Design and Implementation of Visual Art Database and Research Mode Based on Big Data Thinking

1st Fan Fang
School of Design
Central Academy of Fine Arts
Beijing, China
35564584@qq.com

2nd Zhuo CHEN
School of Design
Central Academy of Fine Arts
Beijing, China
chenzhuo716@qq.com

3rd Kuan Li
Information Technology Center
Kunming University of Yunnan Education Department
Kunming, China
likuan@kmu.edu.cn

4th Weiguo HOU
School of Art and Design
Beijing Institute of Fashion Technology
Beijing, China
43523676@qq.com

5th Chang Liu
the *dept. of Plastic and Cosmetic Surgery*
Beijing Shijitan Hospital, Capital Medical University
Beijing, China
liuchang850@hotmail.com

Abstract— **Research background**: The current mainstream online databases and platforms at home and abroad are mainly divided into two types: textual literature databases and image professional databases. The former integrates various academic literature resources such as academic journals, degree and conference papers, newspapers, books, etc., while the latter is a comprehensive image database (online museum) characterized by high-quality images and graphics. But in the field of visual arts research, researchers often need to simultaneously consult academic literature and high-quality images, and the data of the two attributes must be able to establish a real-time connection for comparison and analysis. The existing online databases and research models are difficult to meet the requirements.**Objective**: Based on the current problems, we explore the establishment of a comprehensive information resource library for visual art literature and images based on big data thinking, and create its research model.**Method**: Based on the big data thinking, we construct an online database and research model based on a data framework with underlying multidimensional correlations and efficient front-end data correlation presentation. This model builds bridges between different "data islands" and establishes a multi-dimensional data association mechanism between image databases and textual literature databases. Through a well-designed user interface and behavior pattern, it provides users with a good user experience and comprehensively improves the efficiency of academic research and art dissemination.**Result**: This model has been applied to multiple online database platforms. By comparing with the traditional mode, we found that the new mode has better user efficiency and experience than the traditional mode. Through a survey questionnaire, it was found that visitors have a high overall satisfaction with the new model.**Conclusion**: The new model constructed by this research institute has greatly improved the user experience and research efficiency by designing and constructing underlying data models centered around data.

Keywords— Big data thinking, Visual Arts Database, Literature database, User interface design

I. INTRODUCTION

Professional databases and online platforms in the field of visual arts should not be limited to online galleries or museums, but should be combined with traditional textual databases, with data as the center, to build a more universal and integrated art data ecosystem, connecting data of different attributes to each other and becoming more complete, in order to achieve maximum value.

A. Background

In the information age, the problems of the information composition factors (construction, generation, dissemination channels, and audience acquisition habits) of traditional visual arts are increasingly prominent [1]. It is difficult for researchers to conduct in-depth exploration of relevant information in specific art categories using traditional methods, and it is even more challenging to conduct systematic research [2]. Therefore, it is necessary to digitize and scientifically archive traditional art data information to form a knowledge base and online database. This not only greatly improves research efficiency through a good interface interaction experience, but also enables art entities carrying different cultures to achieve better dissemination effects [3] .

B. Present situation

At present, with the development of media technology, many Internet based online databases and platforms have emerged at home and abroad that can be used by researchers [4].They can be roughly divided into two categories: one is based on written documents such as art journals, magazines and papers, supplemented by picture information in articles. The other type focuses more on graphic data, with high-quality artwork images as the main focus [5].

1) Mainly based on textual literature, they are mostly full-text databases, such as China National Knowledge Infrastructure, Chinese Social Science Citation Index Database, Chaoxing Digital Library in China, and JSTOR, Project MUSE, ProQuest in foreign countries;

Corresponding author: Chang LIU, Associate Chief Doctor, Beijing Shijitan Hospital, Capital Medical University,No.10 Tieyi Road Haidian Dist, Beijing,China, Email: liuchang850@hotmail.com

Figure 1: Journal Storage Full text Database

JSTOR, also known as Journal Storage, was founded in August 1995 as part of the Meilun Foundation's Digital Archive Program. It is a non-profit organization dedicated to digitizing expired journals [6] . The JSTOR full-text database aims to include expired Western language journals, systematically establish digital archives of core academic expired journals, save physical space, and provide full-text retrieval.

Figure 2: China National Knowledge Infrastructure (CNKI)

China National Knowledge Infrastructure (CNKI) was founded in June 1999 as an information technology construction project aimed at achieving the dissemination, sharing, and value-added utilization of knowledge resources throughout society. It was initiated by Tsinghua University and Tsinghua Tongfang, and is a concept of national knowledge infrastructure. It is an academic platform under Tongfang Co., Ltd. [7].

2) Representative visual information mainly based on graphics, such as Artlib in China ArtBase、ARTLINKART，Google Arts&Culture, ARTSTORE, Berg Fashion Library, and others from abroad;

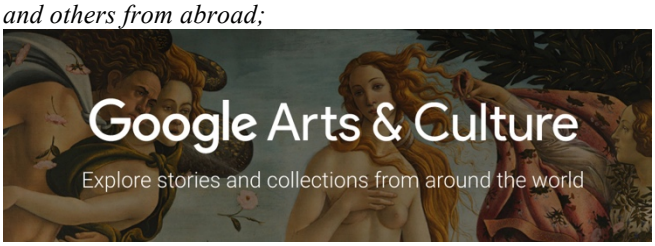

Figure 3 google arts & culture

Google Arts and Culture is a digital platform for cultural and artistic content under Google, which originated from a project launched by Google in 2011 called the Google Art Project [8].

C. Analysis of Existing Problems and Causes

The role of these online databases and open platforms in art dissemination and research cannot be underestimated. But there are also some shortcomings, mainly manifested in:

1) Lack of targeted systems that conform to the characteristics of visual arts disciplines

Figure 4: The coverage of disciplines is relatively wide, mostly in the categories of humanities and social sciences

Online databases and open platforms have a relatively wide coverage of disciplines, but mostly fall under the categories of humanities and social sciences [9]. Online open platforms related to visual arts mostly rely on online databases of humanities and social sciences, with few focusing on one or several art majors or disciplines, and information distribution tends to be flat, lacking vertical depth, making it difficult for data to achieve vertical extension [10].

2) Lack of high-quality graphic and image information in literature databases.

Figure 5: Journal Storage (JSTOR)

Although journal articles and other data are relatively abundant, the lack of independent databases for works and artists results in existing graphic and image data mostly relying on literature and article content, mixed with characters, and unable to be presented separately or form a centralized data pool, making it difficult for information to form multidimensional correlations [11].

3) The image database lacks relevant textual literature and research data support

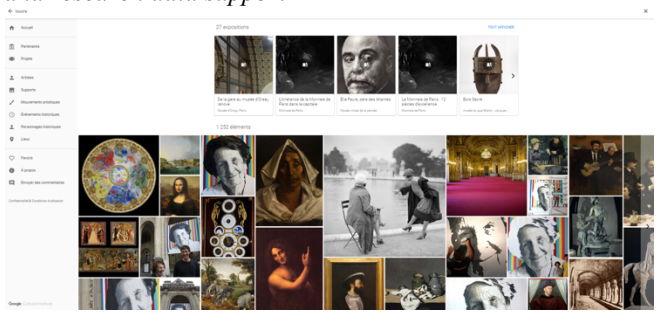

Figure 6 Google Arts&Culture - Art Display

Although there is abundant graphic image data in the image database, it is difficult to conduct comprehensive and systematic research on art works, artists, or art events due to the lack of many to many related literature research data support [12].However, data related to visual art works mostly rely on major online art galleries and are usually only a small category. The displayed graphics and images mostly only have basic introduction text, lacking relevant papers and reviews (journal literature databases), related art activities, exhibition information, and other data. Due to the lack of an independent artist database, artist resumes are often limited to simple textual introductions, appearing thin. The missing and prominent categorical features mentioned above have formed "data islands" with different data attributes, which directly prevent users from conducting multi-level and multi-dimensional research, resulting in low

efficiency. With more and more people devoting themselves to the research and creation of visual arts in recent years, it is necessary to establish a comprehensive and efficient research mechanism and dissemination platform.

II. OBJECTIVE

Based on the current problems, we explore the establishment of a comprehensive information resource library for visual art literature and images based on big data thinking, and create its research mode to build bridges between different "data islands". On the one hand, we hope to accelerate the progress of digitizing and archiving traditional visual art literature, graphic images, physical objects, and other resources through the establishment of this resource library. Only by digitizing resources, leaving clear graphic images and digital archives that can comprehensively present the full picture of the research object, supplemented by relevant literature data and resources, can high accuracy be achieved in the study of art events, artists, and works [13].On the other hand, we hope that the front-end interaction design and behavioral logic based on this online database will provide not only a perspective and literature, but also a specialized research method for the visual arts discipline. By studying the correlation between various types of data, it is possible to more accurately grasp the overall characteristics and development trends of the research object [14,15].

This study is conducive to strengthening the understanding of the origin of visual art research and user interaction behavior, and can improve the research on the extension of traditional visual art communication and research in individual user behavior. The solution to a series of problems caused by the shortcomings of traditional research models can improve the research status of the application of textual literature data in the visual arts field, which is mainly based on image reading mode, empowered by digital technology, and further expand the scope of digital research and dissemination of visual arts [16].

III. METHODOLOGY

Big data thinking is a data centric way of thinking that aims to collect, analyze, and utilize massive amounts of data to deeply mine and comprehensively analyze all relevant data, make decisions, and solve problems.

Based on big data thinking, we construct an online database and research model based on a data framework with underlying multidimensional correlations and efficient front-end data correlation presentation. Unlike the data presentation and research mechanisms of online art platforms or online museums, and not limited to the traditional research model of humanities and social science textual literature databases, this model connects online libraries and textual literature databases such as journal articles from the bottom layer, effectively establishing a multidimensional correlation mechanism for data. And through a well-designed media terminal interface, more data can be associated and presented to enhance the efficiency of academic research and art dissemination.

At the underlying data architecture level, this pattern is centered around data and forms multi-dimensional correlations through reasonable design. Driven by data, automatic full sample analysis is conducted under specific rules to trace information, and by analyzing the correlation between various types of data, many patterns and trends that are difficult to discover by traditional methods are discovered. At the front-end user interaction level, we follow the KISS principle and strive for simplicity and efficiency. And through the balance and optimization of Hick's Law, users can obtain more and effective information in the shortest possible time, bringing them a comprehensive information acquisition channel and a good user experience.

A. Conduct user behavior logic analysis and design information framework based on data attributes

In the process of analyzing user behavior logic, on one hand, we conduct behavior event analysis, obtain data through buried points, record the specific behaviors of users in the event, and analyze and define the results. On the other hand, conducting retention analysis, focusing on user and functional dimensions, and analyzing from different perspectives. At the level of process optimization, more funnel analysis is conducted around core business conversion and other links to obtain feedback and make adjustments and optimizations.

At the level of information framework design, we divide the data framework into four main parts based on information categories: people, works, events, and texts. The "people" section focuses on artists and includes information such as art resumes, works, exhibitions, academic activities, and published articles; The work section is centered around the work, involving basic information about the work, creator, exhibition, award and collection information, comments, etc; Events can be divided into two categories: the first is more traditional, such as academic updates, exhibition reports, and news information, and the second is thematic, such as exhibition, project, and academic activity modules. In addition to basic introductions, they also cover artists, works, and all related dynamic information; The "text" section mainly consists of written literature, such as journal articles, reviews, academic seminar records, etc.

In this way, a multifunctional module combination will be formed at the front-end interaction level. Each functional module can be decomposed into several sub functions and interfaces. According to the established pattern, a three-dimensional framework combining a tree structure and a star structure is ultimately formed.

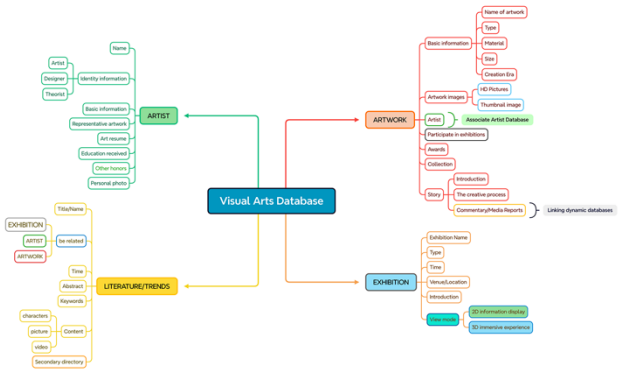

Figure 3-1 Data centric - Multi dimensional presentation module structure of information

B. Establishing a data framework based on new information logic

We establish a data analysis framework model through several parts: data collection, data storage, data processing,

and data analysis. Data collection is the starting point of the entire process, and we have employed various techniques and methods during the collection process. In the initial stage of data storage, we mainly focused on relational databases suitable for structured data. At the same time, to prevent data loss or leakage, we established backup strategies and various security measures. The data processing part involves data cleaning, transformation, and integration. In this stage, we used ETL tools, data processing scripts, and frameworks. The data analysis process usually includes data exploration, modeling, and validation. In the data analysis process, the main tools and techniques we use are SAS and SPSS.

During the construction process, we digitize the graphic and textual information in traditional media (such as paper-based books, picture books, and other historical documents) one by one, then proofread, reorganized, and classified them. After a series of testing and error correction processes, we enter the digitized information into the database for archiving by category. For example, the work can be divided into modules such as information hotspots, information attributes, and interactions. Information hotspots consist of basic information, artists, exhibitors, awards, publications, collections, comments, and other parts; The information attributes are divided into text, images, audio, video, etc.

C. *Creating a New Model Based on a Data Framework*

Build models for the framework from a data perspective, including functional models, information models, data models, and control models. Identify entities from abstract relationships, analyze and classify them, restructure them, and ultimately complete model reconstruction. This results in a data structure graph where all nodes are no longer just a single data, but a dataset. For example, a work can be expanded from nodes, in addition to its basic information and high-definition images, multimedia introductions, it can also be associated with other exhibition, award, collection and other information of the work. At the same time, other works in the series where the work is located, as well as works of other artists in the category of the work, can also be seen. It can also discover related information of other similar works from various aspects such as size, color, style, etc., and associate them with relevant databases and information collections, layer by layer, and so on. Ultimately, a new star shaped system based on art big data will be formed.

D. *User Interface Design*

As a medium for interaction between people and information, the user interface is the functional carrier and typical feature of information products. By analyzing the data obtained from monitoring user behavior, and fully understanding user behavior habits, a solution is formed. On this basis, analyze and design the operational logic. Compared to conventional user interfaces, this mode involves and presents a larger amount of information. In order to achieve a better user experience and higher efficiency, we use the interactive usability prediction model [17] to evaluate the feedback data of users selecting target information items, predict the user behavior of objects, and improve the interactive experience and usability of the user interface. Ultimately, it enhances the correlation of various attribute massive data and improves the user's reception effect of information.

The user experience design process includes user participation, iterative design, multidisciplinary teams, and usability testing. After obtaining first-hand demand data through research, user interviews, and feedback analysis, in the design process, based on the Schick's law and related analysis models [18], We conducted research on user feedback, continuously adjusted and improved the design, and evaluated and improved it in a timely manner. In addition, our team includes designers, developers, and user experience experts, which enables the team to understand user needs from multiple perspectives and design better solutions. After the product goes online for trial operation, we also monitor and record the behavior of real users when using the product through technical means, analyze the data, and optimize and improve the product to ensure that the product can be updated and iterated to a certain extent during each testing cycle.

In the new model we designed, the design of the online database front-end user interface follows the KISS principle (Keep It Simple, Stupid), that is, the "simple interface principle", and has made multi terminal adaptation, so that under different resolutions of different Internet terminals, users can be presented with the best layout and visual effects, and different interfaces have been designed with their own characteristics of interaction methods to obtain the best user experience [19].Then, we validate and optimize the designed interface and interaction form using Scheck's law. Schick's Law was proposed by William Edmund Hick and Ray Hyman in 1952. Reflect the relationship between the number of choices faced and the required reaction time. The mathematical formula is as follows: RT=A+B.log2 (N)

Among them, RT represents decision time, A represents the total time unrelated to the decision (previous cognition and observation, etc.), B represents the time for option recognition and processing (a constant derived from experience, approximately 0.155 seconds for humans), and N represents the number of options available. From the formula, it can be seen that the fewer options, the faster the decision [20].

Through the analysis and optimization of feedback information from the analysis model, efficient information classification and combination have improved users' acceptance of information and reading efficiency. At the same time, through standardized interaction behavior design, the user experience has been improved, and the information reception rate of users during product use has significantly increased, greatly enhancing the usability of the system [21].

In the end, we obtained an interface interaction mode centered on the multidimensional presentation of visual art information. The way users obtain information is multidimensional, and any information node can be regarded as the root node of an information tree. Through the root node, it can expand infinitely and automatically associate with other related information, forming a three-dimensional data network.

E. *User Feedback Strategy*

During the model's online testing process, we proactively collected, categorized, and analyzed user feedback to identify user needs in a data-driven manner, forming a multi-channel feedback mechanism [22]. This mechanism is used in multiple

interface modules, and we have designed a computer program to monitor and record real-time access data for each information node, such as dwell time, click through rates, and online interactions, and record relevant data. Through data relationship design and comparison, user behavior analysis is conducted[23]. In addition, we also conduct periodic surveys, interviews, and email communications with some users to continuously iterate and optimize product features and user experience, ensuring that problems are effectively resolved.

IV. RESULT

This model has been applied to multiple online knowledge bases and application platforms. Among them, we conducted real-time monitoring and analysis on the Chinese watermark woodcut literature database (new model), and randomly selected a traditional online database platform: the Central Academy of Fine Arts Teacher Studio - an online database based on artists and art events (traditional model). We compared the two and finally established the advantages and completeness of this new model, which was officially launched.

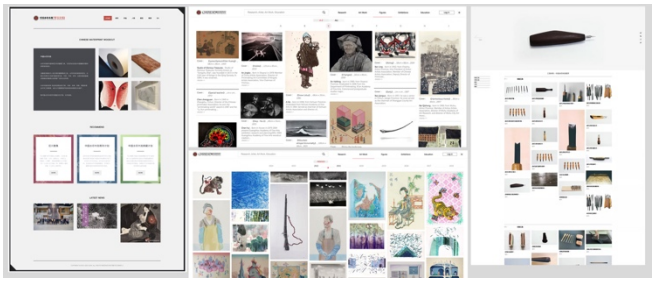

Figure 4-1 Chinese Water-based Woodblock Literature Database

Figure 4-2 Central Academy of Fine Arts Teacher Studio

The design test lasts for 120 days and is divided into three steps:

A. *Step 1:*

Design high fidelity models for specific interfaces such as dynamic content of literature, artists' personal and exhibition topics, connect to databases and go online. Conduct user experiments and collect relevant data. Through calculation and behavior pattern analysis, obtain relevant values related to Scheck's law in the new model, compare them with the expected design values, and optimize the interface layout. At the same time, data recording and comparison are also synchronized with existing traditional models.

B. *Step 2:*

While conducting user experiments, conduct real-time monitoring and statistics on third-party platforms, compare them with traditional models, and adjust and improve the database association framework based on third-party online real-time monitoring data (such as visit volume, user stickiness, bounce rate, etc.) to optimize the underlying data structure.

C. *Step 3:*

Based on the optimization results of the data layer in step two, and then feedback to the front-end user interface, combined with step one, conduct comprehensive optimization of the interaction logic design and data display level.

Repeat this process until all testing feedback data meets the design expectations.

Among them, in the interface interaction logic test of the Chinese watermark woodcut literature database using the new model, we conducted a 30 day user behavior record and questionnaire survey. We selected 110 users, aged between 20-60 years old, who all use their right hand for relevant operations and are proficient in using Windows and Mac operating systems. For the Hick's Law, we preset the interface prototype menu and information nodes as fixed and familiar Chinese terms, with a fixed order of arrangement. Each participant is required to complete 5 sets of information click experiments, with 30 different click target tasks assigned to each set. Analyze and optimize adjustments based on real-time recorded data, and then conduct testing repeatedly.

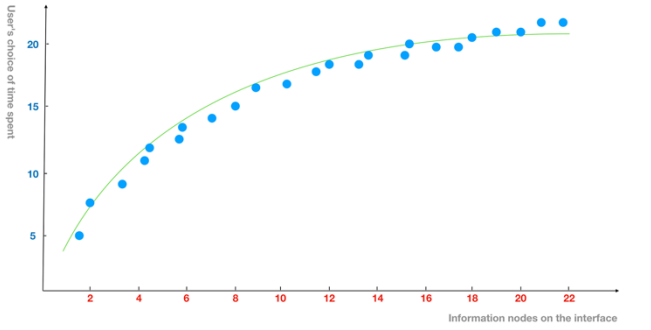

Figure 4-3 Real time curve changes of users clicking on target information nodes within a given time in the new mode

Through testing, we have controlled the number of clickable information hotspots on each independent interface within 12-18. Within this range, the user's selection time and the number of information nodes required to be displayed can reach a balance point. If there are too many information nodes, the user's selection time will greatly increase, and if there are too few nodes, it is not conducive to the communication of information.

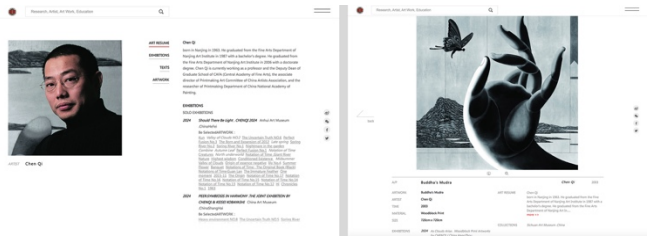

Figure 4-4 Artist Interface of Chinese Water-based Woodblock Literature Database

Figure 4-5 Personal page of the online artist library of the Central Academy of Fine Arts Teacher Studio

In addition, dynamic monitoring of the above online databases will be conducted for a period of 120 days, publicly available to the entire network, and real-time monitoring and statistics will be conducted through third-party platforms. Regarding 1, click through rate; 2. User stickiness; 3. Observe, record, and analyze data such as dwell time. The following is the real-time monitoring data obtained from the online artist database of the Central Academy of Fine Arts Teacher Studio and the artist section of the China Watermark Woodcut Literature Database from September 1, 2023 to December 30, 2023. The following figure shows a data comparison chart of visit click through rates and trends, where the red line represents the click through rate of the new mode and the blue line represents the click through rate of the traditional mode.

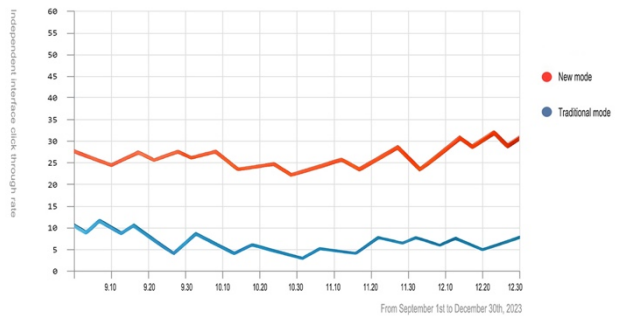

Figure 4-6 Comparison and analysis of interface click through rates

Figure 4-6 shows the monitoring and statistics of user clicks on the same exhibition theme/artist's personal page. As can be seen, in traditional mode, clicking events within a single interface are usually accompanied by a pop-up. This is because in the traditional mode, the information content in the interface is presented in a straightforward manner and can only be browsed and read without any click events unless the page needs to be popped up or closed. But under the new mode, the click through rate has increased dramatically. This is because in the new mode, the interface information content is composed of multiple information nodes, each of which can be viewed as a link. Users have multiple information hotspots to choose from and click on, view new content within the interface, or jump to other information interfaces.

The following is an analysis chart of user viscosity statistics data. User stickiness, also known as the degree of user stickiness, is an important indicator for attracting users to visit again or stay on the interface for a long time.

Figure 4-7 Comparison and Analysis of User Viscosity Data

As shown in Figure 4-7, within 120 days of monitoring and statistics, in the same information topic interface, in the traditional mode, jumping out is basically equivalent to leaving, and only 7% of users choose to visit again. But in the new mode, most users jump by clicking on the information nodes they are interested in. After a series of browsing, 23% of users choose a second visit and 33% of users choose a third visit.

The following figure shows the comparison of the user's stay time in the artwork section of any artist's personal page in the database obtained by the program. Blue represents the new mode, red represents the traditional mode:

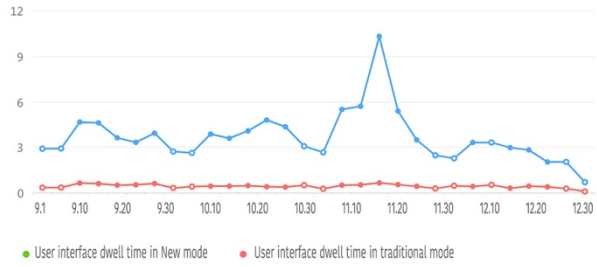

Figure 4-8 Comparison of viewer interface dwell time

As shown in Figure 4-8, the average total dwell time of users on the traditional mode interface is less than 1 minute, and some (or interesting, more attractive) dwell times reach about 2 minutes. Compared to the traditional mode, in the new mode, viewers can directly jump between different columns to view new content by clicking on information hotspots. The average dwell time on a single interface is about 3 minutes, with many reaching 5 minutes and the longest reaching 11 minutes.

We compared with previous online databases and found that under the new model, users' attention to the entire website has significantly increased. In some cases, frequent bounce rates are accompanied by equal or even more page opening times, and the dwell time on a single independent information interface is longer.

At the same time, we conducted 5 user visits and 2 questionnaire surveys, interviewing 290 users. Among them, 286 users stated that the new mode provides a more efficient user experience and easier access to information, while 4 users believed that both modes have their own strengths. At the same time, we have distributed more than 600 questionnaires via the Internet or offline, and received 570 valid questionnaires. More than 95% of users agree with the use experience under the new model [24] .

V. DISCUSS

The development of visual arts includes two levels: creation and research. The relationship between creation and

research is interdependent and mutually reinforcing. Creation provides samples and cases for research, and the theories and achievements generated by research promote the development of creation. The new mode of interface interaction behavior based on big data thinking is the product of these two levels. Compared with traditional online knowledge bases, the literature database adopting the new mode can make up for the shortcomings of traditional knowledge bases in data association and integration, and can improve research efficiency by bringing users a new user experience [25]. By analyzing a large amount of data, patterns, trends, and correlations are discovered. We hope this can provide a new way to establish specialized literature data for the discipline.

As one of the commonly used and main methods in the study of art theory, literature research involves consulting relevant books, professional journals, academic papers, and other literature to understand and analyze existing research results and analytical viewpoints. With the development of media technology, many Internet based online databases and platforms have emerged for researchers at home and abroad. The guiding ideology and academic foundation of the architecture of conventional online databases in humanities and social sciences are mostly centered on research in library and information science and information resource management [26]. Centered around the principle of indexing and its implications, the relationship between indexing and directories, table of contents, and databases. In recent years, with the development of technology, the updating of AI's text semantic analysis technology, and the development of research paradigms, many online knowledge bases and literature databases have provided researchers with more interactive possibilities, bringing new experiences and improving the efficiency of searching and screening academic literature resources [27]. However, in the field of visual arts research, traditional data frameworks and front-end interactive behavior patterns still have significant limitations in indexing and constructing textual literature. When researchers want to obtain more information, especially rich media information such as video introductions, creative stories, and even films, conventional literature libraries are difficult to meet the requirements.

However, the lack of text document library in the construction and presentation of graphic and image data may also be a natural limitation, but it is the online image library and online exhibition halls and databases that are good at. The latter are presented to the audience in a new form through Internet terminal equipment, supplemented by digital media technology. There are rich and diverse interactive display methods, and the audience can obtain the best user experience [28]. It can always be centered around data, presenting rich media data such as video, audio, text, and images to users in all aspects.

Therefore, we are trying to combine the two. On the one hand, optimizing the framework and architecture of graphic image data, expanding label based image data processing and tags with representation business information, information nodes are no longer characters or simple textual information, but directly associated with textual literature libraries, and then integrating and classifying various types of data. On the other hand, based on traditional textual literature databases, rich media data (images, videos, audio, etc.) and character data are separated, classified according to attributes, and specific associations and calling methods are established. In this way, flattened information can become three-dimensional. By optimizing the front-end interaction behavior logic, it provides users with a comprehensive information acquisition channel and experience [29].

The impact on future literature databases and knowledge bases:

This new model based on online literature database gives full play to the advantages of the Internet and big data: the character and graphic image data are split at the bottom and stored by database classification, the application layer is associated and reorganized according to specific requirements, and the user interface is diversified through new media means to present data. The interaction means are more diversified, and users can obtain more comprehensive information, which is better and more convenient. By adopting this model, professional researchers can easily access relevant historical literature, academic papers, journals, yearbooks, artist information, album collections, academic monographs through the system, and can compare and analyze them online. These pieces of information will naturally appear to users during the browsing process. Researchers from around the world can use this model to collect, compare, and study data on the platform. Because this model provides not only a perspective and literature, but also a specialized disciplinary research method for the art world to attempt. At the same time, we believe that this also provides a reference sample and illustrative paradigm for other professional disciplines in the field of art in the future.

VI. CONCLUSION

The visual art database constructed by this research institute has improved the accuracy of information acquisition through the design and construction of underlying data models, with data as the center, and effective data cleaning and mining techniques, providing users with the possibility of more comprehensive data analysis and in-depth data mining. Meanwhile, the multidimensional correlation of data breaks the limitations of traditional data processing. In the new mode, users can analyze different data sources and related professional knowledge bases to discover the maximum correlation value between data and discover new trends. The new model has improved the user experience of using online professional databases and significantly enhanced research efficiency.

This model also has some shortcomings: the premise for building this new model is to obtain sufficient and effective data, otherwise it is difficult to establish effective correlations between data, which will affect the user experience. It is necessary to establish channels and mechanisms for data collection and screening to ensure that the collected data is both comprehensive and accurate.

To sum up, from the perspective of research on interface interaction behavior mode under big data thinking, this paper constructs a new underlying data structure and data association logic. At the user end, it redesigns the interaction and behavior mode of online knowledge base, providing theoretical and empirical verification for users to better conduct online browsing and research through Internet terminals. I hope this study can provide assistance for future research on the design and development of professional online knowledge bases, so that they can better serve users.

We will continue to conduct further research, especially on the reshaping of digital media art works in the knowledge base, as well as whether big data technology and AI technology can be effectively utilized. In subsequent research, we will gradually improve relevant theoretical and practical methods to form a more complete knowledge system.

ACKNOWLEDGMENT

Finally, I would like to express my gratitude to the Research Department of the Central Academy of Fine Arts for their support, Professor Chen Qi, and fellow students Weiguo HOU, Wang Lin, and Shaofeng DUAN for providing a wealth of valuable digital resources, including many important series exhibitions and academic materials, multimedia materials for tracking and presenting works at the Venice Biennale, and digital resources for national art fund projects. Thank you to Hui Ding, Wen Chen, and Mr. Sima, Cui Li, Pengcheng Yang, Bing Xu, Yahui Wang, Haidi Wang, Tianchan Chen... for providing a lot of help in data construction, not only providing a large amount of digital resources, but also offering suggestions for solving problems that arise during the project process. Thank you also to the project development team members Songwei PU, Liang Peng, Kuan Li, Fan Liu, and Da Liao for their silent efforts. A journey of a thousand miles begins with a single step. Data construction will be a long and challenging process, but I believe it will have infinite possibilities for the future!

REFERENCES

[1] Feng Changyang, Li Danyang, Li Xinlai. Analysis of the Research Situation of Chinese Citation Index [J]. Libraly Journal, 2020, 39(1): 67-75.

[2] Cohen, Kathleen, James Elkins, Marilyn Aronberg Lavin, Nancy Macko, Gary Schwartz, Susan L. Siegfried, and Barbara Maria Stafford. “Digital Culture and the Practices of Art and Art History.” The Art Bulletin 79, no. 2 (1997): 187–216.

[3] Devine, Jane, and Francine Egger-Sider. “Going Beyond Google Again.” American Libraries 45, no. 3/4 (2014): 48–51.

[4] Sun Qi, Zhang Xiaomei. Analysis on Development of the Book Citation Index Databases between Home and Abroad[J]. Libraly Journal, 2017, 36(6): 84-87.

[5] Banks, Kimball M., and J. Signe Snortland. “EVERY PICTURE TELLS A STORY: HISTORIC IMAGES, TIPI CAMPS, AND ARCHAEOLOGY.” Plains Anthropologist 40, no. 152 (1995): 125–44.

[6] Gitelman, Lisa. “Searching and Thinking About Searching JSTOR.” Representations 127, no. 1 (2014): 73–82.

[7] Hannas, Wm. C., and Huey-Meei Chang. “China’s ‘New Generation’ AI-Brain Project.” PRISM 9, no. 3 (2021): 18–33.

[8] Hope, Erling. “BETWEEN GOD AND GOOGLE: REFLECTIONS ON THE TECHNOLOGY PROJECT OF THE SOCIETY FOR THE ARTS, RELIGION AND CONTEMPORARY CULTURE.” CrossCurrents 62, no. 2 (2012): 235–59.

[9] Ye Jiyuan.The Innovation,Significance and Enlightenment of the Database of Chinese Book Citation Index(CBkCI) Research & Development[J].Journal of Academic Libraries,2013,31(1):48-53.

[10] Ye Jiyuan, Wei Ruibin, Song Ge. Investigation and analysis of the current situation of Chinese humanities and social sciences academic journals[J]. China Publishing.2006(10):17-21

[11] Chung, Sheng Kuan. “Art Education Technology: Digital Storytelling.” Art Education 60, no. 2 (2007): 17–22.

[12] Hopkins, Joanna. “The Royal Society Picture Library Database.” Notes and Records of the Royal Society of London 66, no. 1 (2012): 105–10.

[13] Seren, Tasha. “Integrated Art Documentation: The Guggenheim Perspective.” Art Documentation: Journal of the Art Libraries Society of North America 20, no. 1 (2001): 31–35.

[14] Spriggs, Amy D., David L. Gast, and Kevin M. Ayres. “Using Picture Activity Schedule Books to Increase On-Schedule and On-Task Behaviors.” Education and Training in Developmental Disabilities 42, no. 2 (2007): 209–23.

[15] Camarero, Carmen, María José Garrido, and Rebeca San José. “Efficiency of Web Communication Strategies: The Case of Art Museums.” International Journal of Arts Management 18, no. 2 (2016): 42–62

[16] Spriggs, Amy D., David L. Gast, and Kevin M. Ayres. “Using Picture Activity Schedule Books to Increase On-Schedule and On-Task Behaviors.” Education and Training in Developmental Disabilities 42, no. 2 (2007): 209–23.

[17] Lane D M, Napier H A, Batsell R R, et al. Predicting the skilled use of hierarchical menus with the keystroke-level model[J].Human-Computer Interaction, 1993, 8(2):185-192.

[18] Hekler E B, Klasnja P, Froehlich J E, et al.Mind the the- oretical gap:interpreting, using, and developing behavioral theory in HCI research[C]//Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. ACM, 2013:3307-3316

[19] Blair-Early, Adream, and Mike Zender. “User Interface Design Principles for Interaction Design.” Design Issues 24, no. 3 (2008): 85–107.

[20] Kieras, David E. “An Overview of Human-Computer Interaction.” Journal of the Washington Academy of Sciences 80, no. 2 (1990): 39–70.

[21] Reilly, Susan S., and John W. Roach. “Designing Human/Computer Interfaces: A Comparison of Human Factors and Graphic Arts Principles.” Educational Technology 26, no. 1 (1986): 36–40.

[22] McKeen, James D., Tor Guimaraes, and James C. Wetherbe. “The Relationship between User Participation and User Satisfaction: An Investigation of Four Contingency Factors.” MIS Quarterly 18, no. 4 (1994): 427–51.

[23] Satzinger, John W., and Lorne Olfman. “User Interface Consistency across End-User Applications: The Effects on Mental Models.” Journal of Management Information Systems 14, no. 4 (1998): 167–93.

[24] Mayer, Jennifer, and Cheryl Goldenstein. “Academic Libraries Supporting Visual Culture: A Survey of Image Access and Use.” Art Documentation: Journal of the Art Libraries Society of North America 28, no. 1 (2009): 16–28.

[25] Fang Fan.The evolution of Internet ecology in visual arts universities[J].Journal of Tianjin Academy of Fine Arts,2019,(02):104-106.

[26] Ye Jiyuan.The essential attribute of index and its role in academic norms and evaluation[J].Library and information knowledge,2023,40(06):61-67.

[27] Li Jie, Meng Ye, Jin Jiali, et al.A comparative study of emerging science citation index databases[J].Journal of academic libraries ,2021,39(06):48-55+77.

[28] Brewer, Camille Ann. “Fine Art Collection Management in Urban Public Libraries.” Art Documentation: Journal of the Art Libraries Society of North America 30, no. 2 (2011): 74–78.

[29] Gendron, Heather, and Eva Sclippa. “Where Visual and Information Literacies Meet: Redesigning Research Skills Teaching and Assessment for Large Art History Survey Courses.” Art Documentation: Journal of the Art Libraries Society of North America 33, no. 2 (2014): 327–44.