Research on Information Visualization Design of Dong Culture

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Abstract. In the era of new media prevalence, rapid social and cultural changes pose challenges to preserving and sharing traditional minority cultures. Dong culture, like other cultural treasures, needs new strategies to fit modern aesthetics and explore new communication and display methods. This paper examines how to integrate information visualization with modern technology to revitalize Dong culture. The interactive visualization platform created showcases Dong culture's richness and boosts public awareness and interest. Additionally, using information visualization in minority culture research and promotion expands its application and is crucial for the protection and revitalization of minority cultures.

Keywords: Dong Culture; Information Visualization Design; EChart

1   INTRODUCTION

Protecting ethnic cultures is essential for a culturally vibrant country, but modernization poses challenges for minority cultures like the Dong. In 2017, the Ministry of Culture issued the "Guiding Opinions on Promoting the Innovative Development of the Digital Cultural Industry" to leverage local cultural uniqueness and drive digital transformation of heritage [1]. Since then, digital technology has become essential in preserving and sharing ethnic cultures, keeping them relevant today.

The concept of "information visualization design" was first introduced by Stuart K. Card and two other scholars in 1989. Liu Z [2] presented hierarchical graph refreshing and linked interactive queries in their paper imMens: Real-Time Visual Querying of Big Data. Research on information visualization in China began later but has grown significantly in recent years. Zhang, Y. [3] in their paper Web Dynamic Interaction Visualization Using D3.js, explored web interaction visualization with D3.js, focusing on dynamic interaction challenges and demonstrating D3.js's effectiveness and ease of use.

Contemporary studies on Dong culture often focus on specific aspects, offering a broad understanding of the culture. A Brief History of the Dong People give a detailed overview of their origins, ethnic evolution, literature, art, and customs, making it a key reference for in-depth research [4]. The Actual Record of Dong Songs examines the features, structure, artistic style, and singing techniques of Dong songs, providing detailed insights into this traditional art form [5]. Foreign research on Dong culture is limited, with Japanese scholars often documenting the customs and habits of Chinese ethnic minorities from an anthropological perspective. For instance, Travels in Southwest China records Torii Ryuzo's observations and photographs of life in the Dong region [6].

Zhang, L. [7] enhanced information visualization by using art design to highlight plants from the Book of Songs, combining traditional and modern techniques to showcase their aesthetic and cultural value. Li, R. [8] explored traditional handicrafts from the Dagukou River basin, integrating them with information visualization to help preserve and promote these crafts through innovative visual methods.

Though information visualization is widely used, it remains underutilized for Dong culture. This study explores how digital and interactive methods can preserve and present Dong culture, merging technology with art to highlight its rich heritage.

2   RESEARCH AND ANALYSIS OF VISUALIZATION IN DONG CULTURE

National culture embodies unique historical and artistic values. Information visualization connects modern society with traditional culture by turning abstract elements into concrete visuals, enhancing understanding and appeal. This process refines and combines cultural elements to reveal their connections, creating a multicultural symbol system that showcases the richness and diversity of Dong culture.

3   PRINCIPLES AND STRATEGIES OF VISUALIZATION DESIGN

Under the framework of visualization design principles and strategies, this study proposes three major design principles for the complexity of Dong culture: authenticity, aesthetics and intuitiveness. In the display process, it is necessary to consider the cultural characteristics and audience perception, and to use easy-to-understand charts, graphics and interactive methods. The visualization design strategy, on the other hand, includes integrating the visual symbols of Dong culture into the information visualization to highlight the national characteristics. Design is not only a tool for information delivery, but also a bridge between users and information. Effective delivery relies on clear logic and reasonable structure, especially when displaying the rich culture of the Dong people, it is necessary to establish a clear hierarchy and framework of information, while exploring its cultural connotation and artistic expression in depth.

4   VISUALIZATION DESIGN PROCESS FOR DONG CULTURE

4.1   Information Collection and Processing

The information collection on Dong culture focused on three goals: identifying sources, ensuring completeness, and using multiple methods. The author organized data including 141 geographic entries, 5,000+ drum tower records, 200+ non-heritage items, and nearly 300 wind and rain bridge entries, along with text, images, and audio on food, beliefs, architecture, brocade, and songs, and converted it into a JSON database.

4.2   Visual Design and Interaction Development

Artistic visual design enhances information communication through color, shape, and layout, making the content more engaging and practical. As a web-based presentation, the design should prioritize simplicity and user-friendliness. Therefore, the interaction design of the Dong culture visualization website should incorporate traditional Dong decorative arts to enrich the user experience.

4.3   Web Structure and Organization

The information architecture of the Dong culture visualization website is divided into three main sections and over ten sub-sections (see Fig. 1). The visualization content is primarily presented through two tabs: "Dong Rhythms" and "Dong Treasures." Each tab focuses on different aspects and has distinct practical content and emphasis.
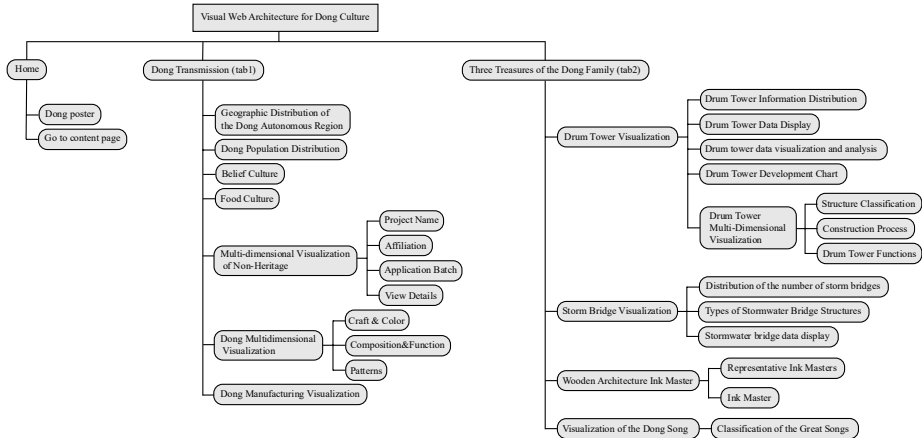

Fig. 1. Organization Structure of the Dong Culture Information Visualization Website （Self-drawn by the author）

4.4   Design Practice of the 'Dong Rhythms Transmission' Tab

The "Dong Rhythm Transmission" Tab showcases key aspects of Dong culture, including geography, population, beliefs, food, non-heritage elements, and brocade weaving. A Sankey diagram organizes information by province, item, and lot, allowing users to click on elements for detailed information. The chart, built with a visualization tool, enables easy navigation through the data.

The authors have collected representative information of the inheritors on the national non-genetic heritage website and displayed it in the form of a radial tree diagram. Users can click on nodes to view detailed information (see Fig. 2).
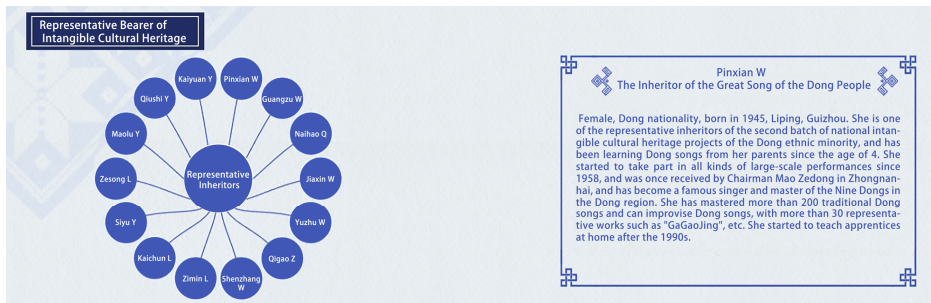
Fig. 2. Radial Tree Diagram of Representative Inheritors of Intangible Cultural Heritage（Self-drawn by the author）

The author collects information on representative Dong intangible cultural heritage inheritors from the National Intangible Cultural Heritage website and displays it using a radial tree diagram. Users can click on sub-nodes to view inheritor details. The diagram uses Echarts' radial tree layout with circular nodes, animations, and interactive effects. The seriesTree function generates the sub-node data, including attributes like name and url_name, and style configurations. The option object sets up the diagram's configuration, including toolbars, tree settings, and data. The data array includes a root node and child nodes generated by seriesTree. Clicking a node with a url_name attribute shows the inheritor's details (see Fig. 3).
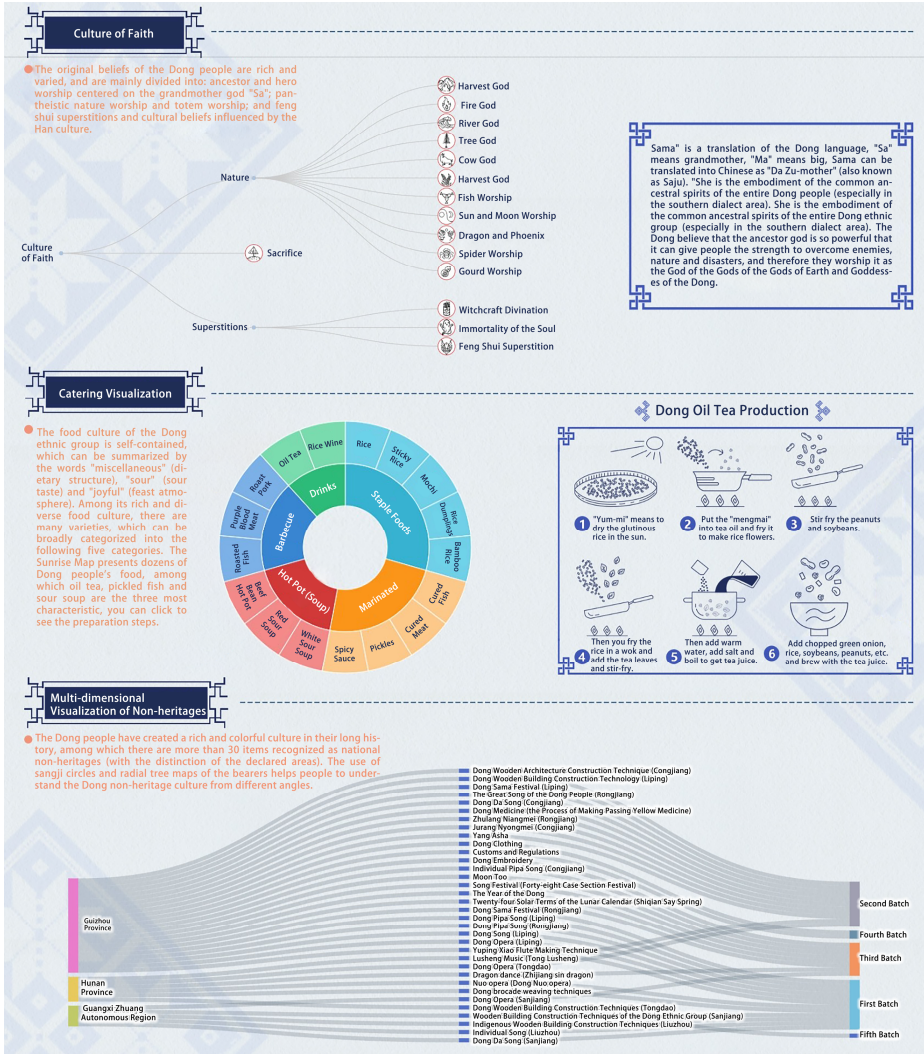
Fig. 3. Visual Display of Dong Non-legacy Projects（Self-drawn by the author）

Dong brocade is one of the ten most famous brocades in China, with a history of more than 2,000 years, and was recognized as a national non-legacy project in 2008. The Dong brocade Tab Page covers a wide range of aspects such as weaving process, color, pattern, function and composition. Based on fieldwork and literature, this study outlines ten major stages of brocade weaving and highlights its main features (see Fig. 4).
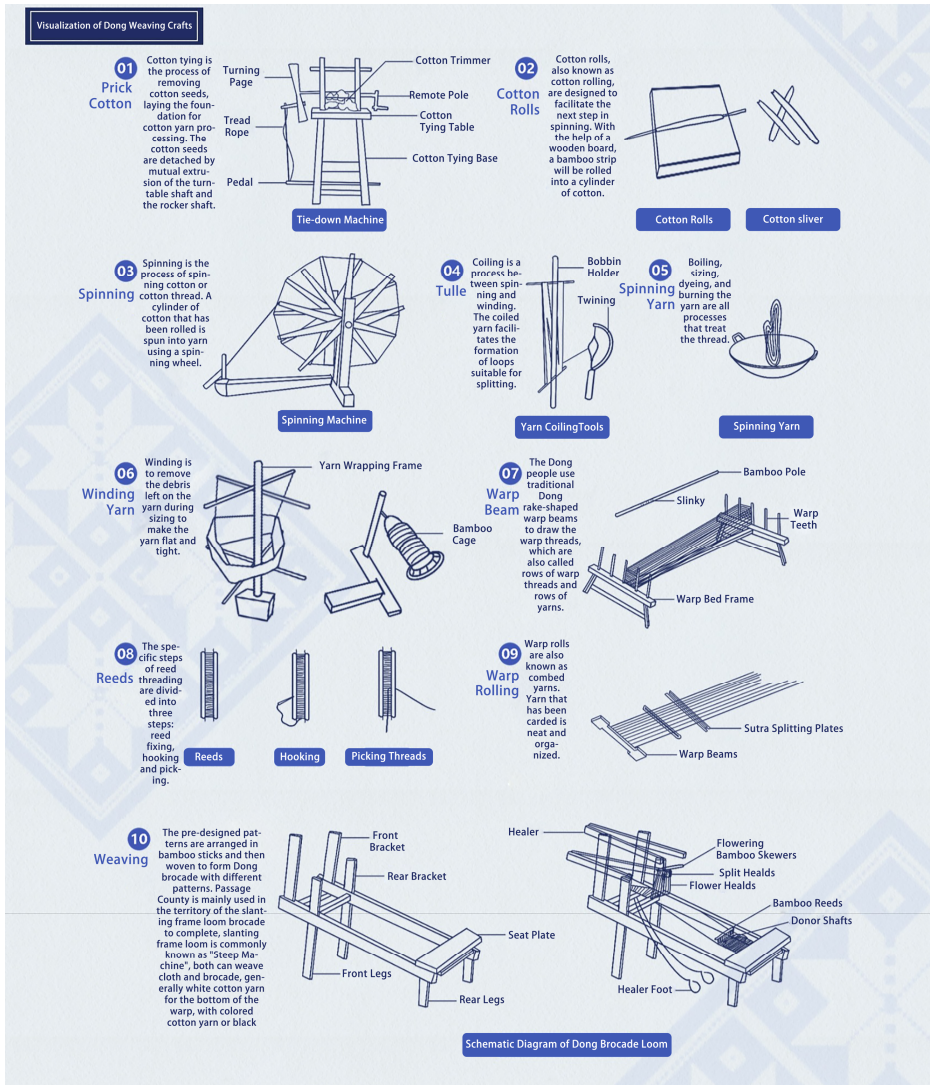
Fig. 4. Visualization of Dong Brocade Weaving Techniques（Self-drawn by the author）

4.5   Design Practice of the 'Three Treasures of the Dong' Tab

Dong drum tower, big songs and wind and rain bridges are called the three treasures of Dong. This table introduces the distribution, function and construction process of drum towers, the structural characteristics and writing style of wind and rain bridges and categorizes the contents of great songs in a visual way. This study has sorted out the development lineage of drum towers, which is divided into four stages: embryonic, development, and maturity, and is shown in a visual way (see Fig. 5). By clicking, users can observe the architectural features and development process of each stage.
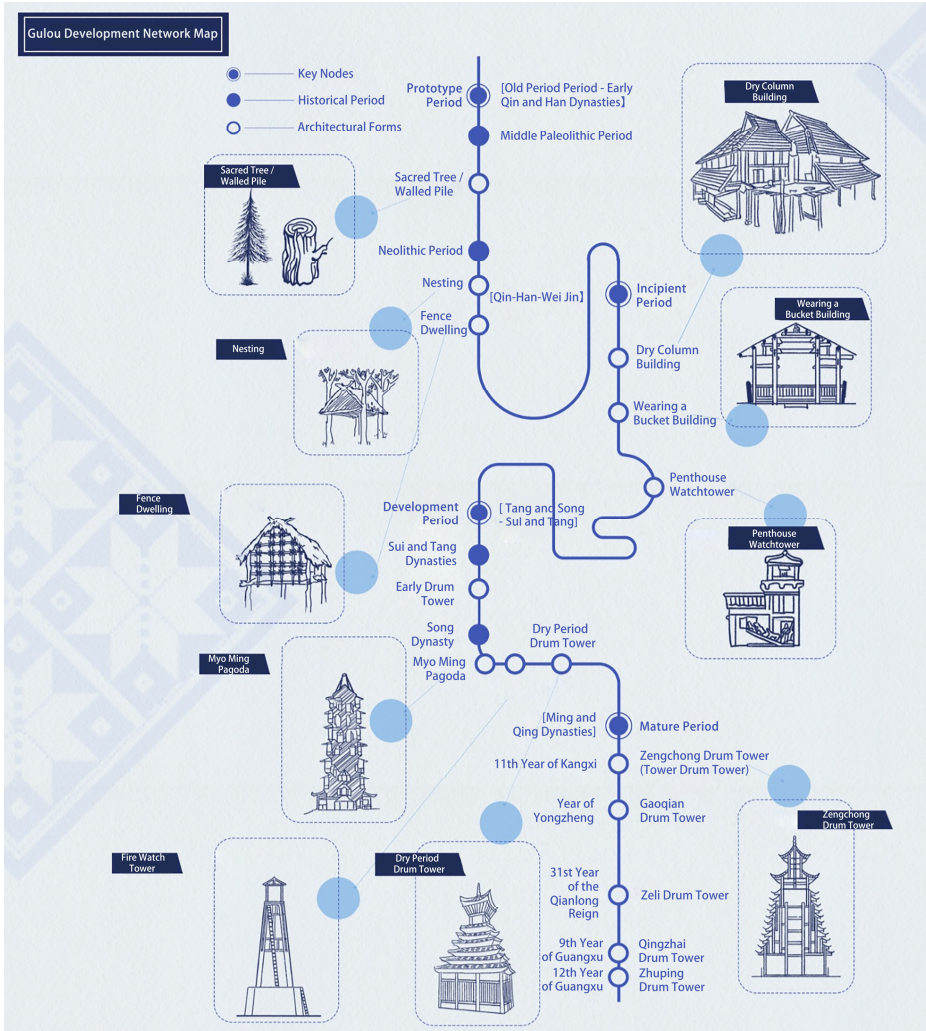
Fig. 5. Partial display of the Gulou Development Chart（Self-drawn by the author）

5   CONCLUSION

This research is based on Dong culture, gathering and analyzing diverse, multi-dimensional data. Through information visualization design and practice, it explores innovative ways to present and communicate Dong culture. The study establishes a standardized design process and successfully creates a web-based platform for digital-ly preserving and disseminating Dong culture, offering new avenues for its inher-itance and development.

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