. On the other hand, the knowledge map also realizes the visualization of the knowledge link, and there is a complementary relationship between the two.

4. Knowledge map service system design

The author takes the design of knowledge map as a starting point. In dealing with the factors that affect the knowledge coverage index of the individual, the personal knowledge route is used as the implementation unit to conduct hierarchical mining, focusing on the connotation of knowledge activation; through the implementation process of the specific resource industry chain, focusing on Inter-Action Association is the core knowledge navigation service process optimization framework, designed to fit the resource-oriented smart service content, forming the smart library service theory and practice mode under the AI perspective, identifying the dynamic relationship between resource supply and demand, and obtaining economic value and wisdom Service identification and cognition.
4.1. Acquisition of research objects
Take the unified certification of the intelligent campus of the university as the research entry point, take management review, registration, and data entry as the research objects. Under the premise of respecting personal knowledge and browsing privacy, according to personal reporting, data collection, and professional design index themes are aggregated as an overlay. Evaluate the form and examine the comprehensiveness of knowledge coverage; through the strategic analysis of the dominant factors that influence individual behaviours internally and externally, the design content of the factors affecting the knowledge map and the corresponding relationship between each element are deeply explored, combined with the user's use of resource needs, and the content of the intelligent service of college collections is proposed. Clarify the positioning of the personal knowledge map in the intelligent library, and pay attention to the identification of the personal knowledge unit design in the construction of the intelligent campus. In order to enhance and characterize the ratio between the various elements, the proportion of personal information hidden in the personal knowledge map is visually revealed in the form of charts to promote data utilization and intelligent services [4]. Through the decomposition of knowledge task units, grasp the deployment method of readers' needs, and carry personal knowledge behaviour to analyse the balance effect of knowledge chain and collection resources.

4.2. Analysis of Index Selection of Knowledge Map
We use the principal component analysis data combination model to express the linear relationship between the components, expand the relationship between internal and external factors, and determine the rationality of internal and external factors through testing. n is the number of factors influencing the knowledge map; X is to determine the number proportional relationship between each element; in $m$ principal component analysis $F$, the transformation of factor loading and $\lambda$ characteristic root is determined.

\[
\begin{align*}
F_1 &= U_1X_1 + U_2X_2 + \ldots + U_nX_n \\
F_2 &= U_1X_1 + U_2X_2 + \ldots + U_nX_n \\
\vdots & \quad \vdots \\
F_m &= U_1X_1 + U_2X_2 + \ldots + U_nX_n \\
U &= \frac{F_i}{\sqrt{\lambda}}, i = 1, 2, \ldots, m
\end{align*}
\]

4.3. Linked Data Relationship Construction
Aiming at the role of the linked data technology system in the knowledge map, this paper constructs a new knowledge link model in the knowledge map, and conducts an in-depth discussion from the perspective of linked data. Figure 3 shows the hierarchical model of the knowledge link construction in the knowledge map based on linked data proposed in this paper, which is displayed in the form of hierarchy, which is divided into the knowledge acquisition layer, the related data layer, the knowledge network layer, and the user layer from bottom to top. In the four aspects, each layer is inherited from each other, forming a knowledge link model that can fully realize knowledge sharing and knowledge innovation [5]. The author refers to the whole process of a user entering keywords to search through the unified query interface of the knowledge management system and browsing the search results as a "search session". The establishment of similar associations depends on the fact that in a search session, the user clicks to browse a certain search result item and the browsing time is longer (through experimental analysis and comparison, this article selects 30s as the threshold for judging the longer browsing time), then The result is likely to be useful information that the user cares about, and several such search items in the same search session are likely to have similar associations in content, that is,
implicitly similar associations. However, sometimes the user spends a long time browsing and finds that the item is not very relevant or useful, or the user quickly finds a useful item but chooses to view it in detail later. In order to correct these two situations, this article allows users to manually mark to evaluate whether the item is useful, that is, an explicit similar relationship.

![Diagram](https://via.placeholder.com/150)

**Figure 3.** Knowledge link construction model in knowledge map based on linked data

5. **System application feedback**

Taking user 2 as an example, the interest, preference, evaluation of recommended information, and demand information should be described in as much detail as possible, not only describing the obvious information provided by the user, but also digging out its internal connections through objective analysis, and then describing it. The specific needs of user 2 point to a specific knowledge directory. The principle of the knowledge catalog in the figure is like the user catalog. Taking knowledge 2 as an example, the following knowledge is again classified into sub-knowledge 1, sub-knowledge 2, and sub-knowledge 3. In order to make the model clear and easy to see, only two items of knowledge description and knowledge storage are listed. The knowledge description project should make a description of the subject matter and other knowledge content of the knowledge, and link it with other knowledge to realize the network structure of knowledge; knowledge storage is an important description item in the knowledge entry, the recommendation system and Librarians find the corresponding knowledge storage address based on the storage records. A service recommendation may require a collection of multiple collection resources to cooperate with multiple librarians to complete, or it may be completed by a certain collection or a certain librarian. In short, a reasonable and effective matching method depends on the record of the knowledge storage address, and the accuracy of its description greatly affects the use of the knowledge map. The librarian directory has the same principle as the user directory [6]. The visualization behind the user catalog, knowledge catalog and librarian catalog refers to the use of WIDAS tools to provide a visual environment to visualize abstract information, filter out irrelevant information, guide and accelerate the process of searching and even obtaining information, so that users and recommend Both the system and the librarians can see what they could not see in the past, and can interact and communicate in time to improve their insight into complex issues, models or systems.

The application of knowledge map in personalized information recommendation service makes its working mechanism more intuitive and vivid. After the user information is submitted to the recommendation system and the librarian, after a comprehensive analysis, the knowledge range to which it belongs is judged, and then the knowledge map is searched for. Select the most suitable knowledge
category in the knowledge catalog, and then query the content of this knowledge entry to find the collection or librarian who owns the knowledge resource. The librarian or recommendation system analyses and summarizes these resources, and then in the user catalog of the knowledge map to compare the resource, recommend the resource to those users who are suitable and need it. The visualization principle in Figure 4 is the same as the visualization principle in Figure 3.

**Figure 4.** Personalized information recommendation service work using knowledge map

6. Conclusion
This article defines the relationship between knowledge map and knowledge link, expounds the influencing factors of knowledge link construction in knowledge map, including summarizing the type of association relationship between knowledge elements, and summarizing the knowledge processing technology applied to the realization of knowledge element link, Knowledge extraction technology and knowledge association technology, through the introduction of linked data technology to carry out research on its mechanism in knowledge linking, distinguishing the meaning of knowledge element and clarifying the importance of knowledge element in knowledge linking.

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