Core Elements and Optimization Strategies of Library Narratives in the Era of Digital Intelligence

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Abstract

[Purpose/Significance] The evolving needs of information users and the transformation of digital technologies in the era of digital intelligence have made it difficult for traditional library narrative approaches to respond to increasingly diversified user demands. How to reconstruct library narrative strategies and the logic of service innovation in the era of digital intelligence has become a key issue in current library transformation. [Method/Process] Through a literature review, this study traces the research trajectory of library narrative, extracts six core elements of library narrative, and proposes an optimization framework for library narrative strategies based on the characteristics of the era of digital intelligence. [Results/Conclusion] The findings show that library narrative in the era of digital intelligence exhibits trends such as heterogeneous and diversified subjects, isomorphic integration of virtual and physical spaces, and convergence of media modalities. In response to digital-intelligent transformation, libraries should uphold their missions of knowledge equity and cultural memory, draw on their collections to tell compelling stories of science, technology, and the humanities, promote the deep integration of library narrative and digital-intelligent technologies, and develop library narrative strategies that balance inheritance and innovation.

Full Text

Core Elements and Optimization Strategies of Library Narratives in the Era of Digital Intelligence

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Abstract: [**Purpose/Significance**] In the era of digital intelligence, the needs of information users and changes in digital technology have made it difficult for traditional library narrative approaches to respond to increasingly diversified user demands. How to reconstruct library narrative strategies and the logic of service innovation in the era of digital intelligence has become a key issue in the current transformation of libraries. [**Method/Process**] Through a literature review, this study traces the research lineage of library narratives, distills six core elements of library narratives, and, based on the characteristics of the era of digital intelligence, proposes an optimization framework for library narrative strategies. [**Results/Conclusions**] The study shows that library narratives in the era of digital intelligence exhibit such trends as heterogeneous and diversified subjects, the co-structuring of virtual and physical spaces, and the integration of media modalities. In the face of digital-intelligent transformation, libraries should uphold their missions of knowledge equity and cultural memory, rely on their collections to tell stories of science, technology, and the humanities

well, promote the deep integration of library narratives with digital-intelligent technologies, and realize library narrative strategies that give due consideration to both inheritance and innovation.

Keywords: era of digital intelligence; library narrative; core elements; optimization strategies; service innovation

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0 Introduction

The emergence of general-purpose large-model intelligence technology in 2023 marks our entry into the era of digital intelligence[1]. In this era, the deep integration of digitization and intelligence is reshaping the logic of social operation and driving technological innovation across entire processes as well as the transformation of the knowledge society. As another epoch-making transformative technology after the steam engine, electricity, and the Internet, artificial intelligence is driving economic and social development toward a new stage of intelligentization at an unprecedented speed, breadth, and depth[2]. Against this background, libraries, as knowledge intermediaries, face transformation and upgrading in their forms of existence and service paradigms, and urgently need to anchor the coordinates of transformation through scientific planning. In this regard, the *Public Library Manifesto* clearly advocates that libraries should become community creators, advocates of digital technology, and promoters of cooperation[3].

In the era of digital intelligence, narrative theory has already derived the branches of digital narrative and spatial narrative in the fields of communication studies and architecture, and its structure is shifting from linear causal progression toward nonlinear, multimodal, and interactive organizational logic. Therefore, introducing narrative theory into libraries is not simply a matter of applying the techniques of "storytelling"; rather, it requires revealing the deep mechanisms by which libraries function as sites of meaning production—namely, how scattered documents and services can be elevated into cultural experiences with the power to inspire identity and belonging through plot arrangement, spatial creation, and media deployment. Library narratives need to rely on digital-intelligent technologies and storified thinking to organize plots and convey meaning from narrative materials such as collection resources, spatial environments, user services, development histories, and personal stories. The core of library narrative in the era of digital intelligence lies in promoting knowledge trans-

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dissemination, cultural identity, and cognitive construction, making the library a digital memory bond that connects history and the future, the individual and the community. By demonstrating the rationality of introducing narrative theory into libraries in the digital-intelligence era, this paper explores library narrative elements and optimization strategies that are both contemporary and universal, with the aim of providing a theoretical reference for libraries' intelligent-digital upgrading and modernized transformation.

1 Narrative Theory and Related Concepts

1.1 The Evolution of Narrative Theory

Tzvetan Todorov (T. Todorov) first proposed the concept of "narratology" in 1969, defining it as the science that studies the structure and narrative mechanisms of narrative works. He emphasized the dual levels of story and discourse, and focused on the overall structure and narrative mechanisms of narrative texts [4]. In fact, before narratology became a formal discipline, its ideas can be traced back to Plato' s and Aristotle' s discussions of "mimesis" and "narrative" [5]. Subsequently, with the development of Enlightenment rationality and novel criticism, as well as the influence of structuralist linguistics and Russian formalism, narratology in the true sense took shape in the 1960s [6]. Over the course of several decades, narratology can be divided into two schools: "classical narratology" and "postclassical narratology." The former focuses on the constituent elements, structural relations, and operating laws of works; the latter breaks through closed structures and turns toward the exploration of the meaning of works, attending to the interactions among author, text, reader, and sociohistorical context [7]. This shift offers an important insight for library studies: the library is not only a place for collecting documents, but also a dynamic "text" jointly written by readers, librarians, and space.

1.2 The Rise of Spatial Narrative

Narrative studies long emphasized the temporal dimension and inevitably moved toward linear historical narrative, which placed space in a subordinate position. Yet time and space are an interdependent and indivisible unity; narratives that ignore spatiality inevitably lead to a one-sided and simplified understanding of stories, giving rise to the narrative crisis and discursive coercion of modernity [8]. With the rise of postmodernism, space was reconsidered as an important dimension of meaning construction. In 1945, Joseph Frank (J. Frank) proposed the concept of "spatial form," pioneering the study of narrative space, promoting a shift in the center of gravity of narratology toward the spatial dimension [9], and forming two directions: "narrative space" and "spatial narrative." The former concerns spatial images constructed in the text; its point of focus is "space," including physical space, psychological space, and symbolic space. The latter regards the physical field as a medium of narration and explores how spatial layouts carry historical memory and social relations [10]. For libraries, their

architectural circulation routes and regional divisions are not only functional arrangements, but also a kind of "silent narrative grammar."

1.3 Digital Narrative: The Core Narrative of the Digital-Intelligence Era

Digital narrative (Digital Narrative/Storytelling) is the product of the integration of computer-represented digital media and narratology, and constitutes the core form of narrative in the digital-intelligence era. For example, the early television documentary miniseries *The Civil War* and the multimedia autobiographical work *Next Exit* are both classic practices of using digital media to share life stories [11]. At present, the academic community has not yet fully unified the definition of digital narrative, but consensus has been reached regarding its characteristics of interactivity, immersion, multimodality, and generativity [12–13]. Daniel Meadows (D. Meadows) was among the earliest scholars to engage in digital narrative research. He pointed out that "digital narrative, as a narrative practice integrating digital media with individual/collective experience, is characterized at its core by brevity, personalization, multimodality, and shareability" [14]. From the perspective of its development, digital narrative has roughly gone through two stages: in the early stage, it was represented by hypertext and interactive fiction, in which readers achieved nonlinear reading through autonomous choice; in the later stage, it relied on social media and multimedia platforms, forming narrative practices with universal public participation. With the application of virtual reality (VR), augmented reality (AR), and AI-generated content (AIGC), digital narrative

It has shown potential for cross-boundary integration and experiential innovation in education and training as well as in commercial marketing[11].

Although digital narrative represents a "breakthrough" or "mutation" of traditional narratology, and although its technological attributes may give rise to problems such as "technology supremacy" or "sensory supremacy," it has not in fact overturned the essence of the "story." Rather, it has expanded the pathways for co-constructing meaning and generating emotional resonance[15]. It embodies the extension and deepening of traditional narrative in the environment of digital new media, emphasizing that users release their aesthetic subjectivity through interaction and complete cognitive construction through participation. This paper takes digital narrative as the thread running through library narrative because it directly responds to library users' deeper demands, in the digital-intelligence era, for personalized and participatory experiences, and provides a direct theoretical tool for reorganizing the elements of library narrative and optimizing its strategies.

2 Overview of Library Narrative Research

After decades of development, the disciplinary scope and research domains involved in narrative theory have continued to expand. In the field of library sci-

ence research, the introduction of narrative theory has become a research topic marked by disciplinary distinctiveness and a trend toward cross-integration.

2.1 Related Research Literature

A literature search was conducted in the China National Knowledge Infrastructure (CNKI) database on December 21, 2025. A subject search using "library narrative" as the search term yielded 74 records; a subject search using the query "'library' AND 'narrative'," with the discipline limited to "Library and Information Science and Digital Library," yielded 289 records. After merging the two sets of literature and removing duplicates, 218 highly relevant papers were obtained. The criteria for duplicate removal and screening were as follows: first, literature unrelated to libraries was excluded, such as works on literary narrative and film-and-television narrative that did not involve libraries at all; second, news reports, conference notices, and non-academic reviews were removed; finally, papers were retained if their topics included "library + narrative / story / plot / telling," or if they explicitly used narrative theory to analyze scenarios such as library services, spaces, promotion, and digital humanities.

VOSviewer software (version 1.6.20) was used to conduct a visual analysis of the above 218 highly relevant papers. The parameters were set as follows: the type of keyword co-occurrence was "author keywords," the minimum number of occurrences was 2, and the clustering resolution was 1.0. A total of 81 high-frequency keywords were selected, and LinLog was used for layout optimization, forming a VOSviewer keyword co-occurrence network (Figure 1). As shown in Figure 1, "library" and "public library," as high-frequency nodes, have become the main research objects, while high-frequency nodes such as "digital narrative," "reading promotion," "immersive experience," and "spatial narrative" have become research themes in library narrative. This directly reflects the extent to which the field of library narrative research is concerned with the empowerment of digital-intelligent technologies and the upgrading of experience.

Specifically, existing research on library narrative mainly focuses on five thematic areas. First is the integration of digital-intelligent technologies with narrative, exploring the impact of VR/AR, the metaverse, and AIGC on the development of documentary resources[16–17], for example by using digital narrative to promote digital inclusion and bridge the digital divide[18]. Second is the narrative turn in reading promotion, which constructs an interactive model coupling people, space, and technology, and breaks through the one-way service model to enhance the appeal of reading[19]. Third is scenario reconstruction[20], memory reinforcement[21], and immersive experience design[22] driven by spatial narrative, focusing on the transformation of libraries from static collections into dynamic experience centers. Fourth is the application of narrative in cultural development: as a platform for emotional expression and value reproduction, the library can use narrative to enhance the dissemination effectiveness of cultural and creative products[23], red literature[24], and intangible cultural heritage[25]. Fifth is cross-institutional collaboration in digital narrative among

Keyword co-occurrence network for "library narrative".

Figure 1: Keyword co-occurrence network for "library narrative".

libraries, archives, and museums (LAM), which, by launching various compelling digital narrative projects such as "Digital Palace Museum" and "Digital Dunhuang," demonstrates the value of digital narrative in the dissemination and education of cultural heritage and promotes cross-institutional narrative integration and knowledge co-construction[13].

Figure 1. Keyword co-occurrence network for "library narrative"

2.2 Research Contributions of This Study

It can thus be seen that, empowered by digital-intelligent technologies, libraries are continuously expanding and optimizing the configuration of resources, spaces, and services by leveraging their narrative functions. In recent years, the carriers of library narrative have shifted from linear texts to three-dimensional spaces, with physical space becoming a narrative field capable of expressing emotion and meaning; narrative subjects have tended toward diversification and collaboration, expanding from librarians to the broader public; and narrative methods have increasingly exhibited intelligent and immersive features, transforming from static dissemination to dynamic interaction. However, current research on library narrative still has several weak links. First, no consensus has yet been reached on the core elements of library narrative; analyses of narrative elements often directly transplant frameworks from literature or museology, lacking a theoretical system and validated cases that reflect the characteristics of the library discipline. Second, digital-intelligent narrative strategies mostly emphasize the level of technological tools, while their "narrativity" remains relatively weak; they have not been systematically designed by being deeply rooted in the underlying logic of narratology.

In view of this, this study seeks to make an incremental contribution to existing research in terms of theoretical integration and service innovation by reorganizing the elements of library narrative and optimizing its strategies. The research mainly concerns the core elements of library narrative and their relationships, and proposes optimization strategies for library narrative in the digital-intelligent era.

3 Core Elements of Library Narrative in the Digital-Intelligent Era and Their Relationships

Although different disciplines vary in their emphases on the constituent elements of narrative, narrative subjects, content, space, and media have always been

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These constitute the core elements of narrative, and library narrative is no exception. In the era of digital intelligence, library narrative has already undergone profound transformation: technological logic has comprehensively permeated every narrative element, reshaping the expressive forms of each element and their interrelationships. Drawing on classical narratology, postclassical narratology, and relevant research literature in the fields of libraries, archives, and museums (LAM) in the era of digital intelligence, this paper derives the six core elements of library narrative and their relationships, as shown in Figure 2.

Translated text in the figure:

- Provides background and field
- Library narrative subject
- Library narrative time-space
- Library narrative medium
- Provides carrier and form
- Library narrative dynamics
  - Core conflict
  - Is organized as
  - Library narrative plot
- Through
- Library narrative perspective
- Presents
- Library narrative theme
- Triggers
- Meaning and effects
- Control and selection

Figure 2. The Six Core Elements of Library Narrative and Their Relationships

3.1 Derivation of the Core Elements of Library Narrative

Regarding the constituent elements of narrative, narratology usually divides them into three major links— "narrator, text, and receiver" —and on this basis forms the basic logical framework of narratology [26]. In the field of literature, narrative elements are often summarized as "setting, character, and plot," or as "narrative subject, structure, logic, and time-space" [23]. Art exhibitions, by contrast, focus on narrative time, narrative space, narrators, and so forth [27]. In the fields of libraries, archives, and museums (LAM), the library community holds that narrative elements include "people," "time," "events," "objects," and the ubiquitous "field" [20]; the archival community divides narrative elements into "subject, object, content, medium, and purpose"[28]; and museum narrative elements are summarized as "content and its modes of expression, and media and their modes of combination" [29].

At present, in the fields of libraries, archives, and museums (LAM), the expressions for narrative subjects—people or information resources—and narrative media—tools or platforms, etc.—have become relatively clear and unified. However, there remains obvious intermingling and overlap between narrative plot and perspective, and between narrative content and theme. On the one hand, narrative perspective is often regarded as an "appendage" of narrative plot, whereas in narratology the two are relatively independent concepts. This indicates that existing research has not yet sufficiently transplanted theory, and lacks contextualized and field-specific definitions grounded in the characteristics of library science. On the other hand, narrative theme and narrative content overlap and repeat each other. In literary works, narrative theme refers to the abstract central idea, while narrative content refers to substantive matters, specifically the aesthetic value and ideological depth expressed in the work. This shows that "narrative content" can accommodate the basic images of objective things, and can also carry subjective emotional implications and psychological perceptions; as a result, narrative content and narrative theme are easily treated as equivalent.

In view of this, this paper treats "narrative perspective" and "narrative plot" as independent elements placed in parallel, revealing how library narrative enriches perspectives and shapes plots. Meanwhile, to avoid conceptual confusion, this paper narrows the denotative scope of narrative elements: the "objective basic images" within narrative content are incorporated into narrative plot, while "subjective emotional implications" are assigned to narrative theme. Finally, this paper derives the library narra[[unclear: sentence continues beyond the visible page]]

the six core elements of narrative. The derivation process comprises two main steps. First, using narratology' s "story-discourse" dichotomy as the top-level framework, the basic conditions required for library narrative are summarized as narrative materials (resources) and narrative modes (perspectives and media), which together constitute the foundational elements for shaping the storyline. Second, in light of the institutional characteristics of the library as an integration of "space-resources-services," and according to the time and field in which library narrative occurs (spatiotemporality), the sender of the narrative (subject), and the narrative value (theme), the six core elements of library narrative are extracted. Specifically, these include "who is telling" (narrative subject), "when and where it is told" (narrative spatiotemporality), "what is used to tell it" (narrative medium), "what is told" (narrative plot), "from what angle it is told" (narrative perspective), and "why it is told" (narrative theme). Thus, a framework of library narrative elements is formed, consisting of narrative subject, narrative spatiotemporality, narrative medium, narrative plot, narrative perspective, and narrative theme.

3.2 Composition of the Core Elements of Library Narrative

(1) The subject element of library narrative: from institutional monologue to human-machine co-creation

The narrative subject is the initiator of narrative action. In the digital-intelligent era, the subjects of library narrative present a pattern of "heterogeneous coexistence." In addition to librarians, experts, users, and the public have also become important participants in narrative; virtual characters driven by AIGC and "anthropomorphized" collection resources—such as ancient books empowered by knowledge graphs—have also become active narrators; the narrative subject has shifted from a real-world subject to an intelligent subject[30]. Digital narrative gives silent documents the possibility of "speaking," and the subject structure has thus shifted from "institutional monologue"to "human-machine co-creation."

(2)The spatiotemporal element of library narrative: a perceptual field interwoven with the virtual and the real

Narrative time is the warp and weft along which the plot unfolds, and the way it is organized affects logical construction and thematic transmission. The temporal structure of library narrative can be divided into two types: the diachronic structure presents a linear causal thread; the synchronic structure means that "with the support of digital-intelligent technologies, hyperlink technologies and visualization technologies can support users in freely moving among story nodes, constructing nonlinear, jump-style narratives" [31]. The space of library narrative encompasses physical space (architectural layouts such as reading areas, stacks, and corridors, as well as environmental elements such as sound, light, and heat), social space (promoting public life as a "third space")[32], psychological space (as a "knowledge universe" and "memory palace"), and digital space (online catalogs, digital libraries, and virtual libraries). Digital narrative in libraries promotes the deep integration of physical and digital spaces, building a "wall-less knowledge ecology" and greatly expanding narrative spatiotemporality through the interweaving of the virtual and the real.

(3) The medium element of library narrative: the collaborative expression of multimodal symbols

The narrative medium is the carrier of storytelling. Among them, language is the core narrative medium, relying on vocabulary and grammar to express complex ideas, shape characters, and construct plots. With the evolution of media forms, nonverbal elements such as images, sound, video, bodily activities, and facial expressions have also gradually become important components of narrative media. In library narrative, narrative media mainly include: documentary media (text and audiovisual media), whereby readers understand the stories and spirit embedded in documents through text and audiovisual forms; spatial media (architectural form and internal layout), whereby the library' s architectural form and spatial materials participate in narration as a "silent text" [33]; activity media (lectures and cultural salons), whereby readers participate in storytelling

and cultural production through interactive activities, forming a narrative field of knowledge sharing and emotional resonance; digital media (virtual tours and AI librarians, etc.), whereby libraries use digital narrative methods such as the metaverse and VR/AR, integrating multiple symbols such as language, images, and embodied interaction to construct immersive and three-dimensional narrative scenes.

(4) The plot element of library narrative: logical weaving based on real events

Plot is composed of character relationships and the progression of events; in essence, it is the temporalization and causalization of events[34]. Events, in turn, are composed of actions, spatiotemporality, and roles, and action is the key to distinguishing event types[35]. The plot of library narrative takes the library as the narrative space and, through interactions among collections, librarians, and readers as well as changes in spatial functions, reveals the causal factors behind transformations in characters' cognition, cultural conflicts, and the reconstruction of social relations.

process. It should be clarified that library narrative is a form of "nonfiction narrative." Its "plot" is not fabricated out of thin air, but is instead a selective reorganization and causal interpretation of real service events, readers' developmental trajectories, and materials concerning spatial evolution. For example, a reader' s progression from "information disorientation," to "acquiring search skills through library digital-literacy training," and then to "completing an academic project"constitutes a micro-plot of "predicament—action—transformation." The shaping of plot in library narrative is precisely achieved by identifying and connecting such real events to form an engaging narrative chain. Its structure includes an opening (motivation triggered), development (exploration and obstacles), climax (breakthrough or crisis), and ending (resolution of contradictions and cognitive elevation). In this way, the plot of library narrative reveals the dynamic relationships among knowledge, emotion, and social interaction within cultural space.

(5) Elements of library narrative perspective: moving between omniscience and immersion

Narrative perspective refers to the standpoint and angle from which the narrator observes and tells the story; different perspectives determine the structure of the story and the audience' s mode of understanding[36]. An omniscient perspective can survey the overall ecology, historical evolution, spatial design, and resource distribution of the library, helping to construct a systematic knowledge graph and create a distinctive brand image. An internal perspective conveys, through the first-person experience of "I," the humanistic warmth of the library as an "affective field." An external perspective proceeds from the narrator' s limited understanding and observation—for example, the unfamiliarity and dramatic quality experienced when readers first encounter the library—thereby preserving the suspense of exploration and stimulating readers' interest in and expectations for the library' s spaces, resources, and activities. Digital narrative in

the digital-intelligent era is adept at switching perspectives: in a VR experience, for instance, users may both "personally experience" history from an internal perspective and at any time switch to an external perspective to overlook the whole. Such flexibility in omniscient perspective is difficult for traditional media to achieve.

(6)Elements of library narrative theme: cultural symbols and the core of meaning

The narrative theme governs the overall narrative and points toward cultural symbols and social meanings. In library narrative themes, common deeper connotations include: the temple of knowledge and enlightenment, referring to the library' s rich collections and open ideals, which symbolize human wisdom and educational value and make it an important place for individuals to seek knowledge, enlighten the mind, and escape ignorance; the symbol of order and rationality, referring to the library' s establishment and refinement of informational order, its organization of complex information, and its reflection of humankind' s pursuit of order and rationality from antiquity to the present[37]; the site of memory and forgetting, referring to explorations of how knowledge and history are selected, shaped, and regenerated between preservation and oblivion, thereby embodying both the fragility and preservability of human memory; and a space of spiritual healing, referring to the library' s role amid the anxieties of modern society as a spiritual dwelling place for psychological consolation and intellectual stimulation, providing an equal and safe refuge of the mind for the lonely and for seekers of knowledge[38]. In short, library narrative themes in the digital-intelligent era need to possess greater contemporary tension, for example by incorporating new issues such as "information ethics," "digital inclusion," and "AI literacy."

3.3 Relationships among the Elements of Library Narrative

From the six core elements of library narrative shown in Fig. 2, the interrelationships among the elements can be discerned. Among them, the library "narrative subject," as the "initiator" and "designer" of the entire narrative system, is driven by the subject' s will to guide the selection of other narrative elements and control the narrative process. On the one hand, it constructs the library' s "narrative time-space," providing the background field and spatiotemporal coordinates for the subsequent unfolding of library narrative (such as historical development trajectories, the physical space of collections, service scenarios, and so forth). On the other hand, it selects the library' s "narrative medium," providing carriers and forms suited to library settings for the presentation of narrative content (such as collection exhibitions, themed activities, new-media platforms, and so on). Conversely, the ideas of the narrative subject, transformations of narrative time-space, expression of narrative plot, switching of narrative perspective, and explicit presentation of narrative theme all need to be realized through narrative media. Narrative time-space and narrative media together provide support for the generation of narrative momentum. Narrative time-space provides the library narrative with specific situational coordinates,

while narrative media provide a technical pathway for the expression of library narrative. Under the motivating force of core conflicts in the library—such as contradictions between user needs and service provision, the contest between the activation and dormancy of collection resources, and transformations in forms of spatial use—the library organizes scattered real events into a coherent narrative plot, thereby constructing the complete "skeleton" of library narrative. Then, the "narrative plot" is further presented through the "narrative perspective" preset by the narrative subject (such as Fig.

presented (e.g., the library' s omniscient perspective, the librarian' s internal perspective, the reader's external perspective, etc.), while the choice of narrative perspective is also directly controlled by the narrative subject, ensuring that the narrative stance is consistent with the library' s development goals. Finally, the library' s narrative plot is presented through a specific narrative perspective, distilling the library' s service philosophy, resource value, cultural mission, and so forth into the library' s "narrative theme," thereby eliciting users' cognitive, emotional, and behavioral resonance, realizing the meaning of library narrative, and generating social effects. Through the dynamic circulation and mutual stimulation of the various narrative elements, a complete library narrative for the digital-intelligent era is formed.

Based on the conceptual connotations of the above narrative elements and their interrelationships, this paper holds that library narrative in the digital-intelligent era refers to the following: in an age of digital and intelligent technologies, multiple narrative subjects such as librarians, users, and intelligent systems engage in collaborative interaction; with the aid of digital-intelligent narrative media such as big data, social media, and virtual reality, narrative plots based on real events—such as the improvement of service levels, user-profile analysis, and the design of smart scenarios—are unfolded within a narrative time-space characterized by leaps and transitions, and by the interweaving of the virtual and the real; through diversified shifts in narrative perspective, they ultimately point toward narrative themes such as shared reading, cultural inheritance, and knowledge dissemination, eliciting a series of meaning effects such as users' deep experience, cognitive value-added, and cultural identification, thus completing the meaning construction of library service innovation and transformational upgrading. This definition not only attends to the distinctive feature of library narrative in the digital-intelligent era— "technological empowerment and experiential upgrading" —but also contains the goal logic by which libraries move from a resource-centered orientation to a people-centered one, and from one-way provision to value co-creation.

3.4 Verification of the Completeness of Library Narrative Elements—Taking Jinling Library' s XR Project *Kaogong Ji* as an Example

Relying on its distinctive collection of ancient books, Jinling Library restores ancient craft-production scenes through digital technology without damaging the physical ancient books, allowing audiences to "personally experience" the

entire process of assembling chariots and smelting bronze[^39]. To verify the completeness of the six core narrative elements described above, this paper provides supporting evidence through the representative case of library narrative in the digital-intelligent era, namely "Jinling Library' s original XR project *Kaogong Ji*."

In comparison with the six core elements of library narrative discussed above, Jinling Library' s original XR project *Kaogong Ji* can effectively verify the completeness and rationality of each element. The narrative subject is the distinctive ancient-book collection resource. *Kaogong Ji* is a comprehensive masterpiece of pre-Qin Chinese craft technology and institutional culture; it records the norms and cultural system of ancient handicrafts and contains scientific knowledge such as the principle of the lever, mortise-and-tenon structures, and bronze casting. Jinling Library deeply excavates the textual connotations and, through XR technology, carries out "anthropomorphic" narration and multimodal presentation, bringing the ancient books in its collection "to life" and realizing the transformation from static documents into intelligent narrative subjects. It constructs a library narrative time-space in which the virtual and the real are intertwined. In terms of time, it adopts a nonlinear interactive structure, enabling users to independently explore processes such as material selection, mortise-and-tenon joining, and casting, thereby breaking the linear causal relationship; in terms of space, it integrates physical space—the library XR experience area—with digital space—a virtual pre-Qin workshop. Library users can place themselves within the virtual workshop, perceive environmental elements such as sound, light, and heat, and complete an immersive spatiotemporal reconstruction of ancient technological history through dynamic exploration. Digital-intelligent media are a prominent feature of library narrative media in the digital-intelligent era. XR technology is used to integrate multiple symbols such as language, images, and actions into interactive narrative, enabling users to "personally" forge chariots through gesture capture, eye-tracking, and the like, thus overcoming the limitations of passively receiving information about physical objects; through spatial media such as architectural materials and tool arrangements in the virtual workshop, an immersive and three-dimensional digital-intelligent narrative scene is jointly constructed. It forms a micro narrative plot of "predicament—action—transformation." When users first enter the workshop, they face the predicament of scattered components; through actions such as material selection, mortise-and-tenon assembly, and bronze casting—the development—they forge a chariot and comprehend the wisdom of the ancients—the climax and resolution. This narrative plot is driven by user behavior and presents a dynamic process from "information anxiety" to "skill mastery" and then to "cognitive elevation" ; its structure is complete and highly compelling. Internal and external narrative perspectives are combined. From the internal perspective, library users enter the virtual world in the first-person role of "craftsman," personally forging a chariot, perceiving craft details, and gaining a strong sense of immersion; from the external perspective, the project system provides an omniscient bird' s-eye view of the workshop

at key nodes, helping users understand the overall craft process and historical background. The flexible switching between internal and external perspectives accommodates both individual experience and the systematic nature of knowledge. It closely adheres to the library' s role as a "palace of knowledge and enlightenment"

narrative theme. This project transforms *Kaogong Ji* from a static text into an interactive technological narrative, highlighting the library as an enlightening space where traditional wisdom and modern technology converge. At the same time, by presenting the refined craftsmanship of ancient artisans and the rational spirit embodied in lever principles and mortise-and-tenon structures, it echoes the "symbol of order and rationality," allowing users, through an immersive experience, to perceive the rational beauty of Chinese civilization and the inheritance of craftsmanship.

It can thus be seen that, through a case-based examination of the Jinling Library XR original project *Kaogong Ji*, the core narrative elements of libraries in the digital-intelligent era constructed above are rational and interpretable at the practical level. At the same time, it also clearly demonstrates how digital-intelligent technologies can activate the six core elements of library narrative and form a complete closed loop of digital narrative.

4 Optimization Strategies for Library Narrative in the Digital-Intelligent Era

Library narrative in the digital-intelligent era is shifting from one-dimensional "information dissemination" to multidimensional "co-creation of meaning," specifically manifesting in three significant transformations: the narrative subject is moving from "institution-led" to "human-machine co-creation + public participation" ; narrative time and space are moving from "linear physicality" to "derived interaction + connection between past and present" ; and narrative media are moving from "single text" to "cross-modal interaction + immersive experience."To adapt to this transformation, it is necessary to build a library "dynamic narrative ecology" supported by "value core (narrative theme)—structural framework (narrative time and space, narrative perspective, and narrative plot) —interface of expression (narrative subject and narrative media)." The operating mechanism of this ecology can be described as follows: first, story materials are generated, and plots are shaped around specific spatiotemporal slices from a certain perspective, thereby producing the basic materials of library narrative; second, interactive expression is strengthened, multiple subjects are introduced into plot generation, and digital-intelligent media are used to realize interaction, enhancing the expressiveness of story materials and the vividness of discourse expression; finally, meaning generation is completed. Library narrative ultimately points to the core theme of cultural inheritance, and, in close connection with ethical contexts such as fairness, transparency, and inclusiveness in the digital-intelligent era, achieves an elevation of narrative value. Based on the transformations of the digital-intelligent era, this paper proposes optimization

strategies for library narrative in the digital-intelligent era, with the aim of emphasizing the practical guiding significance of library narrative theory.

4.1 Deepen the Thematic Connotations of Library Narrative and Highlight the Values of the Era

Library narrative should be grounded in "cultural symbols and semantic cores," consistently uphold the basic functions of libraries such as "knowledge enlightenment," "cultural inheritance," and "information service," reshape a narrative thematic system with greater depth of connotation and value for the era, and actively embrace new topics of the times such as "breaking cross-sector boundaries" and "AI ethics." First, the thematic dimension should be expanded while remaining steadfast in principle. Taking the protection of citizens' freedom of knowledge as the ethical bottom line, libraries should ensure that their narrative practices do not narrow knowledge landscapes because of ideology, technological inertia, or data bias, thereby leading to "blind spots" in library narrative. To this end, it is necessary to build a three-dimensional, diverse, and inclusive framework of library narrative themes, maintain openness and balance in narrative structures, and avoid a homogenizing tendency in library information services. Second, cultural symbols should be deepened to achieve differentiated positioning. By integrating distinctive collections and regional culture, libraries can create highly recognizable narrative labels such as "Jinling cultural lineage" and "maritime-school memory," revealing the cultural veins and values of the era embedded in collection resources. Third, a mechanism for dynamic thematic optimization should be established. Libraries should pay attention to social changes and the evolution of user interests, deeply mine potential hot spots in collection and user data, and use public opinion analysis tools to adjust thematic directions, ensuring that narratives resonate in synchrony with the times. Fourth, thematic resonance and public participation should be strengthened. A mechanism for co-creating themes should be established; through user profiling, social-media sentiment analysis, and interactive feedback, needs can be accurately captured, and librarians, experts, and readers can be brought into collaborative planning. Fifth, the modes of thematic presentation should be innovated. By comprehensively applying multimodal and immersive technologies, abstract themes can be transformed into perceptible and interactive narrative experiences, strengthening cultural appeal and communication effectiveness.

4.2 Integrating the Library' s Virtual and Physical Spaces and Connecting Time from Antiquity to the Present

In the spatial dimension, libraries should reconstruct narrative space through systematic thinking. First, they should promote the narrativized redevelopment of the library' s physical space[41]. Through flexible adjustment of spatial materials, lighting, and layout, libraries can create learning spaces that are personalized, intelligent, and interactive. By using waterfall-flow large screens, space-capsule-like installations, or generated immersive game scripts, collection

resources can be integrated with spatial scenes, enabling readers to learn through game-based interaction and transforming static spaces into dynamic narrative practices. For example, the Helsinki Central Library in Finland uses a "stepped reading area + immersive projection"to transform space into a narrative medium that conveys the theme of "climbing toward knowledge" [42]. Second, libraries should extract cultural symbols to construct immersive cultural spaces, incorporating historical traditions and regional culture into spatial construction, and giving full play to the library' s functional role in promoting fine traditional Chinese culture and transmitting knowledge and information. For example, the Hebei Provincial Library created the "Shouzheng Study,"building an experiential scene for opera culture and art, thereby enabling Hebei Bangzi, an ancient form of opera, to be disseminated and inherited more widely. Third, libraries should use digital-intelligent technologies to construct virtual–real twin scenarios. With the help of AR/VR, they can promote the integrated construction of virtual platforms and physical spaces, and use AIGC to generate "virtual libraries" that enable real-time interactive guidance[43]. For example, the National Library of China' s "Panoramic VR Project for the *Yongle Dadian*" uses virtual-reality technology to reconstruct ancient compilation scenes, allowing users to "converse" with historical figures in virtual space. Fourth, libraries should enhance spatial openness and inclusiveness. With multilingual and speech-synthesis technologies, they can provide barrier-free guidance, achieve equal participation among diverse groups, and use big data to monitor audience preferences and emotional characteristics, thereby providing decision-making support for spatial layout and narrative optimization.

In the temporal dimension, libraries can extend temporal fields to connect the past, present, and future. First, they should integrate horizontal narrative time. Libraries can collect literature, operational, and user data through intelligent sensing technologies, and carry out knowledge extraction and discovery through natural-language understanding, text mining, association-rule analysis, and other methods, distilling vast bodies of knowledge relating to disciplines, users, and services[44]. With the help of knowledge graphs, they can organize and integrate explicit and tacit library knowledge, identify key figures, scenes, and events, organize plots according to certain causal relationships, and create synchronic narrative sequences to expand the temporal span of narrative, enabling users to enter from any node and obtain panoramic cross-sectional information about that node. Second, libraries should strengthen vertical narrative levels and build a timeline-based narrative framework that connects antiquity, the present, and the future. By using technologies such as text mining and deep learning to integrate massive data, they can form an interactive three-dimensional spatiotemporal network and reconstruct historical scenes. Emphasizing forward-looking design, valuing data insights, and improving content-generation capabilities, libraries can use time-series data prediction models to quantitatively forecast specific operational indicators, making narrative content more closely aligned with readers' needs; they can also use generative AI models to transform predicted trends and data into rich, coherent, and vivid textual

narratives or multimedia content. Third, libraries should enhance the affective power of narrative time. By using multimedia generation technologies to transform text into short videos, podcasts, or virtual interactive content, they can construct immersive experiences across time and space, making the depth of history perceptible and visions of the future visible.

4.3 Integrating the Library' s Multidimensional Perspectives to Trigger Interactive Symbiosis

Current digital narratives usually tell stories from a third-person perspective. Although this is more objective than a first-person perspective, the absence of the first-person perspective can easily weaken empathy. Library narratives should move between omniscience and immersion, constructing a multidimensional network of perspectives to strengthen readers' empathy. First, libraries should change the singular omniscient mode of broadcasting. With the help of natural-language processing and sentiment-analysis tools, they can cluster and analyze the emotions of texts on social media, accurately identify the narrative preferences and emotional trigger points of different groups, further depict user profiles, shift from standardized supply to personalized adaptation, and form individually tailored narrative strategies. For example, for introverted groups, an immersive strategy using an internal perspective is appropriate; for first-time visitors to a library, it is appropriate to retain the exploratory suspense of an external perspective. This represents a shift from standardized supply to personalized perspective adaptation. Second, libraries should encourage users to participate in content co-creation, build an interactive and symbiotic narrative-generation ecosystem, and guide users in collaborative narratives centered on the collection. For example, the National Library Board of Singapore (NLB) launched the AI story generator "StoryGen," which allows users to recreate classic stories such as "Sun Wukong Thrice Defeats the White Bone Demon." Users can reimagine these stories, adapt them into different work types, create entirely new endings, and explore various narrative possibilities[45]. Third, strengthen

From a humanistic perspective, it is necessary to move beyond the misunderstanding of "technology-only theory."In the age of digital intelligence, the essence of library narrative remains a narrative of "people" ; technology can never replace humanistic perspectives and values. Library narrative must adhere to an inward perspective centered on "people" in order to convey values, eliminate narrative blind spots, attend to the public' s real needs, preserve readers' right to observe, question, and criticize, and ensure that technological rationality always serves humanistic care.

4.4 Constructing Three-Dimensional Library Plots and Stimulating Emotional Resonance

Plot is the engine that drives narrative forward. Library narrative should logically organize itself around real events and strengthen the completeness and infectious power of narrative plots. First, it should enrich the hierarchy and

depth of plots. Intelligent content-mining technologies can be used to sort out the historical associations and evolutionary processes among massive resources, restoring fragmented authentic materials into a digital cultural-scene mosaic and providing support for cultural narratives with spatiotemporal depth. For example, based on local documents, Changsha Library developed the red-themed puzzle-solving script *Light of the Deep Alley*, transforming local Party history into a participatory story experience[^46]. Second, the logic and continuity of plots should be strengthened. Plots should be organized around narrative themes to ensure an intact plot structure of "motivation trigger—obstacle exploration—climax breakthrough—cognitive sublimation," with clear causal chains. If characters, events, and space-time are consistent, they should be integrated into the same plot and placed within the same narrative thread; if they are inconsistent, they should be treated as nodal plots or branch plots. For example, in Jinling Library' s XR project *Taodu by the Flow*, users begin from a virtual rare-book pavilion, touch ancient books to trigger time travel, and each operation lays the groundwork for subsequent plots, forming a clear logical chain and enhancing the persuasiveness and immersive quality of the narrative[^47]. Third, cross-boundary innovation in plot construction should be promoted. Under the premise of consistency in thematic logic, media such as virtual reality and interactive drama can be used to design multi-threaded, multi-ending web-like narratives. For example, Ningbo Library launched the immersive script experience *Assassinating Qin*, taking as its basis the historical episode of "when the map is unrolled, the dagger is revealed," setting up 21 branching endings, granting readers agency to rewrite the course of history, and attracting readers to deepen their understanding of Qin-Han history through role-playing[^48].

4.5 Activating Heterogeneous Library Subjects and Empowering Co-Creation by All

From the perspective of narratology, "activating heterogeneous subjects" emphasizes who has the right to narrate and how narration is carried out. Digital-intelligence technologies such as artificial intelligence, digital twins, big-data analysis, and machine learning have made it possible for libraries to transform from one-way transmitters of information into equal co-creators of narrative. On this basis, library narrative should clarify the role positioning of multiple subjects and build a co-creation pattern of "heterogeneous coexistence." First, composite subjects of human-machine collaboration should be established. AIGC virtual characters and anthropomorphized collections—such as ancient books empowered by knowledge graphs—may be recognized as "active narrators," and AI may be integrated into management and service systems as a co-creative partner[^40]. For example, the new AI librarian "Pupu 2.0" at Shanghai Pudong Library is equipped with multimodal interaction technologies and can answer readers' inquiries through speech or text and recommend books and other services, while human librarians focus on in-depth planning, thereby realizing human-machine co-creation and creative expansion and jointly improving narrative efficiency. Second, data intelligence should be used to construct

resource ontologies. Libraries possess vast quantities of multi-source, heterogeneous documentary resources; by comprehensively applying technologies such as cloud computing, data integration, and data cleaning, they can build intelligent and integrated digital corpora, thereby forming documentary-resource ontology models and knowledge graphs and establishing deep associations among dispersed documentary resources at the semantic level. Third, scenario reconstruction should be used to promote user participation as subjects and lower the threshold for creative production. By deploying "foolproof" creative tools such as voice interaction and gesture recognition, ordinary readers can be helped to participate conveniently in the production of cultural narratives, promoting the sinking of narrative authority and advancing the massification and democratization of cultural production in the age of digital intelligence[^49].

4.6 Expanding Library Media Forms and Deepening Integrated Dissemination

Library narrative in the age of digital intelligence should expand its media forms, integrating dispersed communication carriers into a collaboratively operating narrative media system rather than simply piling up technical equipment. First, physical objects, flat media, three-dimensional models, and interactive devices should be integrated to build multimodal and multisensory narrative fields. Physical-object media such as equipment and furniture; two-dimensional planar media such as text, images, and audiovisual materials; three-dimensional entity media such as replicas and models; and interactive exhibition media such as AIGC, VR/AR, and touchscreens should be used to clarify each media···

the functional positioning and collaborative logic of media, build a multisensory reading experience, and make library narratives more perceptible and more interpretive. Second, promote the deep integration of media and content, while guarding against "digital traps" and "media showmanship." To convey cultural connotations more accurately and vividly, the choice of digital media should serve content expression and cultural meaning. For example, the fully immersive theater of *Luoyang* uses VR technology and real-world spaces to redesign narrative and interactive immersive experiences, recreating such scenes as the nightscape of the Divine Capital, the Luoyang city towers, and the illusory realm of the Heavenly Buddha; players can truly feel the prosperity and bustle of Luoyang, achieving a deep adaptation between media technology and urban aesthetics [50]. Third, construct a cross-media collaborative narrative ecosystem. By connecting online platforms with offline spaces, establishing a unified content-management middle platform, and building an interconnected narrative network linking documents, spaces, activities, and digital media, libraries can ensure that users obtain a coherent and integrated cultural experience across different types of media touchpoints—such as physical book exhibitions, online virtual exhibition halls, and offline reading salons—thereby realizing integrated communication through "one-time creation, multi-terminal presentation" [51].

5 Conclusion

The age of digital intelligence has endowed library narrative with new opportunities and challenges. Through literature research and case analysis, this paper has systematically reviewed the research landscape of library narrative, derived the six core elements of library narrative—subject, time-space, media, plot, perspective, and theme—as well as their internal relationships, and, on this basis, proposed six strategies for optimizing library narrative in the era of digital intelligence.

The research shows that digital-intelligent technologies have permeated every element of library narrative: the narrative subject has shifted from "institutional monologue" to "human–machine co-creation" ; narrative time-space has moved from a linear physical form to an interactive field where the virtual and the real are intertwined; narrative media have expanded from a single text to the collaborative expression of multimodal symbols; narrative plots rely on the logical weaving of real events to stimulate emotional resonance; narrative perspective has shifted from one-way third-person narration to multidimensional interactive coexistence; and narrative themes, while adhering to knowledge enlightenment and cultural inheritance, also explore new issues of the times that are positive, inclusive, and diverse. In response to the transformation of these library narrative elements, this paper proposes optimization strategies for library narrative in the age of digital intelligence from six dimensions: theme deepening, time-space integration, perspective convergence, plot construction, subject activation, and media expansion. The digital-intelligent transformation of library narrative is not a simple superposition of technological tools, but a profound transformation involving narrative logic and mechanisms of meaning production. In this process, ensuring information equity and safeguarding cultural memory remain the value foundations of library narrative. In the future, research on library narrative needs to further explore the points of convergence between technological empowerment and humanistic guardianship, and to construct an intelligent, inclusive, and trustworthy library narrative system, thereby consolidating the library' s role in cultural leadership and its position of social trust in the process of digital civilization.

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Core Elements and Optimization Strategies of Library Narratives in Data Intelligence Era

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Abstract: [**Purpose/Significance**] The changes in user cognition and technological development in the data intelligence era have made it difficult for libraries to respond to increasingly diverse user demands through their traditional narrative mode. How to reconstruct the narrative strategies and service innovation logic of libraries from the perspective of narratology has become a key issue for current libraries' transformation. [**Method/Process**] Through literature review, this study traces the research context of library narratives, identifies six core elements of library narratives, and proposes an optimization framework for library narrative strategies based on the characteristics of the data intelligence era. [**Result/Conclusion**] The research indicates that library narratives in the data intelligence era exhibit the trends of heterogeneous

and diverse subjects, virtual and physical integration, and the convergence of media modalities. Faced with data intelligence transformation, libraries need to uphold the mission of knowledge equity and cultural memory, rely on their collections to tell stories about science, technology, and humanities, promote the deep integration of library narratives and data intelligence technologies, and implement library narrative strategies that balance inheritance and innovation.

Keywords: Data Intelligence era; Library narratives; Core elements; Optimization strategies; Service innovation

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