

Governance Statements and Service Embedding: A Comparative Study and Optimization Pathways for Generative AI Function Configuration in Global First-Class University Libraries*

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Abstract

Based on publicly available information on university library official websites, this study systematically examines the overall architecture of generative artificial intelligence (AIGC) service function settings and governance statements. The study selects the official websites of the libraries of the top 50 universities in the 2024 QS World University Rankings as the research sample, classifies AIGC service functions into 8 dimensions, and conducts binary coding for quantitative analysis, integrating descriptive statistics and Fisher's exact test for empirical analysis. The findings show that the current application of AIGC in overseas university libraries is generally characterized by "governance statements preceding implementation, with insufficient service embedding." The libraries of the top ten universities are significantly ahead in the development of technology-enabled functions such as intelligent retrieval and knowledge graphs, but their AIGC governance statements show no significant differences from those of other universities. Accordingly, this study proposes that the development of AIGC systems in university libraries should take compliant governance statements as a basic prerequisite, steadily carry out scenario-based application pilots, implement tiered development based on collection resources, and integrate full-process governance principles into smart service processes. In the future, through inter-library collaborative co-construction models and the integration of cutting-edge technologies such as retrieval-augmented generation (RAG), deep integration between AIGC governance systems and library business services can be achieved.

Full Text

[Overseas · Perspectives]

Governance Statements and Service Embedding: A Comparative Study and Optimization Pathways for Generative AI Function Configuration in Global First-Class University Libraries*

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Abstract Based on publicly available information from university library official websites, this paper systematically reviews the overall architecture of service-function settings and governance statements for generative artificial intelligence (AIGC). Taking the official websites of libraries at the top 50 universities in the 2024 QS World University Rankings as the research sample, the study identifies eight dimensions of AIGC service functions and conducts quantitative analysis through binary coding, using descriptive statistics and Fisher's exact test for empirical analysis. The study finds that, at present, AIGC applications in overseas

university libraries generally exhibit the characteristics of “governance statements taking the lead, while service embedding remains insufficient.” Libraries at top-10 universities are significantly ahead in the construction of technology-enabled functions such as intelligent retrieval and knowledge graphs, but their AIGC governance statements show no obvious difference from those of other universities. Accordingly, the paper proposes that the construction of AIGC systems in university libraries should take compliant governance statements as a basic prerequisite, steadily carry out scenario-based application pilots, implement tiered development based on library collection resources, and integrate full-process governance principles into smart-service workflows. In the future, interlibrary collaborative co-construction models may be used, together with frontier technologies such as retrieval-augmented generation (RAG), to achieve deep integration between AIGC governance systems and library business services.

[**Keywords**] AIGC; university libraries; governance statements; service functions; risk governance

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Introduction

In recent years, AIGC technologies represented by large language models have accelerated their penetration and dissemination in higher education, profoundly changing the modes of research writing, learning support, academic retrieval, and knowledge communication, and exerting a revolutionary impact on university knowledge-service systems. The application of AIGC in libraries has improved the response efficiency and service quality of core services such as resource discovery and reference consultation, providing university faculty and students with more convenient and efficient pathways for knowledge acquisition. However, risks exist in the application of AIGC. In such processes as data training, prompt input, and result output, problems such as leakage of private information, intellectual-property disputes, bias and discrimination, and misleading “hallucinations” may easily arise, thereby posing challenges to academic integrity systems and to faculty and students’ trust in library services. At present, university libraries face a prominent contradiction between expectations for the application of AIGC technologies and the actual effectiveness of implementation: on the one hand, library users expect AIGC technologies to reshape knowledge-service models and improve service efficiency; on the other hand, libraries provide an insufficient supply of user-facing, easy-to-use AIGC

tools, while supporting mechanisms for defining responsibility and full-process audit-and-supervision systems remain incomplete, constraining the standardized and in-depth application of AIGC in the library field.

At present, governance guidelines, policy statements, and risk reminders concerning AIGC applications have been widely disseminated in academia and the industry, and their popularization has proceeded relatively quickly. However, the development of substantive application functions that can be deeply integrated into services such as academic retrieval, discipline-specific precision services, and teaching and research support remains comparatively slow. Mature applications have not yet become widespread, including RAG technologies built on authoritative academic corpora^[1], intelligent question-answering based on professional knowledge-organization systems, and agent-based collaborative workflows. Against this background, clarifying whether university libraries as a whole are still at the stage of advocating governance norms for AIGC applications or have entered the stage of implementing substantive services will help accurately grasp the development landscape and core shortcomings of AIGC construction in the libraries of world-class universities, identify the differentiated positioning of different institutions in technology application and governance construction, and provide practical guidance for the standardized and in-depth application of AIGC technologies in smart library development.

This paper takes the publicly available content on the official websites of libraries at the top 50 universities in the QS World University Rankings as empirical research samples, systematically explores the overall layout of AIGC governance statements and service functions, compares differences in service-function configuration between QS top-10 universities and other universities, and further examines the governance-development orientations and practical construction shortcomings reflected behind these differences. It should be noted that the scope of this study is limited to publicly available AIGC applications on library official websites that are identifiable, accessible, and verifiable; it does not cover various implicit AIGC technology applications and service capabilities that are under internal trial operation within libraries and have not been disclosed externally.

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1 Literature Review

1.1 AIGC Service Scenarios and Capability Boundaries in University Libraries

AIGC is becoming an important tool for documentary information work[2]. Relevant studies, based on the DIKIW logical chain[3], have analyzed its impact on literature retrieval, academic writing, and knowledge organization, while also exploring conversational service models for libraries[4] and implementation pathways for service embedding[5-8]. Researchers generally believe that AIGC can improve the effectiveness of resource discovery, reference consultation, and learning support through RAG, semantic understanding, automatic summarization, and related technologies[9]. However, the effective application of AIGC in library service scenarios is constrained not only by the capabilities of the model itself, but also depends on high-quality data resources, stable system integration, and long-term mechanisms for evaluating effectiveness. Surveys of AIGC practice in university libraries abroad show that actual applications mostly take the form of application pilots, tool provision, and statements on service norms; there remains a gap between these practices and the expected application of full-process intelligent agents[10].

1.2 Research on AIGC Risk Governance in University Libraries

With respect to AIGC risk governance, existing studies mainly focus on privacy leakage, copyright compliance, bias and discrimination, and misleading “hallucinations,” and advocate constructing risk-prevention and control systems through measures such as policy formulation, algorithmic governance, technological optimization, human review, and the division of powers and responsibilities[11-12]. However, most existing studies remain at the level of conceptual advocacy or institutional framework design, and have not discussed how governance mechanisms can be implemented and integrated in relation to the actual service functions of libraries. This indicates that university libraries do not yet possess the application capability to transform governance concepts into service operations.

1.3 Research Review

Existing studies have discussed the current state of AIGC applications in university libraries from the perspectives of service scenarios, governance issues, optimization strategies, and other aspects[13-15]. They provide theoretical references and practical ideas for understanding the development trajectory of AIGC applications in university libraries and optimizing development pathways. However, the following limitations remain: existing samples are mostly case studies or regional investigations, lacking systematic verification with a unified statistical caliber and with global top universities as the research objects; existing

studies often conflate governance disclosure with service provision, making it difficult to effectively distinguish between publicly committed content and actual functional deployment; functional classification and determination standards tend to remain at the level of conceptual induction, and have not yet formed operational definitions that can be queried and verified on official websites, which affects the comparability and replicability of research content and results.

Based on the above research limitations, this paper sets “governance statements” and “service embedding” as two major analytical dimensions. Relying on publicly available information from university library official websites, it compares the configuration patterns and structural differences between the two. Taking the libraries of the top 50 universities in the QS World University Rankings, including tied institutions, as the research sample, this study extracts eight categories of functions on the basis of existing research frameworks. It compares the differences in service functions between Top 10 universities and the remaining universities, and clarifies the differentiated characteristics of application layouts. On this basis, it proposes ideas for the development of AIGC services in university libraries under different resource conditions.

2 Research Design and Methods

2.1 Sources of Sample Data

This paper takes as its sample the official websites of the libraries of the top 50 universities in the 2024 QS World University Rankings, including tied institutions, for a total of 52 university libraries. The main reason is that these top universities are exemplary in terms of resource allocation, technological application, institutional development, and international influence, and are therefore more likely to have carried out AIGC application practices earlier. The data collection period was December 2025 to January 2026. Searches were conducted using keywords such as “AI,” “Generative AI,” “ChatGPT,” “RAG,” “research assistant,” “policy,” and “guideline,” and valid functional entrances, page types, and supporting pages were recorded.

2.2 Functional Classification and Determination Rules

This paper reviews domestic and international studies on AIGC application scenarios, service models, and risk governance in university libraries[5-16], and adjusts and integrates them in light of publicly available content on university library official websites. Eight categories of AIGC functions are identified, as shown in Table 1. This paper adopts binary coding to record the public presentation status of each function on university library official websites. The classification and determination of each category of function are mainly based on the functional entrance settings, interaction forms, data sources, and content of the official website pages. If the official website has a clear entrance and service page, can be accessed normally, and can be verified as having the

corresponding functional content, it is assigned a value of 1; if it is in the testing stage but the entrance and functional description are clear and complete, it is likewise assigned a value of 1; all other cases are assigned a value of 0.

Table 1 Framework of Eight AIGC Function Categories

No.	Function Category	Functional Content
F1	Intelligent retrieval	Supports conversational retrieval of library collections and academic resources; connects to RAG technology channels; output content can be traced back to original collection records and full-text documents.
F2	Knowledge graph construction	Provides operational platforms for constructing knowledge graphs for various disciplines and topics, and explains the logic of data organization and entity association.
F3	Personalized resource recommendation	Draws user profiles and assesses needs based on user behavior, enabling personalized resource push services.
F4	Intelligent Q&A	Configures intelligent Q&A robots for consultation services and FAQ response portals, handles standardized consultation questions, and provides service navigation.

No.	Function Category	Functional Content
F5	Intelligent agent services	Provides intelligent agents and automated workflows capable of multi-step task processing, such as automatically compiling search strategies, screening literature in batches, and assisting with academic writing.
F6	Intelligent analysis	Provides data analysis tools and application platforms such as text mining, data visualization, and trend analysis.
F7	Cultural heritage protection	Provides AI tools such as optical character recognition (OCR), handwriting recognition, image restoration, and digitization processing of collections.
F8	Ethical risk alerts	Publishes systems and norms related to AI use, including privacy protection, copyright compliance, caution against “hallucinations,” and citation norms.

2.3 Analysis Methods and Quality Control

This study performed binary coding of eight categories of AIGC functions, and then calculated the coverage rate of each function, the distribution of the total number of functions, and their combinational characteristics. Because the coded data contained low-frequency counts and zero-count cells, Fisher's exact test was used to test intergroup differences, and the odds ratio (OR) and 95% CI were reported. To ensure coding quality, two researchers first pre-coded a randomly selected 10% sample, and then formulated a unified manual of judgment criteria on the basis of coding consensus. After formal coding was completed, a review sample was selected for a coding consistency test. For items with discrepancies, the researchers traced back to the original pages one by one for discussion and adjudication. To eliminate the interference of marginal distributions with the

coding agreement rate, Cohen's Kappa coefficient was used to test coding reliability. The final coefficient was 0.79, indicating that the coding consistency between the two researchers was at a relatively high level.

3 Current Status of Public AIGC Function Configuration and Analysis of Structural Characteristics

3.1 Analysis of Function Coverage and Deployment Intensity

The AIGC function configuration of the sample university libraries shows a clear characteristic of "governance statements leading, but insufficient service embedding." As shown in Figure 1, universities with only two or fewer AIGC functions accounted for 96.1%. Among the eight categories of functions, only ethical-risk prompts had a coverage rate exceeding half, reaching 65.4%; the coverage rates of all other functions were below 20.0%. Specifically, intelligent retrieval accounted for 7.7%, knowledge-graph construction for 3.8%, while intelligent question answering, intelligent agent services, and intelligent analytics each accounted for only 1.9%. This indicates that the current public presentation of AIGC by university libraries is still dominated by normative explanations, risk prompts, and notifications of usage boundaries, while practical intelligent functions deeply integrated into resource discovery, research support, and knowledge-service processes remain relatively few.

Figure 1. Statistics on the number of AIGC functions in university libraries

Bar chart. Y-axis: Number of university libraries. X-axis: Total number of AIGC functions. Labeled counts for 0-8 functions: 11, 30, 9, 1, 0, 0, 1, 0, 0.

3.2 Differences in Function Configuration Between Top10 Universities and Other Universities

To observe the structural differences in AIGC function configuration among university libraries under different resource conditions, this paper divides the sample into two groups: Top10 universities and other universities. This grouping uses university ranking tiers to indirectly represent the hierarchical differences among university libraries in resource conditions, technological investment, and platform-integration capacity, and is used only for explanatory comparative analysis.

The coverage rates of intelligent retrieval in the two groups were 40.0% and 0.0%, respectively; the coverage rates of knowledge-graph construction were 20.0% and 0.0%, respectively; and the coverage rates of personalized resource recommendation were 40.0% and 4.8%, respectively. By contrast, the coverage rates of ethical-risk prompts were 70.0% and 64.3%, respectively, showing a relatively small gap.

This study used Fisher's exact test to analyze intergroup differences, and the re-

sults are shown in Table 2. Top10 universities had significantly higher coverage of intelligent retrieval functions than other universities; knowledge-graph construction, personalized resource recommendation, and cultural-heritage preservation also showed significant intergroup differences, with all p values below 0.05. Affected by the small sample size and by zero counts in some cells, some of the 95% CI intervals obtained in this study were relatively wide; therefore, these results can only be used to reflect differences in publicly searchable function supply between the two groups of universities. In terms of overall configuration intensity, Top10 universities publicly configured an average of 2.30 functions, while other universities configured 0.81 functions, indicating that Top10 universities not only publicly deployed individual AIGC functions earlier, but also had greater overall public configuration intensity than other universities.

3.3 Morphological Classification and Characteristics of AIGC Function Configuration

According to the preceding data analysis, the AIGC function configuration of the sample university libraries can be summarized into three types. The first is the text-governance type, which focuses on ethical-risk prompts and standardized use, fulfilling responsibilities for notification and risk control. The second is the single-point application type, which opens individual AIGC tools in subdivided service scenarios and possesses basic service functions, but lacks overall planning. The third is the system-embedded type, which integrates functions such as intelligent retrieval and knowledge-graph construction, and is characterized by prominent technical integration and governance-coordination capabilities. These three types reflect the stratified differences in current function configuration. Since the system-embedded type requires coordinated support from data, technology, and management systems, it faces more challenges in actual development and application, and therefore accounts for a relatively small proportion of the sample.

Table 2 Coverage rates of AIGC functions in Top 10 universities and other universities and tests of differences

Function category	Coverage rate in Top 10 universities/%	Coverage rate in other universities/%	p	OR	95% CI
Intelligent retrieval	40.0	0.0	0.0008	58.85	[2.83, 1225.48]
Knowledge graph construction	20.0	0.0	0.0339	25.00	[1.08, 579.77]

Function category	Coverage rate in Top 10 universities/%	Coverage rate in other universities/%	<i>p</i>	OR	95% CI
Personalized resource recommendation	40.0	4.8	0.0094	13.33	[2.00, 88.71]
Intelligent question answering	10.0	0.0	0.1923	13.42	[0.52, 348.86]
Intelligent agent services	0.0	2.4	1.0000	1.32	[0.05, 36.41]
Intelligent analysis	10.0	0.0	0.1923	13.42	[0.52, 348.86]
Cultural heritage preservation	40.0	9.5	0.0353	6.33	[1.13, 35.46]
Ethical risk warnings	70.0	64.3	1.0000	1.30	[0.28, 6.09]

4 Real-World Problems in the Development of AIGC in University Libraries

4.1 Imbalance Between Standardized Notices and Operational Integration

At present, the configuration of AIGC functions in university libraries has obvious shortcomings: content related to governance statements accounts for a relatively high proportion, and the development of risk notifications and service applications is unbalanced. According to the data presented above, the coverage rate of ethical risk warnings is 65.4%, whereas the coverage rates of functions deeply integrated into processes such as resource discovery, research support, and reference consultation—including intelligent retrieval, knowledge graph construction, and intelligent agent services—are all below 20%. This shows that most university libraries have responded to issues triggered by AIGC, such as academic integrity, privacy and security, copyright, and attribution of responsibility, through forms such as usage guidelines and responsibility statements. However, compliance management has not been effectively transformed into

practical service capabilities for users. For example, the AIGC topic pages of the University of Manchester Library[17] and the Bodleian Libraries of the University of Oxford[18] are both placed under academic standards and research support sections. Their content focuses on usage norms, copyright boundaries, citation standards, and risk warnings; they provide compliance guidance only in textual form and are not deeply integrated with service platforms such as collection retrieval, disciplinary services, and reference consultation.

It is practically reasonable for university libraries to give priority to publishing ethical risk warnings and usage norms. Given the risks associated with AIGC, such as copyright ownership, algorithmic bias, and content hallucination, issuing rules and explanations in advance can help avoid the risk of user misuse and meet universities' compliance management needs. However, if functional development remains for a long time at the level of textual notification and lacks integration with real service scenarios, users will find it difficult to obtain intelligent services in processes such as retrieval, reference consultation, and research.

4.2 Resource Constraints Leading to Service Differentiation

Compared with “governance statements,” “service embedding” represents a deeper form of technological application. A comparison between the Top 10 universities and the other universities shows that the former have significantly higher coverage rates than the latter for technology-intensive functions such as intelligent retrieval, knowledge graph construction, and personalized resource recommendation; by contrast, the coverage rates of ethical risk warnings are 70.0% and 64.3%, respectively, with little difference. This indicates that university libraries share broadly similar understandings at the level of compliance governance, and that the main gap lies in their capacity to integrate AIGC with library operations. Taking the ETH Zurich Library as an example[19], relying on a mature digital scholarly service system, the library embeds an AI research assistant into its retrieval platform, supporting natural-language searching, intelligent summarization of literature abstracts, accompanying citations, provision of full-text links and search recommendations, and integration with multiple literature analysis tools, such as Scopus AI and Scite.

Overall, AIGC applications display an uneven development pattern. Governance-related content has a low threshold and spreads quickly, whereas intelligent services that require system integration, knowledge organization, and sustained operation and maintenance are concentrated mainly in institutions with strong resource capacities, further widening service gaps among university libraries.

4.3 Poor Connection Between Functions and Services

In light of the three forms of AIGC functional configuration summarized above, the core gap in current AIGC development in university libraries is not reflected in the number of functions, but rather in the level of integration and connec-

tion between governance norms and service functions. For example, the AI collection retrieval tool Collections Explorer launched by Harvard Library[20] is deeply embedded in the discovery process for special collections and archival resources, becoming an organic component of the resource retrieval system and supporting readers in searching resources such as manuscripts, letters, images, and audiovisual materials. Harvard Library's AIGC function does not merely provide a separate new feature; rather, it helps readers build a complete pathway from access entry to resource acquisition. By contrast, many university libraries currently face the common problem that rule-explanation pages and tool-application pages are separated from one another. Readers need to switch repeatedly among rule explanations, tool trials, and resource results, and the various AIGC functions provided have not yet formed stable connections.

5 Pathways for Building AIGC Capabilities

5.1 From Compliance Statements to Limited Scenario Pilots

Most university libraries do not need to directly develop complex generative systems; instead, they can transform existing compliance explanations and usage guidelines into implementable service entry points. First, they should organize the AI usage instructions, citation norms, database help documents, and frequently asked questions published by the library, and build a question-and-answer knowledge base with traceable sources and dynamic updates; second, in research support and retrieval

Interfaces, help centers, and other modules should be provided with a unified access portal. For questions that cannot be answered directly or that exceed the service boundary, users should be clearly guided to transfer to human consultation, and channels for feedback should be kept open. In the initial stage of development, there is no need to pursue advanced generative capabilities; the core task is to transform existing governance content into usable services. At the same time, the service interface should indicate information sources, usage boundaries, and explanations of authority and responsibility, so that governance norms can be transformed from static documents into service resources that readers can use directly. For example, the MIT Libraries issued guidelines on "Citing AI tools" [21]; such content can be further transformed into question-answering information and resource-navigation services for defined scenarios.

5.2 Implement Tiered Development Based on Resource Differences

The intergroup comparison results above show that the Top 10 universities are clearly ahead in the configuration of functions such as intelligent retrieval, knowledge-graph construction, and personalized resource recommendation, indicating that the implementation of AIGC services is highly dependent on resources. University libraries with limited resource reserves need not independently bear the costs of corpus processing and full-process platform development. They may first improve service-interface standards and FAQ intelligent

question-answering modules, and may rely on campus information platforms, database suppliers, and regional library consortia to carry out cooperation. By introducing mature tools and jointly building and sharing service resources, they can lower the threshold for implementation. For university libraries with well-developed digital infrastructure and strong knowledge-organization capabilities, 1-2 disciplinary special databases, institutional knowledge bases, or distinctive resource databases may first be selected for RAG pilots. The generated content should be restricted to controllable library-held corpora, and answer cards should embed literature citations, resource indexes, and links to the original texts, so that localized pilots can gradually be implemented as functional embedding across the entire system.

5.3 Embed Governance Norms into Specific Service Processes

The construction of university-library AIGC systems needs to transform governance rules into specific functions within service processes, with implementation centered on the two major principles of traceability and auditability. Traceability means that AI-generated content is accompanied by resource provenance, original-text links, and pages for library-held sources, enabling readers to trace generative results back to the original resources. Auditability means that the system retains full-process work logs, including user consultation tickets, human review of content, version iteration, and error correction, thereby ensuring that the entire service chain can be reviewed, verified, dynamically iterated, and optimized. Taking the practice of the University College London Library [22] as an example, the library clearly labels the information-source attributes of generative AI. In addition to reminding readers to pay attention to citation issues, it also embeds the source attributes, usage boundaries, and evaluation criteria of AI-generated content into users' information-acquisition and utilization scenarios. This breaks away from the formalistic drawback of presenting governance clauses in isolation. By relying on users' practical operational scenarios to convey norms for trusting content, it helps readers distinguish among credible reference content, content requiring verification, and situations requiring manual intervention and review.

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Governance Statement and Service Embedding:

A Comparative Study of AIGC Function Configuration and Optimization Paths in World-Class University Libraries

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Abstract Based on publicly available information from university library websites, this study systematically examines the configuration structure of AIGC service functions and governance statements. Using the official websites of libraries from the top 50 universities in the 2024 QS World University Rankings as the sample, an evaluation framework comprising eight functional categories was constructed and binary-coded. Data were analyzed using descriptive statistics and Fisher's exact test. The findings reveal a pattern characterized by "governance statements taking precedence, with insufficient service embedding." The top 10 universities demonstrated a significant lead in technology-empowered functions such as intelligent retrieval and knowledge graphs. However, no significant difference was observed in governance statements between the two groups. Based on these findings, the construction of AIGC systems in university libraries should prioritize compliance governance statements as a fundamental prerequisite, steadily advance scenario-based pilot applications, implement tiered devel-

opment based on collection resources, and integrate governance guidelines into smart service processes. It is recommended to promote deep integration of AIGC governance systems with library services through interlibrary collaboration and retrieval-augmented generation (RAG) technologies.

Keywords AIGC; University library; Governance statement; Service function; Risk governance

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From Digital Collections to Smart Ecology: Analysis and Implications of Australia' s Smart Data Projects from the Libraries, Archives and Museums Perspective

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Abstract The article focuses on Australia' s Smart Data projects within the Libraries, Archives, and Museums (LAM) domain. It employs a combination of web surveys, literature analysis, and email-based interviews to systematically collect information on these projects. A comprehensive review and in-depth analysis of representative cases from various development stages are conducted. It then identifies four key project characteristics: clear strategic positioning and remarkable policy-driven effectiveness; multi-stakeholder participation and efficient collaborative partnerships; an emphasis on cultural heritage preservation and highlighting public value; and a user-oriented approach with continuous service optimization. Finally, the article proposes targeted insights for development by combining the current situation in China, aiming to provide reference for Smart Data construction in China.

Keywords Smart data project; Libraries, Archives and Museums (LAM); Digital collections; Australia

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

Source: ChinaXiv. Machine translation. Verify with the original.