

Analysis of Key Issues in Social Tagging Research within China's Library and Information Science Domain: Postprint

Authors: Li Xuhui, Li Yuanyuan, Ma Feicheng

Date: 2023-08-27T00:00:00+00:00

Abstract

[Purpose/Significance] Social tagging is a research hotspot in the field of library and information science and digital libraries in China. In recent years, the research scope of tags has expanded to multiple LIS research areas such as information quality, information retrieval, and information recommendation. Analysis and review of the progress of tagging research in the LIS discipline will provide a basis for future research on “social tagging”. [Method/Process] Journal literature in the LIS field from 2010 to 2017 was selected, CiteSpace visualization was used to analyze research hotspots, development processes, and research trends of social tagging, and thematic research was analyzed and summarized from five perspectives: tag application, tag information, tag quality, information recommendation, and information retrieval. [Results/Conclusion] Based on the current status and issues of social tagging research, relevant recommendations are proposed, such as expanding the research scope of tags in ontology and information retrieval, adopting a user-centered approach to meet personalized needs, and applying research findings to practice.

Full Text

Preamble

Vol. 62 No. 16 August 2018 ChinaXiv Cooperative Journal

Analysis of Main Problems in Social Tagging Research in China's Library and Information Science Field*

Li Xuhui¹, Li Yuanyuan¹, Ma Feicheng^{1,2}

¹School of Information Management, Wuhan University, Wuhan 430072

²Center for the Studies of Information Resources, Wuhan University, Wuhan 430072

Abstract

[Purpose/Significance] Social tagging has become a research hotspot in library, information science, and digital library disciplines in China. In recent years, the scope of tag research has expanded to encompass information quality, information retrieval, information recommendation, and multiple other LIS research areas. An analysis or review of the progress in tagging research within the LIS discipline will provide a foundation for future development of “social tagging” research.

[Method/Process] This study selected journal articles from the LIS field between 2010 and 2017, utilizing CiteSpace visualization to analyze research hotspots, development processes, and trends in social tagging. Thematic research was analyzed and summarized from five perspectives: tag application, tag information, tag quality, information recommendation, and information retrieval.

[Result/Conclusion] Based on the current state and problems of social tagging research, relevant recommendations are proposed, such as expanding the research scope of tags in ontology and information retrieval levels, adopting a user-centered approach to adapt to personalized needs, and applying research findings to practice.

Classification Number: G250

Keywords: Social tagging; Library science; Information science

DOI: 10.13266/j.issn.0252-3116.2018.16.014

1. Introduction

With the increasing maturity of Internet technology in recent years, more social resources are being digitized, providing people with more channels and methods to access information, while personalized needs for information retrieval and classification are growing daily. The earliest platform to grant classification authority to users was the tagging website Delicious, which allowed users to add tags to website or webpage content to achieve resource sharing and self-organization. Delicious’s adjustment of resource classification authority enabled users to become not only information recipients but also producers, describers, organizers, and sharers of information. Compared with traditional information organization methods, this approach of using user annotations for information resource classification greatly promoted the socialization of information and pointed to new development directions for personalized information needs.

In 2004, T. Vander Wal proposed the concept of “Folksonomy,” meaning folk taxonomy, and divided it into two types: broad and narrow folksonomy. The distinction between narrow and broad lies in whether annotators are homogeneous in knowledge structure and interest fields. Building on this foundation, terms such as “social tagging,” “social annotation,” “social cataloging,” and “social metadata” emerged, reflecting the classification nature of social tagging.

Social tags are semantic descriptions of information resources based on personal cognition, serving as the foundation for users to organize, manage, and share resources. In the process of folksonomy, tags perform keyword classification, information description, annotation, and metadata addition for information resources, demonstrating the interactive integration between objective information and subjective information contained in social tagging. Domestic typical social tagging websites include Douban, Weibo, and Zhihu. As products of User-Generated Content (UGC), social tags incorporate public understanding and recognition of information, strengthening the connection between users and Internet information, and providing important data resources for research and applications in personalized information services, information classification, information recommendation, and information behavior. Social tagging has been applied in government, enterprise, business, education, personal, and other public welfare websites. Using social tags, people can collect, mark, classify, organize, share, and recommend network resources, achieving comprehensive development of information literacy through tag browsing, retrieval, evaluation, addition, dissemination, and sharing activities [1].

Furthermore, tags can be applied in information retrieval, data visualization, personalized services, knowledge mining, and other application fields, making them a highly versatile subject term with extensive research scope.

2. Research Background

2.1 Research Questions

Due to differences in life background, information literacy, and subject knowledge, user-created social tags exhibit characteristics of randomness, subjectivity, and uncertainty. These tag characteristics lead to problems such as uneven quality and low efficiency in specific applications like information retrieval, classification, and recommendation. To better utilize social tags and meet users' needs for obtaining and consuming information, academic research on social tags has expanded from practical application and theoretical discussion to scientific research related to applications, including visualization, tag representation, information recommendation, and tag quality.

As a new form of network resource information organization, the expanding research field of social tagging has attracted increasing attention, becoming a research hotspot in library and information science. Through literature surveys, scholars in the LIS field have focused their research on "social tagging" primarily in areas such as information retrieval, information recommendation, tag representation, and knowledge networks, with few discussions on the state of social tagging research within the LIS discipline itself. The interaction between disciplinary knowledge and research frameworks affects scholars' research effectiveness on social tagging-related issues. Mastering the trends of specialized research topics within professional fields will help experts control the direction of social tagging research and advance the development of information science.

This study selects journal literature on “social tagging” in the LIS field to explore research hotspots and current status, thereby understanding the research situation of “social tagging” in this disciplinary context from a more macro perspective.

2.2 Selection of Research Objects

This study used “tag,” “Folksonomy,” and “Social Tag” as search terms to retrieve journal articles from China’s library, information science, and digital library disciplines from CNKI and Sci-Hub, with the time period set from 2010 to 2017. After removing irrelevant literature, 132 representative social tagging-themed articles were extracted. CiteSpace clusters literature keywords and displays the research evolution process of thematic literature and various sub-fields in a timeline view, where node radius reflects keyword frequency, connections between nodes indicate co-occurrence relationships, and node colors show different years, with blue representing earlier years and red representing recent years [2]. This method was used for preliminary analysis of the “social tagging” journal literature, with the keyword timeline view shown in Figure 1 [Figure 1: see original paper].

2.3 Distribution of Research Hotspots

As seen in Figure 1, among the sample literature, “tag,” “Folksonomy,” and “social tagging” are keywords with relatively high frequency. The earliest journal articles on “social tagging” were published around 2011, with research volume peaking in 2012. Research content included personalization, ontology, tag quality, topic maps, social annotation, and folksonomy. The “Folksonomy” research area discussed information organization, subject navigation, tag recommendation, complex networks, knowledge networks, and domain knowledge. Related “tag” research explored tag retrieval, tag clouds, tag ontology, and folksonomy. “Social tag” primarily studied libraries, subject terms, and standardization.

Keyword co-occurrence network analysis, also known as co-word analysis, identifies keywords that co-occur in text content to explore the relationships between related topics in disciplinary fields. In keyword co-occurrence network diagrams, larger circles represent higher keyword frequency, and keyword co-occurrence reflects keyword centrality. Keywords with high centrality have greater influence in the co-occurrence network. Based on keyword frequency and centrality, the distribution of research hotspots can be understood. Through literature survey and analysis, Chinese LIS scholars’ research on social tagging spans a wide range of fields, covering natural sciences, social sciences, and humanities. According to the keyword co-occurrence network in Figure 2 [Figure 2: see original paper], “Folksonomy” and “tag” have the highest co-occurrence frequency, appearing 5 times in the sample literature. Through tag clustering analysis, tags are closely related to multiple research fields including information organization, information retrieval, annotation systems, and ontology, forming the main body of the

social tagging research network together with topics like Folksonomy and social tags.

2.4 Research Framework

Through reading the literature and analyzing the distribution of social tagging research hotspots, keywords such as tag cloud, topic map, library, subject navigation, and social annotation system reflect the practical application of social tagging. Complex networks, knowledge networks, information organization, tag ontology, subject terms, and domain knowledge constitute the content of tag information research. Tag quality and standardization are topics in tag quality research. Since the sample literature mainly focuses on social annotation systems, personalization and tag recommendation are categorized under information recommendation. Based on comprehensive research on social tagging, this paper will explore the research situation of social tagging in China's library, information science, and digital library fields from five perspectives: tag application, tag information, tag quality, information recommendation, and information retrieval, to further understand the development trends of "social tagging" under current disciplinary backgrounds.

3. Research on Social Tagging Applications

Chinese LIS research on social tagging applications concentrated mainly between 2012 and 2014. Through literature analysis, this section examines the application research from three aspects: application fields, patterns, and management.

3.1 Fields of Tag Application

With the development of Web 2.0 information technology, social tagging has been widely applied and developed in education, culture, scientific research, and technology. In the education field, libraries are the main application scenario for tags. The earliest introduction of tags into library science was in 2007, with typical application systems such as the University of Pennsylvania Library's social tagging system PennTags, the University of Michigan's MTagger, and Sun Yat-sen University Library's system.

Chinese LIS research on social tagging applications primarily focuses on tag applications in university libraries. Xue Juan [3] applied Tag technology to discipline construction services, designing and implementing a university library discipline information navigation system based on social tagging to optimize the co-construction and sharing system of discipline resources. Liu Xianghong [4] introduced tags into intangible cultural heritage resource display platforms, combining folksonomy with traditional list methods for intangible heritage to construct a social intangible heritage database, displaying cultural resources at multiple levels, enhancing user experience, and expanding the application of social tagging in the cultural field.

Social tagging is not only a research hotspot in scientific research, but its visual forms—tag clouds, topic maps, etc.—have also been widely applied in academic research and network platforms. Shen Kuilin et al. [5] integrated readers' literature needs and collection characteristics to display keywords of research literature in tag cloud form, providing a more user-friendly book retrieval and information service method. Some scholars have also constructed tag cloud diagrams by extracting social network data for function expansion or optimization. For example, Bi Qiang et al. [6] selected library and information science book tag data from Douban to draw tag cloud diagrams, displaying the aggregation results of tag resources, and combined social network analysis methods to mine tag semantics and hierarchical relationships, expanding the resource aggregation dimension of social annotation systems. Chen Ting et al. [7] combined social tagging with topic maps to achieve visualization of domain knowledge structures, constructing structured knowledge semantic networks and semantic tag resource navigation, revealing associations between tag subject terms, and compensating for the defects of tag clouds in information display.

3.2 Patterns of Tag Application

Tag application patterns can be divided into four types: integrated, embedded, hybrid, and extended. Feng Qianran et al. [8] introduced these four application patterns based on library book tagging scenarios. The integrated pattern specifically refers to combining book catalogs with social tags to construct social cataloging systems. The embedded pattern refers to introducing tags into library services to leverage the role of social tagging and increase user participation in book resource construction. The hybrid pattern combines multiple tag application patterns to enrich book catalog systems. The extended pattern refers to leveraging mature social tagging websites to expand the breadth and depth of library services.

Tags can effectively reveal the content of digital academic resources. Current university library applications of Folksonomy concentrate in online search and book classification. University libraries mainly adopt embedded service models, embedding tags in library integrated management systems for user self-annotation and retrieval, and using tag links to locate resources. Extended service models are also an application approach, using social tags to radiate library services outward.

3.3 Management of Tag Application

Scholars have mainly studied tag application management from the perspective of library tag applications. Zheng Ran [9] constructed a library information organization model based on Folksonomy applications to achieve a good data processing system. Lin Ting [10] conducted an empirical survey of 112 "Project 211" universities, using classical grounded theory to summarize the management mechanisms of Folksonomy in Chinese university libraries, including operational mechanisms, dynamic mechanisms, and constraint mechanisms. Due to the di-

versity of network activity patterns, the dual identity of users and managers, and the non-uniqueness of technical platforms, library tag operational mechanisms embed social network management methods, presenting diverse characteristics. Under the influence of user social-psychological drivers and the pulling and pushing effects of management subjects, the dynamic mechanism of library tag management shows that pulling benefits of tags are not valued, while pushing benefits depend on system vendors. Constraints on book resource tags mainly come from users themselves, with rights constraints being less obvious.

Social tagging reveals the content or related information of information resources, providing new application methods for information organization and retrieval. However, tag application on OPAC is still in the exploratory and improvement stage. Its uncontrolled, unstructured, and syntactic issues prevent it from being widely used in libraries. How to better match different disciplines or groups requires libraries and other related academic research fields to construct more complete information management models.

4. Research on Social Tag Information

Researchers have studied tag information mainly from perspectives such as complex networks and ontology to explore relationships between tags and deep semantic information, providing standardized data foundations for various information services.

4.1 Tag Information Research

Due to the randomness of user annotation, social tags have characteristics such as polysemy, reducing tag search accuracy. Researchers have introduced tag disambiguation mechanisms using knowledge organization tools, statistical methods, or mathematical models to mine authentic tag information. Dou Yumeng [11] categorized tag disambiguation methods into data mining-based methods, statistical analysis-based methods, and semantic feature utilization methods. Folksonomy user tags exhibit semantic tightness distribution close to random networks at the individual level, while the overall semantic relationship shows higher semantic tightness approaching domain ontology [15]. Li Huizong et al. [16] proposed a tag co-occurrence spectral clustering method based on comprehensive co-occurrence similarity. Through tag clustering based on co-occurrence relationships, this method accurately depicts tag semantic similarity and effectively reveals potential topics, concepts, and semantic structures of tags.

4.2 Research on Inter-tag Relationships

The rich semantics of tags result in various relationships between tags, such as co-occurrence, synonymy, hierarchical relationships, and related relationships. Strengthening the mining of attributes and relationships between tags helps

improve tag resource aggregation systems and optimize tag resource reorganization. Research on semantic relationships between tags based on ontology compensates for the deficiencies of social tagging in semantic accuracy and intelligent information processing. Ding Wanying [17] integrated the advantages of user tags in constructing controlled vocabularies and providing personalized services, proposing a process for building personal ontology based on user tags to standardize tag vocabulary and inter-word relationships. Chen Kaihui [18] constructed a fusion model of ontology and folksonomy to improve tag resource retrieval performance. Xiong Huixiang and Wang Xuedong [19] explored mapping mechanisms between tag concept spaces and domain ontology, achieving semantic organization of tags and optimizing social tagging navigation and search mechanisms.

Tag co-occurrence mines related tags through semantic and content associations in large-scale information resource collections [20]. Researchers have combined tag co-occurrence with social network analysis to analyze tag relationships. Li Yating et al. [21] conducted empirical research using CiteULike data to construct a co-occurrence network with tags as units. The analysis showed that tag co-occurrence networks exhibit “small-world phenomena” and “scale-free characteristics,” and proposed constructing resource association networks to optimize tag-based information resource recommendation. Shang Xianli et al. [20] conducted social network analysis on academic blog tag resources, pointing out the social network properties of academic blog resources, including “small-world characteristics” and “scale-free network” properties.

Social Network Analysis (SNA) demonstrates strong logic, hierarchy, and integrity through mining tag association relationships and group division. In the sample literature, Y.I. Ming et al. [22] were the first to propose applying social network analysis to tag analysis, presenting four types of analysis methods: point-line-density analysis, centrality analysis, cohesive subgroup analysis, and structural equation analysis. Wu Jiang [23] proposed using cohesive subgroup analysis to construct automatic classification network maps based on connections between folksonomy tags and resources to solve the problem of unclear tag hierarchical structures. Sun Zhongqiu et al. [24] collected Douban library and information science book tag data and, through comparative study of Folksonomy-based and SNA-based social annotation systems, concluded that SNA has advantages in tag resource aggregation dimensions, technology, effects, and applications. Yi Ming et al. [25] applied basic principles of network analysis to construct an overall model of knowledge push network evolution based on social networks in social tagging systems, expanding the research field of social networks. Teng Guangqing et al. [26] used complex network analysis methods to construct knowledge communities in community knowledge networks, analyzing that knowledge communities in Folksonomy patterns have characteristics of dynamic development, structural nesting, and rich knowledge associations. Li Jinxia [27] constructed co-tag and associated tag network systems, combining social network analysis methods to obtain thematic characteristics of digital library collection resources, providing references for digital library resource man-

agement. Liu Yashu et al. [28] divided tag local hierarchies based on domain knowledge network path length, analyzing the evolution process of tag local hierarchical structures from a time series perspective, pointing out that tag local hierarchical structures are more complex and diverse than internal relationships in traditional knowledge organization systems, and change continuously with domain knowledge development, accompanied by tag promotion and demotion.

4.3 Tag Information Behavior Research

Ordinary users and experts show partial consistency in annotation behavior, but differences in professional background, interests, and cognitive characteristics cause variations in inter-tag relationships resulting from different users' annotation behaviors, attracting researchers' attention. Some researchers have studied tag relationship information from the perspective of user annotation behavior. Pan Chan et al. [29] analyzed the similarity between tags and keywords in different fields, pointing out that when the same user indexes resources, the similarity between their tags and keywords is not significantly different, while different fields show gaps in tag-keyword similarity due to influences of the "principle of least effort," "Bradford's law," and "obsolescence law." Li Fenglin et al. [30] analyzed relationships between tags and annotated resources formed by different annotation behaviors and applied correlation analysis to tag correlation calculation, effectively improving retrieval result re-ranking effects.

Users are both information organizers and information seekers. Jiang Tingting et al. [31] conducted empirical research on user behavior from an information seeking perspective based on Douban, pointing out that in social tagging systems, users generally adopt multiple strategies for information search, with "serendipitous encounterers" being new users with short access history, and "associative browsers" viewing significantly more resources than "searchers." Wu Dan et al. [32] surveyed book tagging behaviors of Wuhan University Library users, pointing out the personalized characteristics of social annotation behavior: user annotations mostly originate from book classification and recommendation needs, with users preferring to use tags rather than add them; since social annotation is not widely applied in libraries, users rarely pay attention to lectures or public activities related to book tags.

In addition to text resource retrieval, image retrieval is one way users access information resources. The descriptive attributes and characteristics of images affect user annotation behavior. Deng Sanhong et al. [33] investigated the Walters Art Museum digital portal based on social tag classification models, pointing out that users prefer to use general terms to describe image thematic content and are more inclined to describe content related to people or objects.

5. Research on Social Tag Quality

Sample literature on social tag quality includes analysis of factors influencing tag quality, research and optimization of tag quality assessment algorithms or

models, and other case investigations of tag quality.

5.1 Factors Influencing Tag Quality

Low-quality tags interfere with the order of resource organization in social annotation systems, reducing application effectiveness and user satisfaction. Common low-quality tags include overly subjective tags, spelling errors, and spam annotations [34]. Li Lei and Zhang Chengzhi [35] divided social annotation problems into two categories: quality problems caused by user annotation behavior and quality problems caused by lack of semantic specification in annotation systems. Annotation behavior problems mainly manifest as overly subjective user annotations, spelling errors, and spam tags. Semantic specification problems manifest as polysemy and synonym annotation issues. Inability to accurately describe resource attributes or themes makes low-quality tags an important influencing factor that interferes with tag applications.

Liu Lifeng and Pan Xuwei [36] studied the thematic distinctiveness of user tags in social annotation by constructing a social tag topic model, pointing out that most user tags have distinctiveness between extremely distinct and extremely vague, and that tag thematic distinctiveness increases with user activity.

In social annotation systems, unrestricted user annotation behavior coupled with gradually increasing tag scale makes tag quality increasingly influenced by cultural background, language factors, and other aspects. In this context, social tags contain many synonyms and polysemes, and grammatical level analysis alone is insufficient to understand all tag characteristics, such as semantic features [37]. Zhang Chengzhi et al. [38] pointed out that tag quality assessment remains insufficient in multilingual quantitative analysis research. Du Youtao and Xu Chenchen [39] investigated and analyzed current social tag quality influencing factors from the perspectives of annotator motivation and annotation system layers, using Douban as the research object, pointing out that user diversity and annotation randomness reveal many defects in annotation systems.

5.2 Tag Quality Assessment

Tag quality assessment methods can be divided into manual evaluation and automatic evaluation. Li Lei et al. [40] listed representative quality assessment methods based on different resources or evaluation parameters, including manual evaluation, tag statistical attribute-based evaluation, standard word-based evaluation, tag-subject term comparison-based evaluation, user tag-expert annotation comparison-based evaluation, tag-text content keyword comparison-based evaluation, information retrieval-based evaluation, and evaluation based on the relationships among users, resources, and tags [35].

Manual evaluation of tag quality has high accuracy but is time-consuming and difficult to implement on a large scale. Evaluation based on tag attributes can be used for large-scale data quality assessment but does not consider factors such as user annotation motivation. Implicit quality evaluation based on

standard words generally evaluates user annotations in real-time through tag recommendation, spell checking, and input prompts to reduce user input errors and spam tags. Evaluation based on tag-subject term comparison assesses quality according to the matching degree between user annotations and subject term databases, but its effectiveness is unstable due to limitations in subject term update speed and coverage. Compared with subject term lists, evaluation based on expert annotation results adapts to actual situations and can be updated timely. Comparison with text content keywords mainly extracts keywords from text resources for similarity matching, which requires high quality in text keyword extraction. User tag access rates also reflect the accuracy of tags in describing information resources. Information retrieval-based evaluation assesses tag quality through user retrieval and access situations. Methods evaluating tag quality by analyzing user similarity, resource matching degree, and tag semantic similarity consider connections among users, resources, and tags but are highly dependent on these three types of resources.

5.3 Tag Quality Optimization

Standardizing social tags is an important measure for optimizing information organization and retrieval, playing a significant role in ensuring annotation quality. Wu Dan et al. [43] compared Chinese and English book annotation and cataloging, proposing standardized management of book tag resources, including guiding user book annotation, connecting social tags with subject term lists, merging metadata generated by book cataloging with tags generated by book annotation, and establishing personalized semi-automatic indexing methods. Some scholars have optimized tag quality from the perspective of tag structure to reduce problems such as semantic ambiguity and lack of hierarchy. Wang Shuang et al. [44] proposed introducing user classification tags to construct a structural Folksonomy system, reflecting user consistency in relationships between tags and corresponding categories.

Machine learning is a commonly used method for optimizing tag quality models. Researchers optimize system recommendations and improve tag management functions by controlling synonyms and near-synonyms, homographs and abbreviations, and guiding users through free annotation methods to compensate for tag quality defects.

Most existing tag quality research utilizes single attributes of tags. Zhang Chengzhi and Li Lei [34] proposed a support vector machine tag quality assessment model that integrates tag content attributes and social attributes for comprehensive tag quality assessment. Gu Xiaoxue et al. [41] optimized tag clustering algorithms integrating tag quality by analyzing clustering effect differences of machine-generated tags with different qualities.

Tag quality depends on the relevance between tags and resources. Typical tag relevance judgment schemes include absolute frequency-based and content-based relevance judgment strategies. Absolute frequency is not absolutely positively

correlated with tag relevance, while content-based relevance judgment strategies are limited by automatic indexing strategy recall, precision, and universality. He Lin et al. [37] proposed a “controlled core, uncontrolled shell” classification model by establishing a “social tag-subject term” concept space model to control social tags and improve their quality. Lin Xin and Zhou Zhi [42] introduced an activity index for tag relevance judgment, improving the universality of relationship judgment strategies.

6. Research on Social Tag Information Recommendation

In literature on tag-based information recommendation, keywords such as tag recommendation, information recommendation, recommendation algorithm, and recommendation system appear frequently. This section summarizes relevant content from three perspectives: influencing factors, types, and optimization of tag recommendation.

6.1 Influencing Factors of Information Recommendation

Providing users with urgently needed tags and resources is the purpose and core of user services in social annotation systems [6]. Wu Huijuan et al. [45] pointed out from a user personalization perspective that the main influencing factors of tag-based information recommendation include user annotation behavior, user group granularity, and resources in user groups. Due to the freedom of user annotation, tags have problems such as flat category structure, confused semantic relationships, semantic ambiguity, and multiple words for one meaning, limiting the ability of tags for resource retrieval and organization [46], thereby affecting the effectiveness of tag-based information recommendation services. User standardization issues affect tag clustering efficiency in ontology research fields [19], and the flat structure of tags also prevents their full utilization in revealing resource themes and information retrieval.

The dynamic relationship between social tags and resources is one of the influencing factors of tag recommendation. Social tags continuously expand resource themes and dynamic connections between resources through the aggregation effect of the same tag on different resources and different tags on the same resource. The evolution of tag core and edge levels reflects the update and iteration of domain knowledge core hotspots to some extent. The dynamic relationship between social tags and resources gives tags certain patterns. Among them, the “power-law distribution” pattern of tag usage affects personalized information recommendation effectiveness. Discovering new user interests based on social tags is not suitable for content-based information recommendation. For collaborative filtering tag recommendation, the main problem is that users in the long-tail state cannot obtain precise recommendations.

For different types of annotated resources such as images, videos, music, and webpages, different information extraction and retrieval methods also affect information recommendation effectiveness.

6.2 Types of Tag Recommendation

Common tag recommendations include content-based recommendation, collaborative filtering recommendation, and association rule-based recommendation. Content-based recommendation mainly uses information retrieval methods to extract text information features and recommends similar information to users. Collaborative filtering recommendation predicts neighbor nodes of users or items through tags and recommends resources annotated by other similar objects to target objects. Association rule-based recommendation extracts relationships among information resources obtained by users to make similar recommendations to target users, with typical cases such as mining purchasing patterns of beer and diapers from customer purchase sets.

Wu Huijuan et al. [47] analyzed foreign literature on personalized information recommendation and divided tag-based personalized information recommendation into three categories according to different user, resource, and tag organization methods: graph theory-based, tensor-based, and topic model-based. Graph theory-based model research uses graph theory methods to depict relationships among tags, users, and resources to reflect the network structure of tag systems. Tensor-based model research mainly constructs framework models of user-resource-tag relationships and uses theoretical analysis methods to study tag resources at the overall level to optimize personalized recommendation. Topic model-based research mainly mines tag information from the perspective of tag semantics and matches various machine learning algorithms to provide more accurate and efficient recommendation information to meet user needs.

6.3 Optimization of Tag Recommendation

In the field of tag-based information recommendation research, the combination of multiple recommendation methods and resource analysis is a comprehensive research approach in tag recommendation optimization. Zhang Liang [48] proposed a topic model-based recommendation method through fusion analysis of object relationships and resource content in tag systems. Zhong Keyin [49] combined user-based collaborative filtering algorithms and resource-based collaborative filtering algorithms for recommendation in university academic resources, reflecting the diversity of collaborative filtering objects. Yi Ming et al. [50] addressed the defects of three types of recommendation methods (content-based, collaborative filtering, and association rule-based) by proposing content recommendation based on social tag networks and collaborative filtering recommendation based on knowledge-interactive social networks, solving the “cold start,” “new user,” and “new resource” problems faced by social tag-evaluation matrix methods. Xu Wenqing et al. [51] incorporated book “popularity” factors into content-based recommendation algorithms to improve personalized book recommendation.

Compared with traditional collaborative filtering algorithms, tag clustering

methods can effectively improve recommendation service quality in personalized services. The core problem of tag clustering research is calculating similarity between tags to improve the accuracy of tag descriptions of resources. Wang Shuaiteng and Xu Kuan [52] integrated clustering and ontology knowledge, using formal concept analysis to cluster tags and construct a literature book ontology based on social tagging, optimizing social tag resource integration. Some researchers have optimized tag description effects by clustering from the user perspective. S. Shan et al. [53] proposed a user ranking strategy based on the representativeness of user annotation behavior to mine valuable tags and optimize existing personalized information recommendation methods. Su Yang et al. [54] used synonym rings to improve original tag user classification, classifying users by interest to optimize group-based interest push services. Li Zhonghui [55] used tag clustering analysis to construct user interest models and build a tag-based personalized information service process framework. Wang Na et al. [56] proposed a user fuzzy clustering method integrating tag weights, constructing fuzzy similarity matrices for tags and annotation behaviors, and performing user clustering according to thresholds to optimize traditional fuzzy clustering methods.

The semantic ambiguity and disorder of social tags limit tag recommendation efficiency. Vocabularies play an important role in solving tag thematic classification and semantic positioning problems. The professionalization and clear meaning characteristics of controlled vocabularies help standardize user annotation behavior and improve tag retrieval effectiveness. Meanwhile, Folksonomy and controlled vocabularies can complement each other well, increasing information organization methods and improving OPAC system retrieval results. Yao Xiaofeng [57] compared user tags and subject classification, proposing a method of configuring library resources with controlled vocabularies. The semantic relationships in subject term lists have cross-referencing properties with inter-tag relationships. Li Yan and Jia Junzhi [58] formulated tag semantic relationship mining rules with the help of existing semantic relationships in controlled vocabularies, thereby constructing a lightweight tag ontology to improve user retrieval efficiency.

Researchers have also studied tag recommendation optimization from other perspectives. Hu Muhai et al. [61] proposed the applicability of emergent semantics and its application pattern in group preference prediction, making knowledge-context-sensitive group preference prediction in mobile scenarios more accurate and improving the quality of group-oriented information resource push services. Hu Qian et al. [62] used log analysis to call Douban book annotation data, pointing out that book themes significantly influence user tag quantity and type distribution, providing references for book faceted retrieval and tag recommendation design.

7. Research on Social Tagging System Retrieval

Through reading the literature, it is evident that Chinese LIS scholars' research on tag retrieval mainly starts from social annotation system tag retrieval. Given the limited number of articles, this section briefly reviews tag retrieval research from three aspects: tag semantic retrieval, retrieval functions, and retrieval technologies.

7.1 Tag-based Semantic Retrieval

Semantic retrieval is based on knowledge and semantic matching. Researchers mainly enhance the information retrieval capabilities of social annotation systems by strengthening tag semantic information. Tag semantic retrieval research includes two aspects: extended tag semantics and emergent tag semantics. Extended tag semantics research mainly extracts or analyzes tag resource semantic relationships using semantic tools and ontology technology. Emergent tag semantics research mainly uses probability theory, graph theory, co-occurrence networks, and other methods to mine potential semantics of tag resources. Xuan Yungan et al. [63] proposed a latent semantic analysis-based tag semantic retrieval model for social annotation systems, improving tag-resource matrix weight calculation methods to enhance tag semantic retrieval efficiency. Chen Chao [64] comprehensively used semantic description methods and complex network visualization maps to reveal two-dimensional tag semantic aggregation processes based on Folksonomy tag depth and breadth semantic aggregation flows, proposing a Folksonomy navigation architecture with a broad perspective.

7.2 Tag-based Retrieval Functions

Social annotation systems are network platforms connecting users, tags, and resources, providing users with permissions to freely classify and annotate network resources, and are user-oriented information organization management systems. The three major retrieval functions of social annotation systems include term retrieval, browsing retrieval, and personalized information recommendation. Users perform term-based retrieval through keywords, tag words, or combinations of keywords and tag words. However, affected by tag and keyword quality, the refinement level of term retrieval is insufficient, and the diversity of term retrieval as well as information recall and precision are limited. Browsing retrieval includes subject navigation and tag navigation, displayed to users in forms such as navigation bars and tag clouds, mainly recommending resources or user groups during user browsing processes. Due to the randomness of browsing retrieval, it does not have fixed retrieval effectiveness evaluation standards. Personalized information recommendation includes information resource recommendation, tag recommendation, similar user recommendation, and information push, tracking and judging user behavior, and macro control of user interests, which helps improve the pertinence, accuracy, and timeliness of personalized services.

7.3 Tag-based Retrieval Technologies

Social annotation system information retrieval technologies include tag relevance ranking technology, tag ontology technology, personalized tag search technology, multimedia tag retrieval technology, personalized tag recommendation technology, tag word sense disambiguation technology, spam tag elimination technology, and tag clustering technology. Xu Zhiwei et al. [65] elaborated on tag relevance ranking, tag ontology, personalized tag search, and multimedia tag retrieval technologies. Webpage ranking algorithms based on link analysis, clustering algorithms based on vector space models and statistical models, and inverted indexes are currently the main tag relevance technologies. Researchers use ontology to represent or analyze folksonomy to solve the low efficiency of tag information retrieval caused by tag flatness and sparsity. However, due to the high cost of tag ontology construction, some scholars use online vocabularies, thesauri, and other ontology tools to study tag hierarchization and query expansion. Personalized search in social annotation systems is mainly reflected in recommendation systems, including tag recommendation, free recommendation, and similar user recommendation, with tag co-occurrence, collaborative filtering, and tag query expansion applied in personalized recommendation to meet users' personalized search needs. Tag retrieval for images is a topic with more research in social multimedia tag retrieval technology. By improving traditional text-based and content-based image retrieval methods, researchers comprehensively use image visualization and tag co-occurrence algorithms for automatic image annotation, use tag relevance for image ranking, and study image tag retrieval using ontology, online vocabularies, and geographic location.

Some scholars have also applied graph database technology to tag retrieval systems. Wang Huizi et al. [66] applied graph databases to tag system data management and utilization, constructing a graph data model for tag systems. By collecting Flickr API image data to build tag systems, graph database syntax can construct multi-dimensional retrieval analysis and obtain visual network maps. In processing tag resources, graph database-based tag retrieval shows obvious advantages in multi-dimensionality and flexibility compared with relational databases.

8. Summary and Outlook

Through the investigation of social tagging research journal literature in China's library and information science field, this paper summarizes the development and research hotspots of social tagging, elaborates on scholars' research questions and methods from the perspectives of tag application, tag information, tag quality, information recommendation, and information retrieval, and analyzes the current research status and shortcomings in each field, providing reference for social tagging research or system optimization in the LIS field.

8.1 Summary of Research Status

Reviews of social tagging research mainly concentrated between 2012 and 2015, with scholars mainly conducting summary analyses from perspectives such as tag application, research topics, and literature distribution. The earliest literature in the sample to review and analyze social tags was “Overview of Social Tag Progress” by Zhai Shuang and Song Wen, which overviewed the application progress of social tags and their integration research with knowledge organization systems. Zhang Congyu and Zhang Yunzhong [67] conducted co-word analysis on domestic Folksonomy field journal literature from CNKI database between 2006-2015, reviewing research hotspots in information organization, knowledge discovery, annotation systems, tag applications, ontology, and tag recommendation through constructing dissimilarity matrices, cluster analysis, and multidimensional scaling analysis. A more comprehensive review study recently is the “Review of Folksonomy Research at Home and Abroad” by Liu Qingxu and Bi Qiang, which comparatively analyzed theoretical, technical, and practical application research of Folksonomy at home and abroad between 2004-2015, pointing out imperfect theoretical research on folksonomy in China and the need for enrichment in technological innovation and system application. Comprehensive analysis of review literature on social tagging in China’s LIS field shows that existing research mostly elaborates and analyzes social tagging from macro social and academic perspectives, while specialized review research on social tagging in China’s library and information science discipline is rare. This paper designs the review research framework based on literature distribution to obtain research topics, and through quantitative analysis of social tagging research literature in China’s LIS field, identifies tag application, tag information, tag quality, and information recommendation as the main research contents.

8.2 Characteristics and Shortcomings of Existing Research

In the process of summarizing and analyzing literature research, characteristics and problems of social tagging research in China’s LIS field have emerged. At the tag application research level, using ontology forms or related theories to study tag information and semantic relationships between tags is the research method chosen by most literature, while research combining ontology with practical applications of social tagging is a gap in this field. Verification analysis of Folksonomy research based on ontology theory in practical applications is also insufficient. Additionally, university libraries appear frequently in tag application research in the LIS field, but current tag application levels are still far behind network social platforms, reflecting weak practical effectiveness of application research in the education field. After in-depth analysis of the reasons for this situation, the authors found that beyond the superficial reason of few participants in social tagging annotation work in the LIS field, the deeper reason is the “semantic gap” between ontology methods and social tagging. Social tagging is essentially users’ partial understanding of things, while traditional ontology methods require consistent and comprehensive semantic descriptions

of things. This deep-level disconnect makes social tagging methods difficult to gain widespread recognition and application in traditional LIS fields that focus on knowledge ontology classification research.

At the tag recommendation level, many scholars have proposed how to integrate new tags into existing tag systems and how to match unstable user interests with tag systems to refine information recommendation. Both the automatic integration of new tags and changes in user interests require high timeliness and accuracy of tag recommendation, which are urgent problems to be solved in current tag-based information recommendation systems in meeting users' personalized information needs. The authors believe that the root of the tag integration problem lies in the representation and organization methods of semantic information contained in tags. Social tagging is a flexible, non-standard semantic information expression form. When new tags are proposed, their contained semantic information needs to be integrated with the underlying semantic information organization framework to obtain effective recommendation. Current social tagging research generally focuses on the phenomenon of tag recommendation but rarely deeply explores the impact of internal semantic information organization structure and evolution methods on tag recommendation.

At the tag quality research level, researchers mostly use common social tagging analysis objects such as Douban, blogs, Zhihu, and university libraries, making research results somewhat comparable and referential at a certain level. However, single and popular research samples, coupled with limitations of tag attribute types in tag quality research models or methods, make the universality of social tag quality research generally limited. The diversity of social tags is an important component of tag quality research, and analyzing diverse tags requires establishing a consistent and coherent semantic description mechanism to analyze and measure tags from different perspectives and levels, thereby establishing a universal quality research framework. Currently, this aspect still lacks in-depth research.

At the tag retrieval research level, sample literature mainly studies retrieval of social annotation system platforms, with tags mainly used for precise information retrieval, while research on retrieval of social tagging information itself is insufficient in the LIS field. Tag retrieval also depends on representing and measuring the semantic information contained in tags.

8.3 Suggestions for Further Research

With the deepening of social tagging application and research, theories and methods such as ontology, complex semantic association analysis, machine learning, and natural language processing are becoming increasingly important in various research fields. The organic combination of related theories or methods with social tagging research also reflects current research development trends. More new analysis methods or theories will be applied to tag research in the future, helping to fully exploit the value of social tags and improve the utilization rate

of user-generated information resources.

Based on the analysis of the current state of social tagging research in China's LIS field, the authors believe that further in-depth research on social tagging needs to widely introduce semantic information representation and organization methods to solve deep-level problems in tag application, recommendation, quality, and retrieval. At the tag application research level, research should start from the diversity and evolution characteristics of tag semantic representation to explore characteristics of tag changes in application fields, in order to better adapt tag resource management services to different types of objects or fields. Where conditions permit, appropriate research theories should be put into practice to optimize current library resource services, be user-centered, and meet users' personalized information needs. At the tag-based information recommendation research level, it is necessary to combine new technologies for semantic information representation and organization such as knowledge representation learning, focusing on issues such as integrating new tags into existing tag systems and changes in user interests, to improve the reliability and dynamic benefits of social tag systems. At the tag quality research level, the scope of case study objects should be expanded, more tag attributes should be introduced, and tags should be positioned within a consistent and reasonable semantic framework to establish tag quality measurement standards and improve the universality of research results. At the tag retrieval research level, it is also necessary to study the content and topological structure of relevant semantic information and research relevance measurement methods for tag semantics from the perspective of semantic representation and organizational structure, thereby expanding tag retrieval research fields and fully exploiting the information value of social tags.

Acknowledgments: This research and analysis of social tagging problems in China's LIS field was supported by the National Experimental Center for Library and Information Science (Wuhan University).

References

- [1] Dou Yongxiang, Wang Bangjin, Fang Qian. Progress analysis of ontology and social tagging correlation research based on Web of Science [J]. *Journal of Intelligence*, 2014(6): 172-178.
- [2] Liu Guangyang. The dissemination trajectory of CiteSpace domestic applications—Statistical and visualization analysis based on cross-database data from 2006-2015 [J]. *Library and Information Service*, 2017(2): 60-74.
- [3] Xue Juan. Design and implementation of university library discipline navigation system based on social tagging [J]. *New Technology of Library and Information Service*, 2010, 26(11): 90-93.
- [4] Liu Xianghong. Application of folksonomy in intangible cultural heritage databases [J]. *Library Development*, 2014(12): 39-42.
- [5] Shen Kuilin, Shao Bo, Lu Ming. Research and application of tag cloud in academic resource revelation—Taking keywords of library and information science core journal papers in CNKI database as an example [J]. *Library*

Tribune, 2013, 33(3): 36-42.

[6] Bi Qiang, Zhao Yiping, Sun Zhongqiu. Empirical analysis of resource aggregation in social tagging systems [J]. Information and Documentation Services, 2015(5): 30-37.

[7] Chen Ting, Hu Gaili, Chen Fuji, et al. Research on digital library knowledge organization model in social annotation environment—From the perspective of tag topic maps [J]. Information Studies: Theory & Application, 2015, 38(3): 63-70.

[8] Feng Qianran, Wu Dan. Research on application patterns of social tags in libraries [J]. Library and Information Service, 2011, 55(21): 88-92.

[9] Zheng Ran. Research on library information organization application based on Folksonomy [J]. Library Journal, 2011(4): 19-23.

[10] Lin Ting. Empirical research on Folksonomy management mechanisms in Chinese university libraries based on classical grounded theory [J]. Library and Information Service, 2015, 59(16): 60-67.

[11] Dou Yumeng. Review of tag disambiguation methods based on network collaborative annotation [J]. New Technology of Library and Information Service, 2010, 26(3): 27-32.

[12] Zhu He. Research on tag ontology construction [J]. Journal of Library and Information Science, 2013, 23(14): 105-107.

[13] Bai Hua. Research on constructing multi-integrated knowledge ontology using tag-concept mapping method [J]. Library and Information Service, 2015, 59(17): 127-133.

[14] Bai Hua. Research on the fusion of folksonomy ontology and knowledge organization systems [J]. Research on Library Science, 2016(10): 53-59.

[15] Teng Guangqing, Bi Datian, Ren Jing, et al. Research on semantic tightness of user tags in Folksonomy [J]. New Technology of Library and Information Service, 2013(12): 48-54.

[16] Li Huizong, Hu Xuegang, He Wei, et al. Tag co-occurrence spectral clustering method in social annotation environment [J]. Library and Information Service, 2014, 58(23): 129-135.

[17] Ding Wanying. Research on personal ontology construction model based on user tags [J]. Journal of Modern Information, 2011, 31(7): 42-46.

[18] Chen Kaihui. Research on fusion model of ontology and folksonomy [J]. Research on Library Science, 2013(5): 73-77.

[19] Xiong Huixiang, Wang Xuedong. Research on mapping between tags and ontology in folksonomy systems [J]. Information Science, 2014, 32(3): 121-126.

[20] Shang Xianli, Wang Xuedong, Zhang Yuxuan. Research on knowledge resource aggregation in academic blogs based on tag co-occurrence [J]. Information Science, 2016, 34(5): 125-129.

[21] Li Yating, Ma Feicheng. Research on social network analysis based on tag co-occurrence [J]. Journal of Intelligence, 2012, 31(7): 103-109.

[22] Ming YI, Wang X, Deng W. Social tag network analysis and the investigation of personalized information services based on social network analysis [J]. Chinese Journal of Library and Information Science (English Edition), 2011: 102-113.

- [23] Wu Jiang. Research and implementation of clustering free classification tags into network classification structures [J]. Library and Information Service, 2011(1): 75-81.
- [24] Sun Zhongqiu, Chen Xiaomei, Zhou Shanshan. Research on tag resource aggregation in social tagging systems based on SNA [J]. Research on Library Science, 2014(13): 53-61, 94.
- [25] Yi Ming, Mao Jin, Deng Weihua, et al. Research on knowledge push network evolution based on social networks in social tagging systems [J]. Journal of Library Science in China, 2014, 40(2): 50-59.
- [26] Teng Guangqing, Yang Mingqiu, Tian Yilin, et al. Research on knowledge communities and their core knowledge in Folksonomy patterns [J]. Library and Information Service, 2015, 59(22): 124-129.
- [27] Li Jinxia. Research on topic classification of digital library collection resources based on associated tags [J]. Library Science Journal, 2016(10): 67-69.
- [28] Liu Yashu, Chang Zhiyuan, Jiang Bo, et al. Research on dynamic evolution of tag local hierarchies [J]. Research on Library Science, 2016(13): 84-89.
- [29] Pan Chan, Feng Lifei, Ding Wanying, et al. User behavior analysis based on tag-keywords [J]. Journal of Intelligence, 2010, 29(3): 139-142.
- [30] Li Fenglin, Zhang Jing. Correlation analysis and re-ranking based on user annotation behavior [J]. Information Studies: Theory & Application, 2010(10): 57-61.
- [31] Jiang Tingting, Chi Yu, Shi Minshan. Information seeking in social tagging systems—An empirical investigation based on Douban [J]. Library and Information Service, 2013, 57(21): 112-118.
- [32] Dan WU, Xiaomei XU, Wenting YU. Social bookmarking behaviors of college students: a survey of Wuhan University Library users [J]. Data and Information Science, 2013, 6(3): 15-30.
- [33] Deng Sanhong, Liu Qijin, Xia Lixin. Tag classification for image need expression in museums [J]. New Technology of Library and Information Service, 2015, 31(10): 2-12.
- [34] Zhang Chengzhi, Li Lei. Research on automatic assessment of social tag quality [J]. New Technology of Library and Information Service, 2014, 30(9): 1-7.
- [35] Li Lei, Zhang Chengzhi. Review of social tag quality assessment research [J]. New Technology of Library and Information Service, 2013, 29(11): 22-29.
- [36] Liu Lifeng, Pan Xuwei. Research on thematic distinctiveness of user tags in social annotation [D]. Hangzhou: Zhejiang Sci-Tech University, 2017.
- [37] He Lin, Wan Jian, He Juan, et al. Research on automatic classification of Chinese books based on social tags [J]. New Technology of Library and Information Service, 2010, 26(3): 27-32.
- [38] Zhang Chengzhi, Zhao Hua, Li Lei, et al. Comparative study of Chinese and English image tag quality differences—Taking Flickr as an example [J]. Information Studies: Theory & Application, 2018(4): 123-127.
- [39] Du Youtao, Xu Chenchen. Investigation and analysis of folksonomy quality in network environment [J]. Agricultural Library and Information Science

Journal, 2014, 26(6): 134-136.

[40] Li Lei, Zhang Chengzhi. Research on social tag quality assessment based on tag types [J]. New Technology of Library and Information Service, 2014, 30(9): 1-7.

[41] Zhang Chengzhi, Gu Xiaoxue. Machine-generated tag clustering research distinguishing tag quality [J]. New Technology of Library and Information Service, 2015, 31(10): 22-29.

[42] Lin Xin, Zhou Zhi. Research on tag relevance judgment based on activity index [J]. Library and Information Service, 2015, 59(9): 97-103.

[43] Wu Dan, Lin Ruonan, Feng Qianran, et al. Research on standardization of social tags—Book annotation [J]. Library Tribune, 2012, 32(1): 1-7.

[44] Wang Shuang, Xu Xing. Establishing structural folksonomy based on user classification tags [J]. Research on Library Science, 2011(9): 73-76.

[45] Wu Huijuan, Qin Wen, Sun Hongfei, et al. Dynamic model and simulation of personalized information recommendation system based on tags [J]. Journal of Modern Information, 2016, 36(3): 12-16.

[46] Zhou Zhi, Liang Yu. Research on social tag classification based on vocabulary and syntactic rules [J]. Information and Documentation Services, 2017(5): 63-69.

[47] Wu Huijuan, Xu Baoxiang, Zhou Lanping. Research progress of foreign personalized information recommendation models based on tags [J]. Library and Information Service, 2013, 57(7): 122-126.

[48] Zhang Liang. Research on tag recommendation method based on LDA topic model [J]. Journal of Modern Information, 2016, 36(2): 53-56.

[49] Zhong Keyin. Construction of academic resource recommendation system based on tags and collaborative filtering algorithms [J]. Library Theory and Practice, 2014(9): 80-82.

[50] Yi Ming, Deng Weihua, Xu Jia. Research on personalized knowledge recommendation based on combination strategies in social tagging systems [J]. Information Science, 2011(7): 1093-1097.

[51] Xu Wenqing, Shuang Linping. Personalized book recommendation algorithm based on tags incorporating popularity factors [J]. Library and Information Research, 2015(3): 82-86.

[52] Wang Shuaiteng, Xu Kuan. Research on literature book ontology construction based on social tagging [J]. Information Research, 2017(9): 7-13.

[53] SHAN S, ZHANG F, WU X, et al. Ranking tags and users for content-based item recommendation using folksonomy [M]//Computing and Intelligent Systems. Berlin: Springer Berlin Heidelberg, 2011: 32-41.

[54] Su Yang, Shi Hao, Lai Wen, et al. Improving user classification in folksonomy using synonym rings [J]. Library and Information Service, 2011, 55(8): 58-61.

[55] Li Zhonghui. Research on personalized information service based on tags [J]. Wireless Internet Technology, 2015(5): 116-117.

[56] Wang Na, Ge Yubin. Research on user fuzzy clustering method integrating tag weights [J]. Information Studies: Theory & Application, 2016, 39(3): 140-144.

- [57] Yao Xiaofeng. Comparative study of user tags and library subject classification—Taking LibraryThing as an example [J]. *Research on Library Science*, 2010(8): 63-66.
- [58] Li Yan, Jia Junzhi. Research on combining lightweight tag ontology with controlled vocabularies [J]. *Digital Library Forum*, 2014(8): 14-20.
- [59] Song Lingchao, Huang Kun. Research on image emotional classification annotation based on social tags [J]. *Library and Information Service*, 2016, 60(21): 103-112.
- [60] XIE H, LI X, WANG T, et al. Incorporating sentiment into tag-based user profiles and resource profiles for personalized search in folksonomy [J]. *Information Processing & Management*, 2016, 52(1): 61-72.
- [61] Hu Muhai, Chen Xiaxia, Xie Jing, et al. Research on context-sensitive group preference prediction from the perspective of community emergent semantic applicability [J]. *Information Studies: Theory & Application*, 2018(5): 85-90, 119.
- [62] Hu Qian, Shi Yu. Research on the influence of book themes on user tag usage behavior [J]. *Library and Information Service*, 2016, 60(8): 106-112.
- [63] Xuan Yungan, Zhu Qinghua. Research on tag semantic retrieval in social tagging systems based on LSA [J]. *Library and Information Service*, 2011, 55(4): 11-14, 57.
- [64] Chen Chao. Research on Folksonomy navigation architecture oriented to two-dimensional tag semantic aggregation [J]. *Research on Library Science*, 2015(13): 68-73.
- [65] Xu Zhiwei, Zheng Jianyu, Yan Wu. Review of key information retrieval technologies in social tagging systems [J]. *Journal of Intelligence*, 2014, 33(4): 148-152, 155.
- [66] Wang Huizi, Fan Wei. Research on application of graph databases in tag systems [J]. *Digital Library Forum*, 2015(4): 21-27.
- [67] Zhang Congyu, Zhang Yunzhong. Research hotspots and trends in domestic Folksonomy field in recent ten years [J]. *New Century Library*, 2016(7): 91-96.

Author Contributions:

Li Xuhui: Conceived the research framework and revised the paper;

Li Yuanyuan: Collected literature, wrote and revised the paper;

Ma Feicheng: Provided suggestions and revised the paper.

Main Problems Analysis on the Research of Social Tags in China's Library and Information Science Field

Li Xuhui¹, Li Yuanyuan¹, Ma Feicheng^{1,2}

¹School of Information Management, Wuhan University, Wuhan 430072

²Center for the Studies of Information Resources, Wuhan University, Wuhan 430072

Abstract: [Purpose/significance] Social tag is one of the hot topics in the field

of library and information science in China. In recent years of the development process, the research of tags expands to information quality, information retrieval, information recommendation, and some other research areas in LIS. The study or discussion on the research progress of tags in LIS will serve as a theoretical underpinning for the research on social tags in future. [Method/process] By analyzing the papers in the field of library and information science during the year 2010 to 2017 with CiteSpace, this paper visualizes the hot topics, development process and general tendency of research on social tags, and describes the theme in detail from five points of practical application, including information analysis, quality assessment, information recommendation, and information retrieve. [Result/conclusion] Based on the situation and problems of social tags' research, some relevant suggestions are proposed, including expanding the research scopes of social tags in the field of ontology and information retrieve, emphasizing user-centered design to meet the personalized needs, applying the theoretical fruit into practice, and so on.

Keywords: social tags; library science; information science

Note: Figure translations are in progress. See original paper for figures.

Source: ChinaXiv — Machine translation. Verify with original.