



Cross-Media Narrative Visualization of Liu Sanjie and Its Derived Cultures Based on iStoryline

Zhuo Shi^{1a}, Xia Qiu^{2b*}, Ziquan Xu^{3c}, Weiqi Xie^{4d}

¹School of Art and Design, Guilin University of Electronic Technology, Guangxi, 541004, China

²School of Art and Design, Guilin University of Electronic Technology, Guangxi, 541004, China

³School of Art and Design, Guilin University of Electronic Technology, Guangxi, 541004, China

⁴School of Art and Design, Guilin University of Electronic Technology, Guangxi, 541004, China

^ashzh@guet.edu.cn, ^{b*}qiucili@foxmail.com,

^cxuziquan1997@foxmail.com, ^d15712767716@163.com

Abstract. Guangxi's "Liu Sanjie" and its derivative cultures (such as folk song culture, the March 3rd custom culture, etc.) have a profound historical accumulation, diverse and extensive application scenarios, and tremendous development potential. However, their dissemination as cultural resources in contemporary forms have certain limitations. This paper uses iStoryline to visually narrate the plot of the Liu Sanjie legend and its derivative cultures and employs three strategic pathways for cross-media dissemination: web-based, video-based, and graphic-based. These three strategies complement and connect with each other. The theoretical perspectives and practical applications of narrative visualization and cross-media storytelling are beneficial for the systematic dissemination of "Liu Sanjie" and its derivative cultures, enhancing their communication efficiency in the context of contemporary multimedia communication, thereby promoting the creative transformation and innovative dissemination of Liu Sanjie's cultural resources.

Keywords: Narrative Visualization, Cross-Media Communication, Digital Humanities, Liu Sanjie Culture

1 INTRODUCTION

Folk culture spread is vital for cultural identity, value formation, and innovation. Guangxi's "Liu Sanjie" culture, a national intangible heritage, exemplifies this. It reflects admiration for "truth," "goodness," and "beauty." Beyond the legend, it has created cultural systems like the Liu Sanjie ballad and the March 3rd Song Festival, becoming a collective Guangxi memory.

Traditional media for Liu Sanjie's culture are limited in form and often focus on the narrative, neglecting the deeper cultural and artistic significance of Liu Sanjie's ballads.

To address this, narrative visualization, a technique gaining traction in digital humanities, offers a solution. Chen et al. [1] restructured a basketball game into a series of conversations to depict the game's status and intense competition. Shi et al. [2] developed MeetingVis, which helps meeting participants remember the content and context of previous meetings; Li et al. [3] used data videos to showcase the life experiences of the Northern Song Dynasty literary figure Su Shi. Tang et al. [4] developed iStoryline, a tool that blends user interaction with algorithmic layout for narrative visualization. Wang [5] applied iStoryline to visualize the novel "Family Spring, Autumn, and Winter."

Using iStoryline, this paper visually narrates the Liu Sanjie legend by encoding its plot and characters into XML for iStoryline visualization. It also organizes and visualizes related cultures, enhancing cultural comprehension. The paper suggests strategies for spreading Liu Sanjie's culture: webization, vitalization, and planarization, providing new perspectives for its comprehensive dissemination.

2 LIU SANJIE STORY PLOT NARRATIVE VISUALIZATION

2.1 iStoryline Introduction

"iStoryline" is a narrative visualization tool developed by Tang Tan and others at Zhejiang University [4]. It integrates advanced user interaction into optimization algorithms, achieving a balance between hand-drawn story lines and machine automatic layout, and allows users to modify the automatically generated layout according to their preferences. iStoryline generates narrative visuals by keeping same-group lines close, different-group lines distant, and maintaining horizontal progression unless group changes.

2.2 Data Processing

According to the plot of Liu, divide the story scenes and number them. The numbers are divided into two groups (Group 1, Group 2), and record the start and end times of each scene (this article refers to the 1961 film "Liu" produced by Changchun Film Studio for the division of time scenes) as well as the characters appearing in each story scene (Table 1).

Table 1. Part of the scene group table

Scene Group No. 1	Scene Group No. 2	Start time	End time	Characters
1	200	0:00:00	0:12:00	Liu Sanjie, Ah Niu, Ah Niu's Father, Boat
2	201	0:12:00	0:15:00	Mo Huairen, Steward, Maid
3	202	0:15:00	0:17:30	Second Brother Liu, Fan
4	203	0:17:30	0:23:30	Liu Sanjie, Ah Niu, Ah Niu's Father, Boat, Steward
5	204	0:23:30	0:26:00	Mo Huairen, Steward, Maid, Scholar Tao

Encode chars, time nodes, scenes per Table 1. Start is scene start, End is scene end, Session is scene number. Use Group 1's scene number if char appears, else use Group 2's. E.g., Liu Sanjie's plot from 0min to 15min is encoded as:

Start="0" End="12" Session="1"

Start="12" End="15" Session="201"

After completing all character and plot data encoding according to the above rules, import the data encoding file into the iStoryline tool in XML format to generate a narrative visualization storyline.

2.3 The Artistic Treatment of the iStoryline and Web Design

The generated iStoryline storyline is shown in the figure below (Fig. 1):



Fig. 1. iStoryline original generated image

This paper creatively visualizes the narrative of Liu Sanjie using iStoryline, inspired by the folk song "Mountain Songs are Like the Spring River Water." Digitally simulates Guilin, visually encodes story, metaphors depict characters (antagonists as mountains, protagonists as water). Transforms images into an interactive, scroll-like webpage with color-coded characters, allowing readers to follow plot and interactions, immersing in story and Guilin's beauty (Fig. 2).

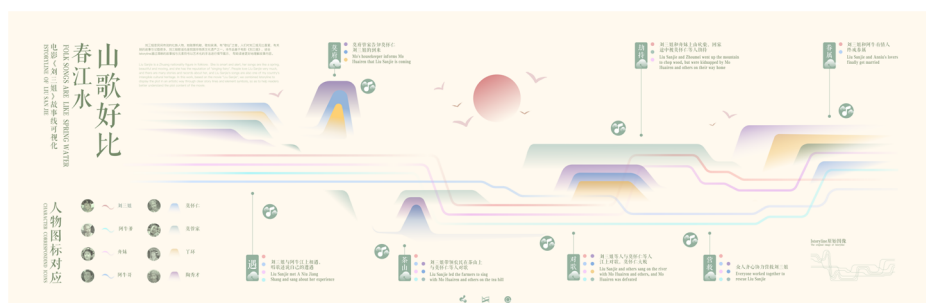


Fig. 2. Liu Sanjie iStoryline narrative visual web design map

The visual interaction features of the page are as follows:

1. The visual metaphor-based design offers a brief graph summary for each plot node, e.g., main plot labeling in Fig. 2. Dot colors by nodes match character colors, showing their scene appearance.

2. Three visualization chart buttons are set up, through which users can expand the Liu Sanjie character analysis sunburst chart (Fig. 3), Liu Sanjie ballad visualization Sankey diagram (Fig. 4), and Liu Sanjie character relationship map (Fig. 5) by clicking the buttons, gaining deeper insight into Liu Sanjie lore and ballad culture. Interactive charts enable exploration via clicks, hovers, drags, and scrolls, boosting engagement and interest.
3. Music play buttons at plot nodes let users click to play Liu Sanjie ballads, merging audio-visual for an edutainment experience.



Fig. 3. Liu Sanjie character analysis sunburst chart



Fig. 4. Liu Sanjie ballad visualization Sankey diagram

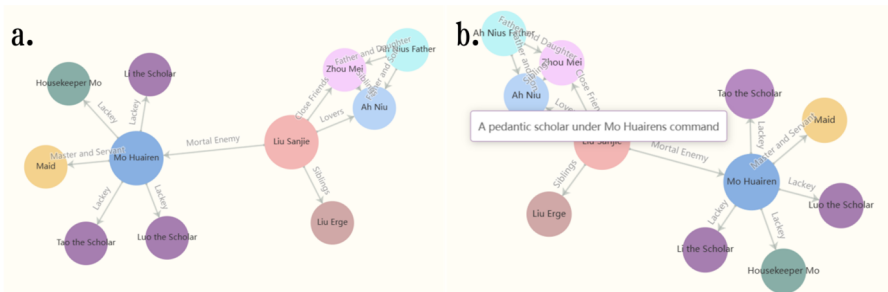


Fig. 5. Liu Sanjie character relationship map

3 VISUALIZED DERIVATIVE CULTURE OF LIU SANJIE

3.1 Data Collection and Processing.

This study compiles diverse Liu Sanjie data, including Zhuang customs, songs, history, geography, and demographics. It uses various sources like texts, folklore, and archives for a comprehensive dataset (Fig. 6).

The data underwent meticulous organization and preprocessing to optimize its utility. Liu Sanjie's folk songs were categorized, and associated traditions were meticulously documented. To analyze this data, the team utilized HarvestText, a text analysis tool that applies unsupervised learning and domain expertise to process specialized texts efficiently. This approach not only streamlined data processing but also established a robust foundation for subsequent analysis and visual presentation. Consequently, the research effectively captured the cultural essence and artistic significance of Liu Sanjie, offering substantial data for visual design.

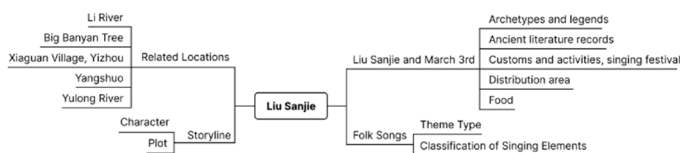


Fig. 6. Data collection chart

3.2 Visual Strategy

Geographical Visualization of the Zhuang Song Fair. The Zhuang Song Fair in Guangxi is a traditional celebration marked by singing. This study utilizes maps to illustrate the fair's locations and their connections within the Liu Sanjie narrative. Centered on Guilin, the map employs colors and symbols to highlight natural, urban, and cultural sites, showcasing the Song Fair's regional spread and coherence. The integration of musical elements visually underscores the cultural legacy of Liu Sanjie's melodies.

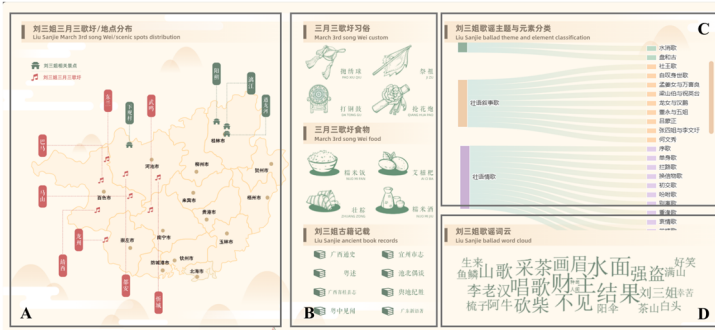
Sankey Diagram of Ballad Themes. Liu Sanjie's ballads, a cornerstone of Zhuang culture, are rich in history and artistry. A Sankey diagram categorizes these ballads by theme, using colored bars to represent different genres and listing song names alongside. This visual approach simplifies the complexity, allowing for easy comparison and understanding of the ballads' diversity.

Word Cloud Analysis of Ballad Text. Word clouds visually represent the frequency and significance of words in text, using size and prominence to indicate importance. Analyzing Liu Sanjie's ballads through a word cloud reveals key themes and their interconnections. Words like "landlord," "mountain songs," and "tea picking" are highlighted, offering a clear view of the ballads' cultural essence and social context. This

technique enhances memory retention and provides a novel method for studying these traditional songs.

3.3 Liu Sanjie Derivative Culture Visualization Web Page Design

Designing an interactive web platform that uses visualizations like GIS maps, Sankey diagrams, word clouds, and legends to explore and showcase the story of Liu Sanjie and its impact on Zhuang culture. The webpage's design aims to pro-mote cultural heritage and education. Users can interactively explore the story's geographical spread, folk song themes, and cultural expressions. The webpage's design effectively visualizes various information types (Fig. 7).



(A)Map of relevant locations;(B)Illustrations of food, activities and related books;(C)Song theme and element classification Sankey diagram;(D)Liu Sanjie ballad word cloud map

Fig. 7. Visual web design

4 CROSS-MEDIA NARRATIVE VISUALIZATION

4.1 The Construction of a Visual Narrative Web Page for "Liu Sanjie" and its Derived Cultural Narratives.

This article broadens the reach of "Liu Sanjie" and its cultural extensions by integrating web programming to link two web pages. Users can switch between views with a button, interactively discovering the story and related folk events and ballad traditions. Interactivity is key to web page quality, especially in visual design, enhancing user engagement and information clarity. The article focuses on interactivity, using dynamic buttons and charts to create an engaging user experience.

4.2 Music Bookmark

Create narrative diagram bookmarks for iStoryline plot nodes; users assemble for full diagram. Also, collect folk songs for plots, QR code them, attach to bookmarks for scanning and listening.

4.3 Animation Demonstration and Explanation.

Additionally, this paper has created a visual animation demonstration video of "Liu Sanjie" and its derived cultural narratives [6]. The small boat moves along the iStoryline, and at each plot node, the corresponding mountain song is played, while the narration provides a synchronized explanation of the plot. The production of the animated demonstration video not only greatly enhances the efficiency of dissemination but also helps readers better understand and use the iStoryline to explore the culture of Liu Sanjie.

5 CONCLUSIONS

Digital humanities, leveraging technology, have established an expansive material network that facilitates cross-media storytelling [7]. This network is rich in narrative diversity, providing a robust base for interactive folktale experiences. iStoryline introduces an innovative perspective on the Liu Sanjie story, making it accessible to new audiences by visually mapping characters, relationships, and plot progression. This paper explores the integration of narrative visualization with folk culture across web, video, and music, aiming to enhance interactive experiences and broaden dissemination strategies for the preservation and evolution of traditional culture. Future efforts will focus on refining these interactive methods and expanding dissemination channels.

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