



A Study on the Digital Revitalization of Lion Motifs in Chinese Ming and Qing Wooden Structures from a Typological Perspective

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Abstract. This paper addresses the challenges faced in preserving the lion motifs in wooden structures from the Ming and Qing dynasties in China. Focusing on these motifs, it explores digital methods for the revitalization and transmission of decorative designs in wooden architecture, offering insights for the development of intangible cultural heritage (ICH). By examining the rich cultural value of the Chinese lion motif and leveraging contemporary digital technologies, the paper selects samples from Ming and Qing wooden structures. Using archaeological typology as the foundation, the lion motifs are initially classified based on their architectural components, and further differentiated by dynamic changes, overall features, and decorative elements. Through this classification, the various forms, combinations, and cultural meanings of lion motifs in Ming and Qing wooden structures are clarified. The motifs' material and spiritual cultural values are extracted and reinterpreted, with the use of digital technologies to create a mobile app that promotes the preservation, transmission, and innovation of these motifs.

Keywords: Lion Motif, Archaeological Typology, Digital Revitalization and Transmission.

1 Introduction

China has long prioritized the protection, transmission, and promotion of intangible cultural heritage (ICH)[1]. An increasing number of scholars are engaged in the study of traditional cultural heritage. The lion motif in Chinese traditional wooden structures first appeared in the mid-Ming period and peaked during the late Ming and Qing dynasties. These motifs are primarily found on components such as dougong (bracket sets), corbels, and beams, with concentrations in regions like Chaozhou, Huizhou, Jiangsu, Zhejiang, and Shanxi. The evolution of these lion motifs serves as an important reference for studying the decorative styles of wooden structures in different regions during the Ming and Qing periods.

The development of digital technology provides a technical foundation for the revitalization and innovation of ICH, becoming a key topic in modern research. By using the lion motifs in Ming and Qing wooden structures as a case study, this paper analyzes

the ecological characteristics of ICH and explores the potential paths for digital protection. This can offer valuable reference points for the preservation and revitalization of ICH.

2 The Concept and Basis of Typology

The classification of lion motifs in wooden structures from the Ming and Qing dynasties is based on archaeological typology, adhering to the conceptual framework established by archaeologists for the classification of artifacts. This involves two aspects: First, "classification," which refers to distinguishing and grouping objects based on their commonalities or similarities. Second, "excavation," as proposed by Anton Schweighofer, suggests that the goal of typological research is to analyze existing objects deeply, uncovering potential logical relationships among them and identifying previously undiscovered patterns rather than inventing new things[2]. In short, typology involves grouping seemingly unrelated or loosely connected objects under specific conditions, establishing a new classification order to discover hidden relationships and continuities. Based on this foundational logic, research can be expanded to explore "new realms."

In the 1920s, American archaeologist Alfred Kidder successfully established a cultural sequence in the southwestern United States. Subsequently, this theoretical framework was further developed by Gordon Willey and Philip Phillips, who argued that cultural development involves not only a vertical transmission of traditions but also extensive horizontal influence and replacement[3]. The development of typological forms does not require direct stratigraphic relationships for each style[4]. Therefore, this study, during its data collation stage, did not strictly adhere to an evolutionary sequence of lion motifs but rather classified them based on their stylistic features in relation to the geographical and socio-cultural environment of the structures. Factors such as the symbiotic relationship between decorative motifs and architectural forms were also considered, aiming to objectively reflect changes in the shape of lion motifs in traditional wooden structures.

3 Classification and Differentiation of Lion Motifs in Ming and Qing Wooden Structures

Lion motifs in traditional Chinese wooden structures are primarily found in the Ming and Qing periods. These motifs are diverse in style and rich in meaning, but there is no comprehensive systematization or integration of the data. Most studies focus on individual cases, and due to the complexity of the designs, finding consistent compositional logic is difficult, and traditional methods of classifying plane patterns do not apply. Therefore, this paper adopts an archaeological typology approach to explore the fundamental morphological features of lion motifs in wooden structures through a "classification and differentiation" method.

3.1 Classification and Differentiation

The term "typology" was introduced by Japanese archaeologist Hamada Kosaku in his translation of Montelius's typology methodology[5]. Although the original work did not provide a clear definition of "typology," Hamada emphasized that "typological research should first focus on the shape and decorative patterns of artifacts.[6]" Chinese scholar Xia Nai proposed that "according to the principle of evolution, objects of the same nature evolve gradually, either progressing from simple to complex or regressing from complex to simple, forming a continuous sequence, with each stage having its own representative type.[7]" To this day, the form and decoration of objects remain indispensable factors in typological research.

In this study, the classification of lion motifs in wooden structures is marked by uppercase English letters to denote "types," a combination of uppercase and lowercase letters to indicate "subtypes," and Roman numerals to designate "variants." According to their location in architectural components, lion motifs can be divided into four categories: A, B, C, and D. These represent different structural elements: A for corbel brackets, B for beam structures, C for the decorative ends of supports, and D for column heads. Category A, B and C can be further divided into subtypes and variants, based on the dynamic changes of the motifs and their overall design.

A-Type: Corbel Brackets. In Ming and Qing architecture, lion motifs are most frequently found on corbel brackets, located at the protruding parts outside of the eaves columns, between the column and the horizontal beam (see Fig. 1). Depending on the dynamic changes of the lion motif on the corbel brackets, two subtypes are identified:

Aa-type: Hanging Design. The lion appears to be in a downward motion, with its head facing downward and its body closely attached to the architectural component. The limbs are positioned as though gripping and stepping, while the mane and tail follow the contour of the body without being affected by gravity. All the legends are in line with the above rules(see Fig. 2~4).

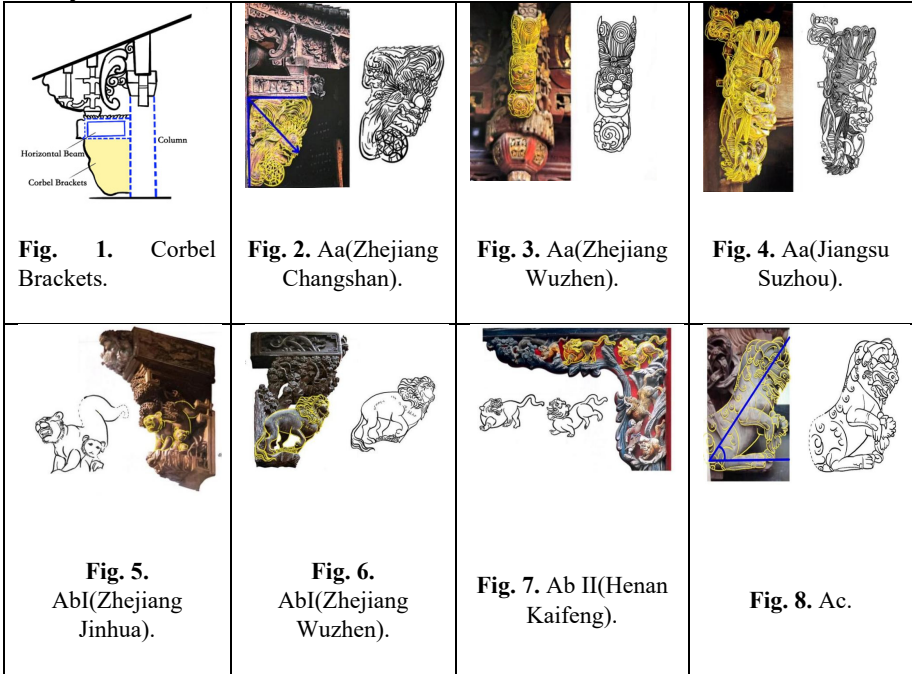
Ab-type: Standing Design. Divided into two variants:

I Variant The lion stands with its body parallel to the ground, its front limbs slightly raised, showing an anthropomorphic expression(see Fig. 5~6). Although the overall shape is far from a real lion, it is more realistic than Type Aa. There is no object being stepped on or grasped under the paws. The hair is concentrated on the head and neck, the tail hangs down naturally.

II Variant The lion appears to be in a dynamic posture, with its body forming an S-shape, indicating movement and aggression. As shown in Figure (6), it is a wooden corbel component of the Shanxi-Shaanxi-Gansu Guild Hall in Kaifeng, in the Qing Dynasty. In the picture, it is composed of five lions and a single person. The shapes of each lion are different. The head may turn backward or be slightly raised obliquely upward. The overall lion shape is in line with type AbII.

Ac-type: Squatting Design. The lion motif appears static, squatting with its head slightly lowered, creating a calmer and more restrained aesthetic. The squatting posture of lions is not very common in corbel components. It is a lion-shaped corbel from the late Ming Dynasty (see Fig. 7). It is similar to Type Aa. The head is slightly lowered and looking at the ground. The eyeballs are protruding. The mouth is open and the

tongue is sticking out. The waist is bent. The buttocks are tangent to the column. The overall lion shape forms an angle of 30 to 60 degrees. It is quite different from types Aa and Ab. In type Ac, most of the lion shapes are static and there is no tendency to move(see Fig. 8). The four limbs are anthropomorphized. The front limbs are bent and raised like human hands. The claws hang down naturally or grasp the embroidered ball. The hind limbs are parallel to the ground and the claws extend straight forward horizontally.



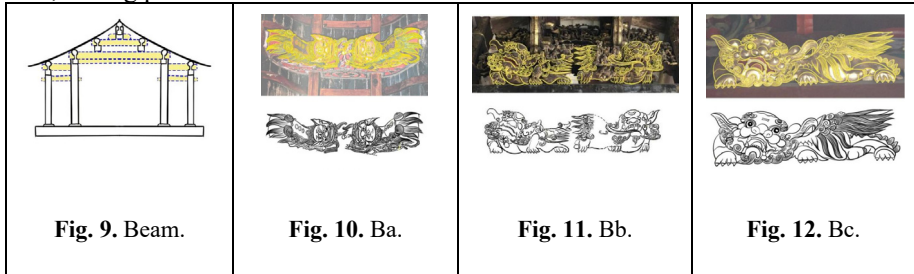
B-Type: Beam Structures. Lion motifs on beams are typically integrated into the beam structure(see Fig. 9), with a more elongated, horizontal form. In traditional Chinese wooden architecture, beams are components that span across columns. Since they are placed on columns and across the air, they mostly appear as long and round strips. Therefore, most of the lion sculptures on beams are built according to their shapes.

Ba-type: Hanging Design. Often featuring two lions facing each other, gripping decorative elements such as embroidered balls. As shown in Figure 10 (see Fig. 10), it is parallel to the ground. The heads and backs are facing the ground direction and facing each other. They glare and grin. The facial expressions are relatively majestic. The front limbs of the two lions grasp the same embroidered ball. The hind limbs stand normally. The hair is depicted in detail. Type Ba is obtained by flipping the scene of double lions stepping on an embroidered ball by 180 degrees and placing it on the beam.

Bb-type: Standing Design. Lions are positioned in a crouching stance, as though preparing to move forward. The head is raised upward and looks slightly at the other lion (see Fig. 11). The mouth is open and teeth are exposed. The ears are raised upward, in a flying-ear shape. The four limbs are slightly bent, showing a tendency to crawl

forward. The knees are close to the column. The claws are sharp and pointed, and are tightly clinging to the column.

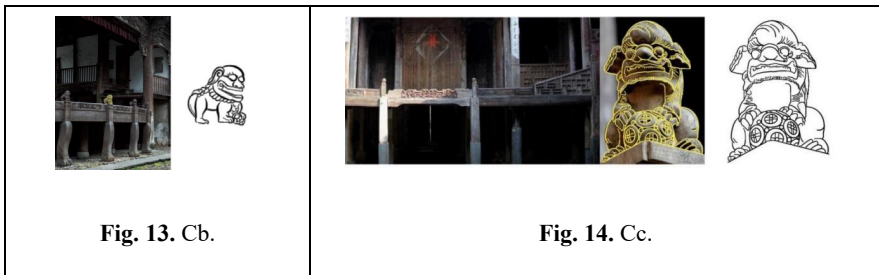
Bc-type: Squatting Design. Similar to the Bb-type, the lion motif is closely attached to the beam structure, with the body parallel to the ground. The head is turned 90 degrees, looking diagonally upward with its mouth open, revealing sharp teeth (see Fig. 12). The ears are raised, and the face is round and full. The tail is raised, with the front limbs closely aligned with the beam. The overall posture appears to be lying down in a calm, resting position.



C-Type: Support Heads. In traditional Chinese wooden architecture, the decorative end of support heads is usually geometric in shape, such as spheres or squares. Due to the limitations of the carving medium, lion motifs rarely appear on these components. However, they are occasionally found in ancient theater structures on railing balusters.

Cb-type: Standing Design. In this design, the lion's head can tilt slightly upward, downward, or remain horizontal (see Fig. 13). The head is round, with minimal hair decoration, and the ears are drooping. The front limbs may be either standing or playing with a smaller lion or embroidered ball, with the back limbs standing upright.

Cc-type: Squatting Design. The lion motif is characterized by a static posture, sitting on the railing with its front limbs resting naturally on an embroidered ball (see Fig. 14). The head is round and simplistic, with ears and nose rounded and prominent. The body is in a squatting position, reflecting a peaceful scene of playing with the embroidered ball.



D-Type: Column Heads. Due to the unique position of column heads in architectural structures, lion motifs carved on these parts are typically limited to the lion's head only, presented in a stylized manner. For this reason, no further subdivisions or variations are made for this category.

Lion motifs on column heads usually have a fierce and terrifying appearance, with large, round eyes and brows replaced by cloud-like patterns (see Fig. 15). The mouth is open, revealing sharp teeth, and the mane is grouped in curly clusters, covering the

entire cross-section of the column head. These lion head carvings are often referred to as "beast heads" or "ghost faces."



Fig. 15. D.

3.2 Comparative Study

Existing studies on lion motifs tend to focus predominantly on the A-type, with limited research on the other categories, partly due to the functional aspects of the architectural components. The corbel bracket (A-type) initially served as a mechanical component before evolving into a decorative feature. Therefore, both functionality and aesthetics are considered, making the study of A-type motifs more prevalent. Among the A-type motifs, the Aa and Ac subtypes share similarities in form and style, while the Ab I variant is more realistic and lifelike, embodying the grandeur of a wild beast. The other types show varying degrees of anthropomorphization or dog-like features, with the lion motifs of B- and C-types appearing particularly canine. These lions exhibit amiable, gentle expressions rather than fierce characteristics.

In terms of quantity, B- and D-types are relatively fixed, generally featuring paired lions facing each other or positioned back-to-back. A-types, except for the Ab II variant (which may include multiple lions), are mostly paired as well. C-types rarely feature paired lions, and instead, often include multiple lions in the design (see Table 1).

Table 1. Classification and Differentiation

Classification and Differentiation	A	B	C	D
a	Aa	Ba	\	
b	Ab I	Bb	Cb	\
	Ab II			
c	Ac	Bc	Cc	

4 Digital Revitalization and Sustainable Development

Traditional lion motifs and their associated cultural meanings are not widely visible in contemporary society. With rapid urban development, many traditional wooden structures have disappeared, and replica architectural complexes, often without historical accuracy, are becoming increasingly common. This has resulted in the loss of the original stylistic significance of the lion motifs, which are either copied without proper understanding or omitted entirely. As such, the transmission of lion motifs faces significant challenges.

Digital revitalization plays a crucial role in the preservation, dissemination, and development of intangible cultural heritage (ICH). Through the use of digital technology for collection, storage, processing, presentation, and dissemination, ICH can be converted into digital formats that can be shared and reproduced. This breaks the limitations of time and space, allowing for rapid dissemination over the internet[8]. Digital technology offers immense advantages in the preservation and transmission of lion motifs and their cultural meanings, particularly through the use of mobile applications (apps).

According to the 53rd Statistical Report on Internet Development in China, published by the China Internet Network Information Center (CNNIC), by December 2023, the number of internet users in China had reached approximately 1.092 billion, with a penetration rate of 77.5%[9]. Apps can use text, images, videos, and models to record and disseminate ICH from multiple perspectives. The simplicity and efficiency of apps make them an ideal platform for promoting ICH, as they simplify information acquisition and improve the efficiency of user engagement.

Thus, by using an app as a platform, lion motifs in Ming and Qing wooden structures can be more intuitively and efficiently preserved and digitally recorded. Virtual storage of these motifs offers a robust backup, providing high-quality images and resources for future restoration, replication, or redesign. At the same time, the app's low barrier to entry breaks down geographical, economic, and temporal limitations, allowing people of all ages to study and disseminate lion motifs and their associated culture anytime and anywhere[10]. This will help bring intangible heritage into the daily lives of ordinary people, allowing lion motifs to "come to life" in modern contexts, ensuring the best possible transmission of lion motifs from Ming and Qing wooden structures.

5 "Lion Art" APP: Digital Revitalization Practice of Lion Motifs

The design practice of the "Lion Art" app can be divided into three parts: user demand analysis, information framework construction, and interface design. Through preliminary research and analysis, we can identify the needs of different user groups. Once these needs are understood, a prototype framework is constructed, followed by the interface design of the app.

5.1 Design Concept of "Lion Art" APP

Target Users and Needs Identification. A sample survey of 118 individuals across different age groups and regions (mainly East, South, and North China) was conducted. Of these, 51 individuals were under 18 years old, 37 were aged 19-30, 22 were aged 31-50, and 8 were over 51 years old (see Fig. 16). The results show that 86.4% of respondents believe that the digital revitalization of intangible cultural heritage (ICH) is highly necessary. Additionally, 57.6% had heard of lion motifs in traditional Ming and Qing wooden architecture but were unfamiliar with their origins and meanings. Among these respondents, 85% expressed a desire to learn more about these motifs but lacked

convenient access to information. Only 7.6% were willing to invest time in researching books and literature. Furthermore, 80.5% of respondents were interested in using a cultural app featuring lion motifs as a way to learn about overlooked elements of ICH in their daily lives, while 65.3% felt frustrated when they couldn't describe or search for ICH knowledge. About 39.8% hoped to access relevant information through a "snapshot" feature while traveling. These findings indicate that digital revitalization is crucial for the transmission of lion motifs in Chinese wooden structures, allowing more people to access this cultural knowledge in a simple and convenient way (see Fig. 17).

■ under 18 ■ 19~30 ■ 31~50 ■ over 51

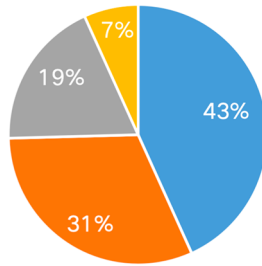


Fig. 16. Age distribution of respondents.

▲ agree ▲ soso ▲ disagree

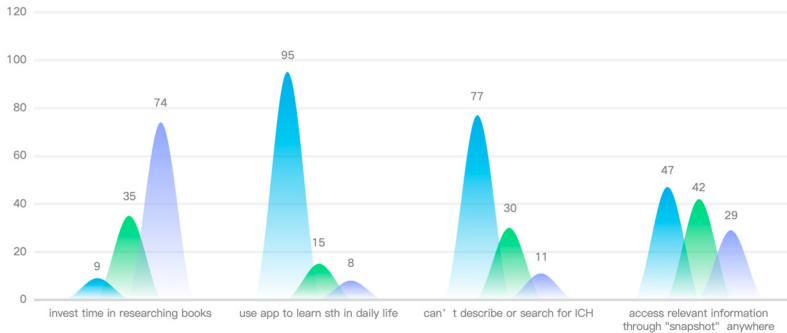


Fig. 17. Survey and research data statistics.

Therefore, when designing the app, the interface should be concise and easy to use based on the preliminary research findings. Users should be categorized into two primary groups: scholars and the general public. Each group has different needs that should be addressed. For scholars, the app acts as a tool to not only spread traditional motifs and cultural meanings but also to keep up with modern trends, incorporating lion

motifs into contemporary life to breathe new life into the culture. Scholars can also act as quality controllers, filling in cultural gaps in the database from a professional perspective. For the general public, while they may admire the intricacies of ICH, they often lack the patience to go through books or find the content dry. Providing a platform where they can easily recognize and learn about the lion motifs in wooden architecture while engaging in simple and fun redesign activities can foster a deeper cultural recognition. The app also leverages the social sharing habits of younger users to enhance cultural dissemination, ultimately ensuring the survival of ICH.

5.2 The "Lion Art" app is Divided into Three Modules: A Database, Cultural Records, and Creative Interactions

The database module primarily uses text, images, and video formats (see Fig. 18). Once the app is launched, it directs users to the database interface, where different lion motifs are displayed daily through a "3-minute read" feature, offering quick educational snippets. While seemingly fragmented, this approach is effective in today's fast-paced society. In addition to quick general education, the database has deeper, comprehensive learning value. It serves as a platform for scholars to conduct quick searches and supplement their research. The database categorizes and organizes existing lion motifs from wooden structures and, based on the previously mentioned classification method, creates a dual-index searchable database. Users can search motifs by type, quantity, or cultural meaning, while the "snapshot" feature in the top-right corner allows users to scan and upload images of lion motifs for direct retrieval. This function solves user pain points such as unclear descriptions, inability to search, or reluctance to consult books. The app neatly organizes the historical origins, stylistic features, and cultural connotations of the motifs.

The cultural records module focuses on the cultural meanings of lion motifs without delving into overly academic or technical jargon. Instead, the content is presented in a simple, accessible manner, often from a folklore perspective, explaining the cultural significance of different lion motifs.

The creative interaction module addresses the common issue of cultural learning being perceived as boring. One feature is a game zone where users can engage in creative redesign of lion motifs, building on the typology framework to combine traditional lion motifs with modern face-shaping and dressing games. This game-like approach expands the digital preservation of lion motifs, allowing users to participate in simple redesign activities with a low level of difficulty and high level of creativity. The second feature is a cultural product area linked to an online store, offering users a platform to share and exchange their creative designs. This not only promotes the dissemination of lion culture but also fosters a sense of recognition among users, allowing them to contribute by filling gaps in the app's offerings.

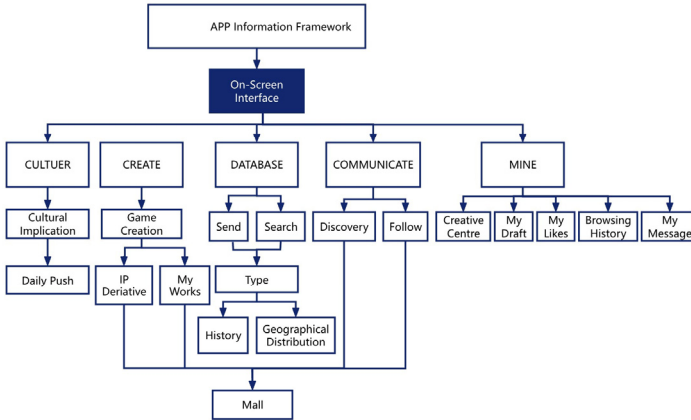


Fig. 18. "Lion Art"APP Information Framework.

5.3 Design Methods of the "Lion Art" APP

Functional Setup. In addition to the dual-index searchable database for lion motifs, the "Lion Art" app includes a map module, offering a clear and intuitive visualization of the distribution and quantity of lion motifs across traditional wooden structures in China. This dynamic data visualization provides users with relevant information in an easy-to-understand format.

In the creative interaction module, a face-shaping game allows users to generate customized lion motifs. Pre-designed lion motifs are provided, and users can modify features like facial elements and clothing based on their preferences and understanding of Chinese lion culture. The resulting creations can be sold directly in the cultural product area. Additionally, users can browse and interact with other users' creations, exchanging ideas and thoughts on lion culture within a dedicated community. The interactive design encourages social sharing on platforms like social media, using achievements, posts, and images of creative designs to generate secondary dissemination effects. This aligns with the emotional needs of younger users, enabling a wider audience to learn about and engage with the lion motifs in Ming and Qing wooden structures.

Visual Presentation. From a user experience perspective, the app design emphasizes the clarity of visual processes and product attributes. The color scheme is derived from traditional Chinese colors, specifically "Mihe" color, extracted from the palette of Chinese wooden architecture and validated through color theory. This color not only reflects the deep and elegant aesthetics of wood-carved lion motifs but also evokes emotional resonance in users. The layout is tag-based, making functional modules immediately visible and reducing the number of interface layers, allowing users to achieve their goals more quickly and conveniently. Sans-serif fonts are used for a clean and simple reading experience, while the icon design follows a flat style, reducing user errors due to cognitive differences and making the operation flow smoother. These design choices aim to provide users with an intuitive, convenient, and culturally rich interactive experience (see Fig. 19).

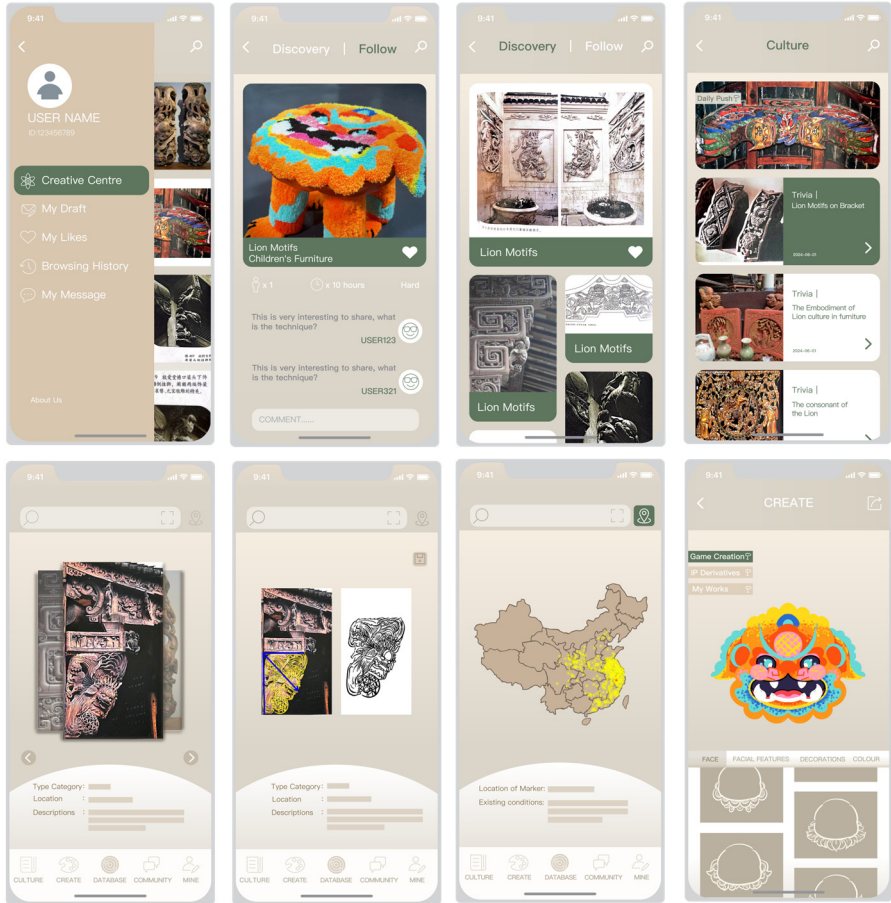


Fig. 19. "Lion Art" APP Interface Showcase.

6 Conclusion

Through the application of digital media technologies and mobile devices, the challenges faced in the development of intangible cultural heritage (ICH) can be addressed from cultural, creative, and interactive perspectives. From a cultural standpoint, the classification of lion motifs is based on archaeological typology, with a focus on logical classification and organization. This provides a clearer record and protection of lion motifs. On the creative side, the app introduces entertainment value in the redesign of lion motifs. In terms of interaction, the app strengthens users' sense of identification with lion culture. The "Lion Art" app design integrates digital media technologies with mobile devices to breathe new life into ICH, providing a new path for the protection of lion motifs and Chinese lion culture in traditional architecture.

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