

CROSSOVER AND EXTENSION OF HAND-DRAWN MAP IN HERITAGE TOURISM: A CASE STUDY

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Abstract. In the realm of thematic map development, hand-drawn maps tailored for tourism hold considerable significance. Nonetheless, their progress is impeded by inherent limitations and challenges, thereby constraining their potential advancement. Concurrently, the emergence and progression of computer and network technology have furnished a proficient platform for fostering interdisciplinary growth in the realm of hand-drawn cartography. The aim of this study is establishing a customized, culturally relevant, metaphorical and de-identified design framework for enhancing visualization in digital interactions, drawing upon the universal design principles inherent in traditional animation. A comprehensive depiction of the design workflow, along with intricate design particulars pertaining to each stage, was demonstrated through a case study centered on the hand-drawn style drawing and map design for Dahuaishu Ancestor Memorial Garden. By adopting such a design framework, the potential outcome entails a more user-friendly and captivating means of disseminating information within digital tourist maps of the same genre. This approach preserves the inherent merits of hand-drawn maps while simultaneously broadening their scope and capabilities.

Keywords: *Interaction, digitization, traditional animation, cultural tourism and visualization.*

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1. Introduction

Throughout the evolution of cartography, the earliest maps primarily served to represent spatial topography and geomorphology, while the emergence of thematic maps came about at a later stage, resulting from the fusion of cartographic knowledge with diverse subject domains such as demographic data, cultural communication and medical diseases (Hong, 2019). Large-scale thematic mapping did not gain momentum until the nineteenth century (Riffenburg, 2014). Robert (2014) asserts that cartography embodies both a scientific and artistic dimension, necessitating a harmonious blend of techniques and creativity to craft visually appealing styles while prioritizing visual narrative design. The rapid growth of tourism has spurred the popularity of modern-style hand-drawn maps in China's major urban centers since the early 21st century (Wang, 2021). These hand-

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drawn maps serve not only as practical and artistic tourist souvenirs but also as effective means to showcase the city's imagery and bolster its overall image, presenting ample potential for future development. Being an ancient yet contemporary form of cartographic expression, hand-drawn maps are poised to captivate an increasing number of tourists (Xie, 2016).

With the development of hand-drawn maps, it does not have the tediousness of traditional maps and the single uninteresting of scenic picture maps, so it attracts a large number of followers with its contrasts of bright color, lively pattern, but also exquisite and practical and makes people feel the destination is both youthful and vigorous (Zhang, 2019). It can be seen that hand-drawn maps have practical significance as a type and form of traditional maps. The case in this thesis imitated real, physical hand-drawn maps in the creation process and was drawn and designed by software to form digital interactive maps with a hand-drawn style to attract users.

However, the development of hand-drawn maps is not without its challenges. Issues arise in terms of their limited capacity to convey information comprehensively, potential delays in updating information, absence of navigation and mobile positioning functionalities, susceptibility to damage due to their traditional form and general lack of convenience (Sun, 2020).

In the realm of digital interactive map development and design, this study introduces an innovative approach of design by integrating traditional animation creation principles to enhance the stylistic elements and overall quality of such designs. By conducting in-depth design analyses and case studies, the research culminates in the identification and synthesis of pertinent frameworks for enriching the scope of design. These frameworks ingeniously incorporate select traditional animation techniques into the domain of digital interaction design, resulting in a novel and enriched visual experience for users towards three aims: a) to propose a set of efficient hand-drawn style design ideas and methods for requirements of similar interact design, b) to propose that traditional animation is transferred from artistic narrative context to problem-solving functional evolution, through case study analysis, which also leads to the compatibility of traditional art and culture in animation to make new interpretation and rendition in the digital interactive era and c) to provide a hand-drawn interactive map experience from animation design for tourism.

2. Background of Study

The advancement of digital technology has ushered in an era of interconnected archives, facilitating the storage, retrieval and dissemination of vast quantities of data at an unprecedented speed. This paradigm shift has been largely driven by new media technologies, fundamentally altering the ways in which information is created, accessed and preserved (Nicholas, 2015). Although cartography has a historical association with the printed page, it too has been significantly influenced by the computer and Internet revolutions (Allan Brown, 2013). With integration of computer, these innovative cartographic representations enable direct utilization of electronic tourism maps within the regions they depict, promoting enhanced accessibility and the element of interactivity, including those designed for mobile devices and various digital platforms available online (Jancewicz & Borowicz, 2017). In the realm of travel websites, when viewed on computer and cellphone screens, the pages can be likened to windows granting access to a vast world of information. Through dynamic movements, users can actively engage with the

information behind this "window", fostering interactions not only with the data but also with other individuals (Allan, 2013).

The adoption of interactive media in China is a relatively recent development, particularly when compared to the long-standing tradition of hand-drawn maps (MengJie, 2022). Especially, the interactive and digital hand-drawn maps is strategically tailored by interactive design, to effectively accommodate the burgeoning advancements in digital media and internet technologies, thereby catering to the contemporary preferences and demands of the youth demographic. In the domain of economic livelihood, the incorporation of interactivity within hand-drawn maps exhibits distinctive characteristics and yields noteworthy results, resonating harmoniously with consumer preferences and value systems (Siyi, 2021). However, it is of paramount importance for designers to maintain a profound appreciation for the historical heritage and cultural significance that underpin traditional hand-drawn maps. Interactivity should be perceived to enhance the tourist experience, acting as a complementary tool to augment the utility of hand-drawn maps. An exclusive focus on technological prowess, to the neglect of tourists' inherent travel motivations and interactive encounters, risks undermining the very essence and purpose of hand-drawn cartography (MengJie, 2022).

Despite their ability to address certain limitations of traditional maps, interactive maps are not without their own set of challenges during development. It remains a rarity to encounter interactive maps that seamlessly blend an appealing visual design with robust interactivity. In instances where interactivity is incorporated, it typically encompasses basic functionalities like zooming, panning, or linking to specific locations (Keller *et al.*, 2000). This is noteworthy considering the array of web design software presently accessible, which offers the potential for diverse forms of interactivity and sophisticated graphic presentation possibilities. However, the full utilization of these tools to overcome the limitations of interactive maps has yet to be fully realized. Through a comprehensive case study, this research endeavors to introduce innovative design concepts aimed at addressing the inherent limitations of both traditional hand-drawn maps and interactive maps.

In addition, the digital design and refinement of certain artistic characteristics of traditional Chinese folk art are also part of the case study. For example, the graphic design in the case study fully draws on the relationship between positive and negative shapes in paper-cutting art and the handling of perspective on the principle of scattered perspective in Chinese ink landscape painting. This way of applying traditional Chinese art to modern digital design is also an inheritance and development of traditional art.

Specifically, the study centers around a digitally interactive hand-drawn style map, uniquely crafted by our team, which effectively resolves the challenges elucidated in the preceding research, leveraging the principles of traditional animation. This interactive hand-drawn map exemplifies the practical application of information visualization, further advancing the realm of information dissemination and display. As this field progresses, it is evident that an array of methods and channels for conveying information will emerge, solidifying Information visualization as an integral part of people's daily lives (Siyi, 2021).

3. Material and Method

Dahuaishu Ancestor Memorial Garden, situated in the northern part of Linfen Basin, Hongtong County, Linfen City, Shanxi Province, China, stands as a pivotal cultural relic protected by government in the region (Liu, 2015). Encompassing an expansive area of 1,494 square kilometers, this historic site experiences an average annual precipitation of 493.3 mm, accompanied by an average annual temperature of 12.3 degrees Celsius (Yue, 2019). Renowned as a national-level tourist attraction, it holds a distinguished status as the sole sacrificial shrine in China dedicated to the themes of "ancestor worship" and "searching for roots." Benefiting from its strategic location, Dahuaishu Ancestor Memorial Garden enjoys easy accessibility, as it is conveniently surrounded by three major transportation arteries. This accessibility contributes to a significant influx of visitors, with a maximum daily capacity to host 100,000 individuals and an annual number of scenic spot visitors reaching an impressive 2.027 million (Yue, 2019).

3.1. Workflow and Design Details

This section is the initial design conceptualization of the overall structure of the case, which mainly included the content of the interaction and the art design. Firstly, the team must design the overall design framework. Secondly the thesis will describe how the overall art style was refined. The third step was the design of various details. The fourth item was how to carry out the dynamic processing. The last one was the time control of all kinds of actions in the interactive animation.

3.1.1. Design Concepts for Platforms and Content

From the inception of the overall digital framework, this case relies on the mobile network terminal, mainly referring to mobile phones, as the foundation for designing the map function module within the Apple and Android system environment. This design caters to both online and offline information requirements.

The chosen architecture, namely the App, prioritizes tactile engagement, encompassing visual and auditory perception to facilitate a rich human-computer interaction process. Additionally, it accommodates the hierarchical expansion of the case's necessities, offering a vast array of information to the user community.

Delving into the functional design, the primary focus centers around travelers, with the main functionalities concentrated in the interaction stage layer. This stage emphasizes the user's experience, information acquisition and the distinctive features of various scenic spots.

Users accessing the mobile terminal can procure spatial information pertaining to scenic spots, plan routes within the scenic area, explore spot-specific content, obtain real-time weather updates, access guided tour details and stay informed about the current flow of people. Additionally, the application provides recommendations and reminders of activities to enrich the user experience further. In addition, in the information management, digital resources serve as vital tools for processing relevant information, functioning primarily as means of information maintenance and feedback. These resources act as windows to streamline administrative processes and enhance user support, facilitating efficient management of the application's functionalities (Figure 1).

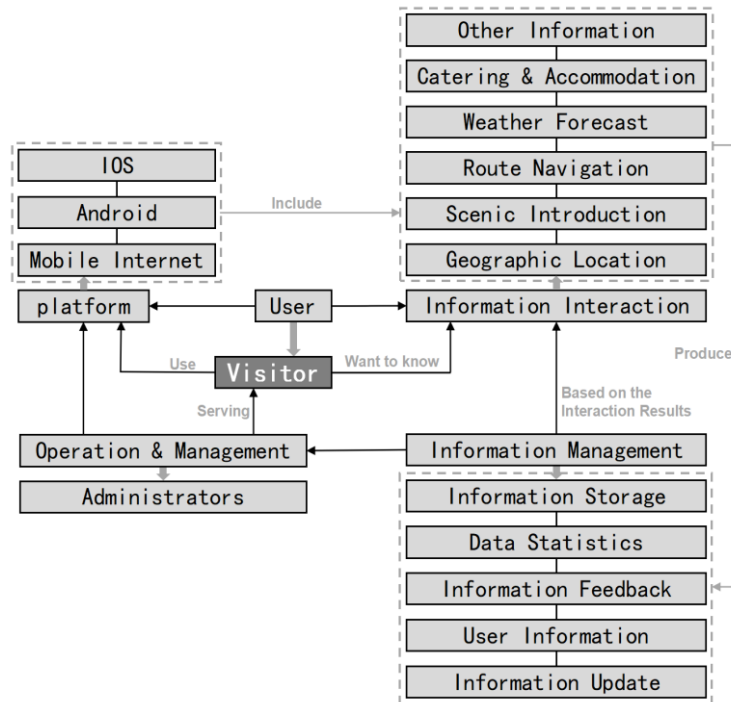


Figure 1. The Case Functional Framework Diagram
Source: By Authors

4. Result and Discussion

4.1. Animation Design Concept Based on Function

The underlying concept of art animation in this context lies in the utilization of dynamic graphic design to dissolve the inherent antagonism between user and design case within the interactive process (Yin, 2013). This serves the fundamental purpose of bridging the gap between the aesthetic subject and object, thereby achieving a harmonious unity between the two entities within the depicted scene (Liu, 2018). In the practical application of this approach, emotional resonance assumes a pivotal role, as it not only facilitates users' comprehension of the aesthetic object but also functions as a conduit through which users may fully experience and engage with the aesthetic sentiment.

In the process of design conception, to effectively implement this art animation design, it becomes imperative to dynamically process pertinent information in alignment with various application functions inherent in the interactive map. This alignment, in turn, constitutes the primary objective of the art animation design process, ensuring a seamless fusion of aesthetics and functionality for an enhanced user experience. Furthermore, certain interactive interfaces exhibit unconventional designs, incorporating features like using of animation effects for interface interactions, among others, necessitating a meticulous approach through frame-by-frame drawing techniques. These unconventional elements introduce an added layer of complexity to the animation process, demanding careful attention to detail to ensure seamless and captivating user interactions.

Drawing from the functional significance of hand-drawn dynamic patterns within the interactive process and the identified challenges that warrant resolution, the pattern

action design encompasses four distinct categories: artistic expression animation, conveying information animation, knowledge-conveying animation and interactive transition animation. Within the realm of artistic expression animation, which is activated through user interaction in the form of clicking, a frame-by-frame animation technique is predominantly employed to depict various natural phenomena and figurative elements. These include the graceful fluttering of auspicious clouds, the gentle ripples on the surface of the lake, the rhythmic swaying of trees in the wind, the elegant movements of swans and the soaring flight of birds. In pursuit of a coherent motion design, paramount importance is placed on evoking a sense of unhurried tranquility and serenity, thereby accentuating and effectively conveying the inherent ecological and humanistic ambiance of the scenic locale. Consequently, this animation style engenders an abstract emotional experience for the targeted user demographic.

The animation designed for conveying information utilizes the frame-by-frame technique, incorporating panning and zooming movements. Notably, in this segment, the figurative indexed information transcends conventional numerical, graphical, or textual representations, as it is ingeniously replaced with hand-drawn dynamic graphics. Notable examples include the weather effects of rain, snow and clouds, as well as the weather forecasting system, all of which are rendered akin to the artistic rendering of special effects observed in traditional animation. Through this artistic approach, precise weather conditions are vividly communicated, wherein the degree of rain and snow is visually portrayed with exceptional clarity. This artistic representation of weather phenomena adds a touch of visual allure to the conveyed information, enhancing user engagement. In the context of conveying knowledge through animation, which is activated by interactive gestures such as clicking, the process primarily revolves around meticulous design considerations pertaining to filming and voice-over techniques. These elements form an integral part of translating the narratives and cultural significance of various scenic spots and attractions into a cohesive amalgamation of auditory and visual representations. Through this skillfully crafted animated rendition, the well-established insights and information are not only vividly illustrated but also thoughtfully narrated, providing a comprehensive and engaging means of communication.

Interaction transitions, encompassing gesture poses like clicking, panning and zooming, constitute a pivotal aspect of the user experience and are predominantly facilitated by modules integrated within the game engine. This facet of interaction stands as a ubiquitous element, catering to various user groups. Given the constrained physical display of mobile terminals, contrasted with the virtually boundless capacity of digital display content, the project necessitates an astute design strategy that effectively triggers an infinite reservoir of digital information within the confines of the limited physical display through user group interactions. As a result, the inherent diversity of traditional animation engenders a plethora of exaggerated and visually intricate art forms in its expressive process.

The finesse and vibrancy of these artistic languages hold considerable importance for the design of interactive maps, as they serve to enrich the expression and tension of aesthetic elements within digital interactions. By harnessing these delicate and vivid artistic attributes, interactive maps can elevate the aesthetic appeal and immersive quality of user experiences, fostering a more engaging and captivating digital environment (Figure 2).

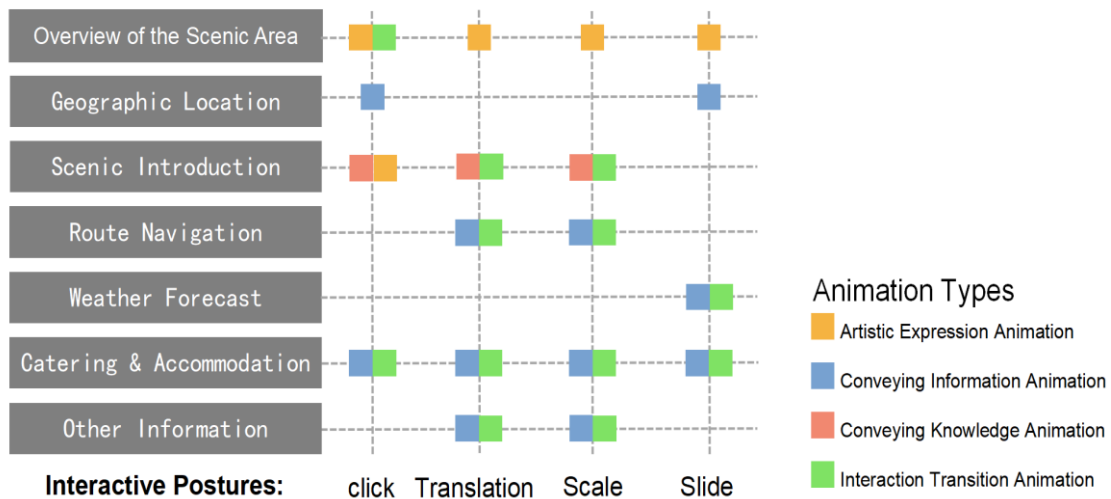


Figure 2. The relationship between animation design types and interactive gestures in the case study
Source: By Authors

4.2. Design Thinking around Regional Characteristics

In exploring the intangible cultural heritage of Hongtong County and its neighboring areas, particularly in the realm of art and opera, there arises a distinct focus on the local social and cultural dynamics. As a result, when devising designs for relevant projects, it becomes imperative to draw upon the rich folk-art tradition of Hongtong County, situated in the southern region of Shanxi Province. The key strategy lies in capturing the quintessential artistic features prevalent in various folk-art forms, including paper-cutting, window decoration, shadow play and New Year's paintings (Hui, 2023). These characteristic elements are then thoughtfully adapted to align with modern aesthetics, presenting a harmonious fusion of heritage and contemporary sensibilities. In doing so, the art design effectively conveys pertinent information within the potential aesthetic object, seamlessly bridging the past and the present.

4.3. Color refinement and design

The intangible cultural heritage of Hongtong County, deeply rooted in its farming culture, prominently features the pervasive “red” element, evident across a wide spectrum of activities, ranging from the ancestral sacrificial customs at Dahuashu to the traditions of visiting relatives.

The significance of red in these family-centric practices lies in its role as a guardian against malevolent spirits, symbolizing a talismanic shield for one's life, a revered totem of regional culture and an unwavering source of spiritual support, replete with profound meanings and metaphors. This cherished aspect of “enjoying red” finds explicit expression in various folk customs and artistic expressions throughout Hongtong County, including the renowned paper-cutting art hailing from the southern region of Fushan County. Such elaborate artistry, which has been preserved and passed down through generations for over a century, reflects the ever-evolving tapestry of history.

Paper cutting as a folk art form, its diverse shapes and pure, simplistic imagery reflects the local people's lives in the Taiyue Mountain Area (Li, 2018). In this context, the present study accentuates the essence of positive and negative shapes in folk paper

cutting as the focal point of graphic design consideration, adeptly incorporating these elements into the crafting of materials and designs (Figure 3). In essence, the color scheme employed in this case predominantly revolves around the utilization of red as the foundational hue. However, the red color is thoughtfully adapted based on the specific requirements of the design program. For instance, it may be employed to symbolize distance or utilized with reduced saturation in background layers to maintain purity.

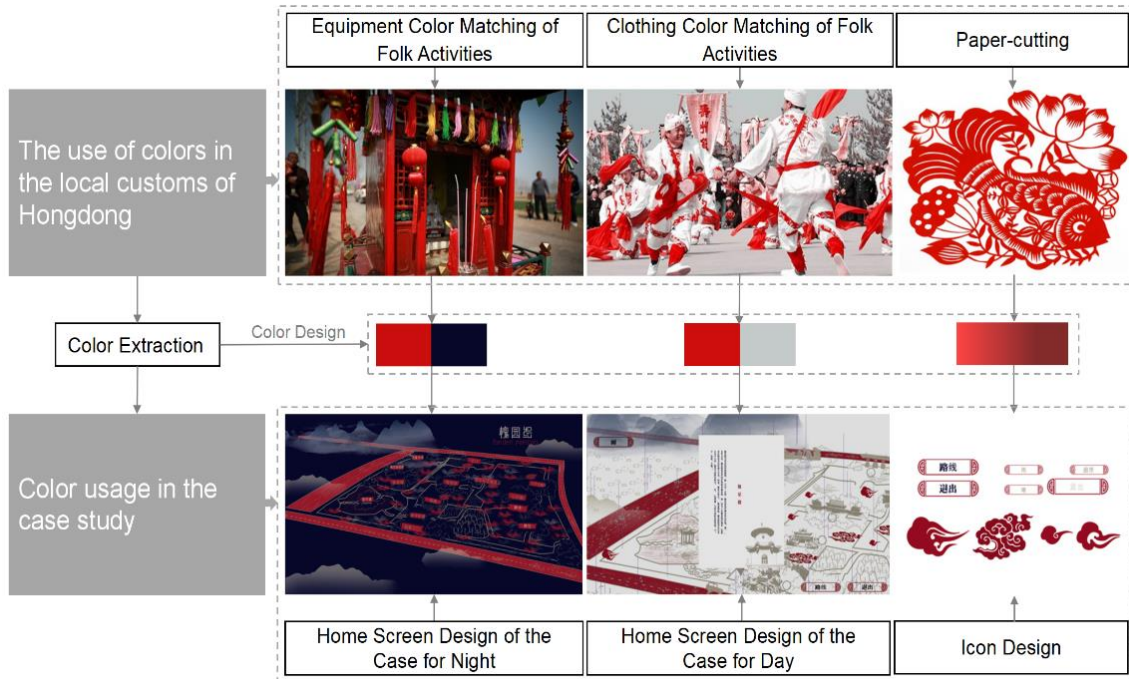


Figure 3. Local Folk Culture Color and Case Design Color
Source: By Authors

4.4. *The Design Concept of Icon*

Regarding the outline and shape design, the elements encompass a diverse range, including architectural features, symbols, animals, plants, physical phenomena, buttons and more. Crucially, these stylistic choices remain intricately intertwined with the rich folk culture and artistic expressions prevalent in Hongtong County. Throughout the design process, paramount importance is placed on the refinement and simplification of the elements, guided by the purpose of the plane composition. Emphasizing the fusion of form and function, the external beauty of the design harmoniously aligns with its internal purpose. Consequently, the design avoids undue complexity, striving to convey the primary function and shape information with utmost clarity. In this pursuit, many of the shapes embrace fundamental and recognizable contours, such as auspicious clouds, trees and other symbolic elements. By doing so, the design encapsulates the essence of Hongtong County's cultural heritage while effectively communicating its intended messages (Figure 4).

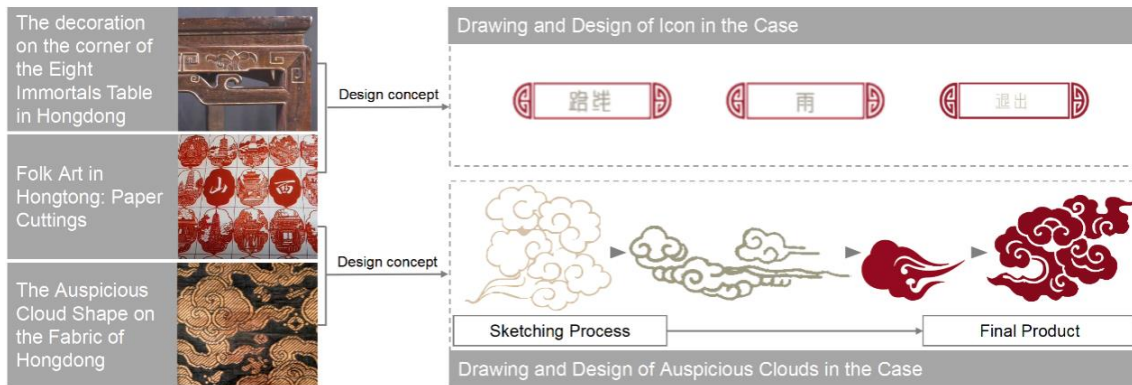


Figure 4. Design ideas for some of the graphic elements
Source: By Authors

4.5. *The Design Concept of Sketches*

The graphics in this case is deeply intertwined with the profound regional folk art and culture, showcasing a seamless blend of nationality and information interaction technology. Consequently, a fundamental principle of design revolves around enhancing public aesthetic awareness and sophistication, while simultaneously expanding the scope of regional cultural expression to foster harmonious coexistence of public aesthetics. For instance, the textual records of immigrant descendants from various regions reveal an abundance of cultural elements, including the iconic large locust tree, ancestor worship rituals and root hunting folk activities, which collectively form the foundation for the design's thematic focus. Many of these elements are intrinsic to the intangible cultural heritage, serving as essential cultural memories and symbols of immigrants' sentiments towards their hometowns, ultimately evolving into emotional emblems of "seeking roots and ancestor worship".

To embrace this characteristic essence, the design predominantly adopts the texture of hand-drawn sketches as the primary artistic style for rendering the main structures and various elements. This approach offers users an engaging experience, as they can effortlessly zoom in on the map by simple gestures, thereby gaining access to clearer depictions of local scenic spots. Additionally, by clicking on these attractions, users are treated to informative introductions, presented through a design interface that embodies the traditional blank space method in painting (Figure 5). Moreover, in the portrayal of distant peaks and clouds, from drawing on the Halo Dyeing Method of Chinese painting, the use of haloing techniques adds depth and richness to the visual layers, enhancing the overall aesthetics of the artwork. In this way, the art design effectively captures the essence of regional cultural heritage, while employing modern technology and interaction principles to create an engaging and harmonious user experience (Figure 6).

4.6. *Design of Motion Graphics*

In this case, the visual functional requirements aim to transform a substantial amount of data into compelling graphical representations, thereby imbuing the design with deep emotional resonance. To achieve this, the design process centers around the visualization of data information through the creation of animation special effects.

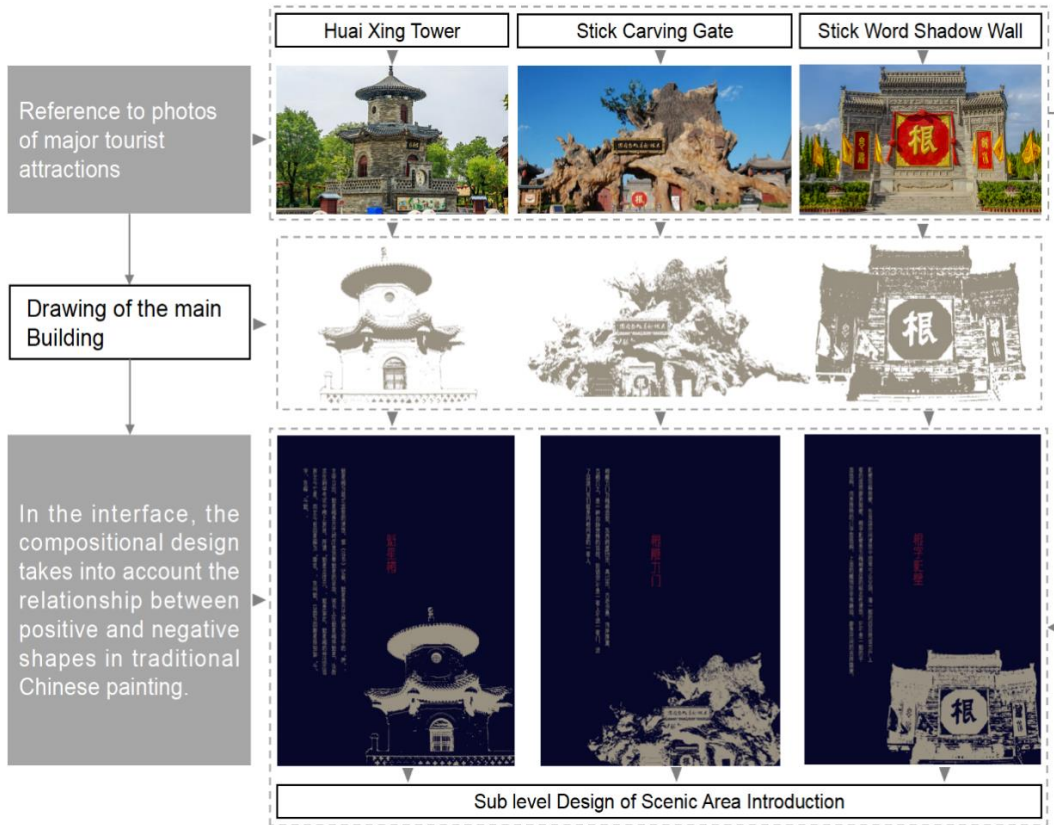


Figure 5. The design relationship between scenic area architecture and case drawing
Source: By Authors

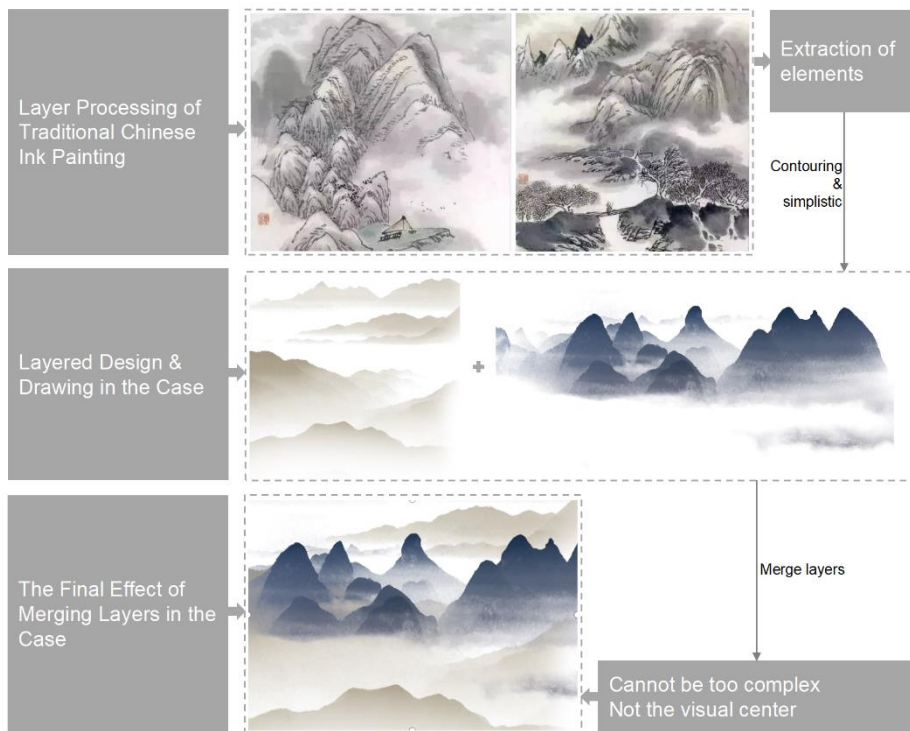


Figure 6. Design and painting of background clouds and mountains.
Source: By Authors

Drawing inspiration from traditional animation techniques, the design paradigm incorporates the methods of special effect expressive action from Information visualization and knowledge visualization. The visualization process is accomplished through the original picture design, wherein the variance in degree information is conveyed through distinct action designs within a single cycle of the original picture. This approach is particularly effective in highlighting the differences between various degrees of the same physical phenomena, such as distinguishing between light rain, moderate rain and heavy rain or representing variations in thunderstorms and cloudy weather. Instead of relying on numerical or textual data, the weather system is portrayed using the special effect drawing method reminiscent of traditional animation. Exaggeration and minimization of change are key in animation design and drawing for user to accurately capture the relevant information. In the case of minor weather phenomena, the animation design can basically draw or diminish the extent of the phenomenon in a way that objectively restores the weather phenomenon. During the drawing process, the shape of the graphics changes less in each frame. But Exaggerating the phenomenon must be needed in designing strong weather phenomena. The change of shape between each frame of the drawing is one of the key elements that reflect the change in degree, that is, the degree of change in the graphic in every two adjacent frames (Figure 7).

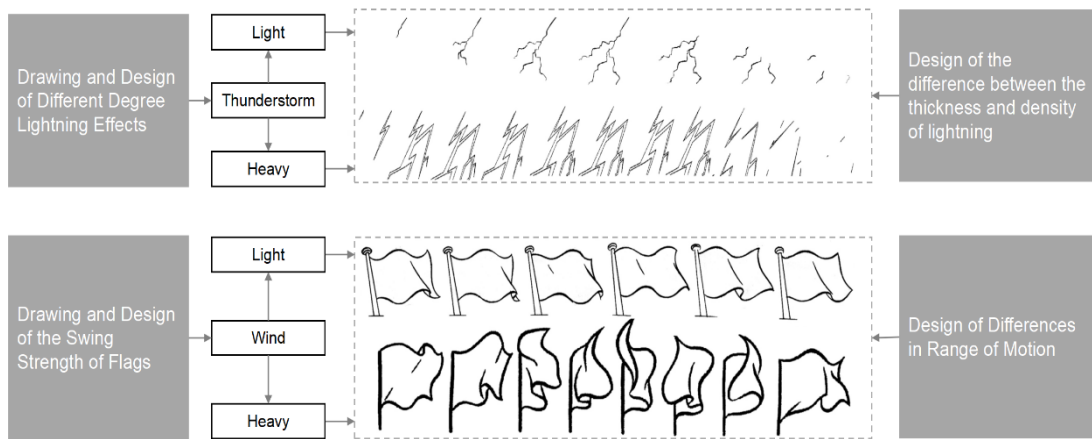


Figure 7. Design and drawing of weather phenomena of different degrees
Source: By Authors

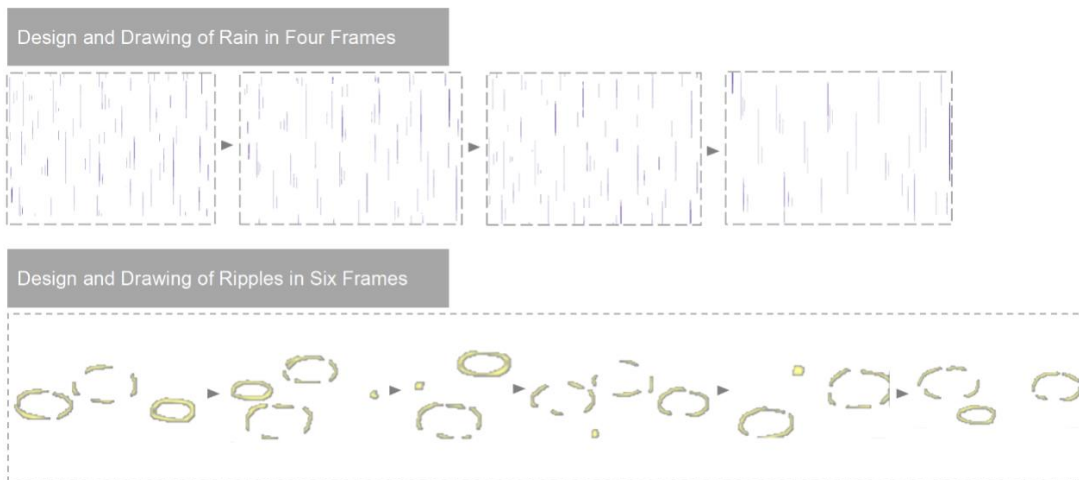


Figure 8. Frame rate design for adaptive loading speed
Source: By Authors

Considering the limitations of software loading speed in the design, the animation strives to complete an action cycle within four to eight frames. The motion frame rate and time are fixed values and the control over the intensity of special effects is primarily achieved by adjusting the amplitude of the original motion between each frame. By accurately rendering the strength of the special effects in each frame, the playback duration can be dynamically adjusted by adding or subtracting intermediate frames to reflect changes in the degree of the depicted special effects (Figure 8).

This meticulous approach to visualization not only enriches the emotional appeal of the design but also ensures that complex data is effectively conveyed through captivating animation special effects, ultimately enhancing the overall user experience. In the information interaction design process, traditional animation serves as a valuable tool for conveying information. Through the design of action forms, a subjective emotional world is constructed for the interactive subject, invoking a surreal visual tension perception of objects. The movement patterns of animals, characters and objects play a vital role in conveying emotional feedback, purposeful intentions and psychological activities, offering insights into information states, reactions and purpose-driven thought processes. This design approach is dedicated to depicting the subconscious and juxtaposing diverse visual thoughts within the interactive subject.

When crafting the original paintings, a deliberate effort is made to differentiate the root-seeking folk activities, characterized by the great immigrants, from the real folk time domain. To achieve this, the action designs tend to adopt a standardized and performative style, introducing novel oral narrative forms to users in a symbolic manner. While doing so, the expressive power of the original paintings is preserved, aligning with the enchanting allure of cultural inclinations. Varied types of exaggerated designs are explored based on the cultural background of different scenic spots and holiday terms. For example, in the case study, distinct walking styles, diverse driving statuses of cars and playful animal movements can be designed, eliciting aesthetic experiences with different directions and connotations based on users' own knowledge, experiences, personalities and other factors. This approach imparts abstract emotional contexts such as peace, comfort, sadness and courage.

The scenic area comprises three main spots, each with a unique ambiance. The area dedicated to ancestral worship activities embodies solemnity and seriousness, thus incorporating grand and ceremonious action designs. The folk tourism areas, with a focus on shadow puppetry, extract symbolic movements from folk arts like drama to serve as elements in action design. On the other hand, the Fenhe ecotope, a place of leisure and entertainment, features relatively slow movement rhythms for animals and characters, accentuating a sense of ease. Throughout the process of Information visualization and knowledge visualization, the action design aligns with the original design while adapting to different scenes and shifts in the humanistic environment. The design process delves into an open emotional resonance environment and explores aesthetic interaction forms within the context of text language, employing a de-territorializing gesture to foster a dynamic and engaging user experience.

4.7. Feedback Design for Improving Interaction Efficiency

Mobile terminals possess the capability to aggregate extensive information content within the confines of a limited square screen (Liu, 2018). To facilitate effective communication and information display, a clear hierarchical relationship is essential. On the other hand, the user interaction process entails a subjective screening of information,

wherein users actively engage in pressing, sliding, dragging and other manual behaviors to selectively access the desired information and knowledge. This accumulation of gestures enables a seamless transition between diverse information levels. Consequently, the information hierarchical screening interaction mode must align with the users' interaction behavior to ensure optimal usability and user experience.

In the context of information interaction, user groups exhibit a tendency to naturally group objects that are in close proximity or spatially related, demonstrating a habitual inclination towards organization, grouping and cohesive arrangement (Lin, 2018). To address this, the design of the interaction process seeks to establish meaningful associations between interconnected content and controls, thereby minimizing spatial distances between them. Additionally, the number of options provided during the interaction significantly impacts the efficiency and time required for the user community to execute information filtering and hierarchical decision-making. A higher number of choices leads to a logarithmic increase in filtering time, consequently influencing the overall user experience. To address this concern, guided processing is employed in the information screening process. Notably, essential functions and key information are accompanied by interpretative traditional animation dynamic elements that serve as cues for the user group's decision-making. For instance, employing traditional animation effects like water droplets falling on pertinent information or generating ripples upon interacting with essential elements effectively captures the user group's attention and guides them towards an efficient and meaningful interaction with the information, culminating in a successful visualization process.

Table 1. Design of animation feedback duration in the case study

Source: By Authors

Functional Classification	Related Content	Interaction Duration	Trigger Form
Conveying Knowledge Animation	Open interface, animation of text and graphics in the interface	Loop Playback	User Control
Conveying Information Animation	Interface tiling displacement, interface scaling, interface switching, interface flipping	0.5-1seconds	Interactive Control
Interaction Transition Animation	Buttons and switches	0.3-0.6seconds	Interactive Control
Artistic Expression Animation	Animal and plant movements, utensil movements, natural phenomena	Loop Playback	System Control
Guide animation	Loading process and information prompt animation	2-4 seconds	System Control

Furthermore, within the domain of applying traditional animation to information interaction, the duration of different animation types significantly influences the frequency and subjective perception of user interactions with specific informational elements. In the present study's design, animations are categorized according to gesture interaction actions and functional roles, encompassing guidance animation, information interaction animation, control animation and art animation. Each animation category is subjected to precise temporal constraints. Excessive duration may induce user fatigue,

whereas overly brief durations may result in incomplete information delivery, thereby underscoring the importance of striking the right balance. Both excessively fast and slow animations can adversely impact the user group's interaction experience. Additionally, the extent of information presented also plays a crucial role in determining the interaction duration. When confronted with a substantial amount of information, users tend to extend their stay, while a paucity of information leads to shorter interaction times for the user group (Table 1).

5. Conclusion

The evolution of hand-drawn maps has been profoundly influenced by a plethora of modern technological advancements, which have eroded the once sacrosanct realm of traditional aesthetics. The amalgamation of animation and interaction design has steered art away from its conventional purpose of mere aesthetics, metamorphosing it into a functional tool for problem-solving that can be embraced and utilized by the general populace. Concurrently, new technologies are assimilating the essence of traditional art, thereby propelling the very evolution of art forms themselves. Thus, the interwoven relationship between traditional animation and information interaction emerges as an efficacious conduit for facilitating the interdisciplinary growth of traditional hand-drawn maps. Far from existing as independent opposites, the reciprocal fusion of traditional art of animation and cutting-edge interactive technologies serves as a means of both inheritance and advancement of tradition. The all-encompassing and profound design approach intrinsic to traditional animation offers a comprehensive and multifaceted paradigm for the interactive information design of maps.

References

- Allan, B.N.E.J.V. (2013). Cartographic design and production in the internet era: The example of tourist web maps. *The Cartographic Journal*, 38(1), 61-72.
- Hong, C.C. (2019). Art maps and the city of Shanghai: Mapping practices and new urban experiences. *Time Architecture*, 14-19.
- Hui, L. (2023). Design and Promotion of linfen city image in the context of regional culture. Master dissertation.
- Jancewicz, K., Borowicz, D. (2017). Tourist maps—definition, types and contents. *Polish Cartographical Review*, 49(1), 27-41.
- Lin, L. (2018). UX designers must understand these user psychology. *Computer and Network*, 44(20), 45.
- Liu, L.X., Sun, Q. & Yang, Z. (2018). Research on interactive animation in the UE era. *View On Publishing*, 313, 69-71.
- Wang, M.J. (2022). Research on Interactive design application based on handdrawn cultural and tourism maps. *Research on Design Art*, 19, 70-72.
- Han, Y., Ma, Q. & Yan, S.Y. (2021). Interactive hand-drawn map design research. *Shoes Technology and Design*, 1(20), 100-102.
- Sun, Y.N., Sun, H.Y. (2020). Application Design of thematic hand-painted maps under the vision of digital media. *Packaging Engineering*, 41(24), 237-242.
- Wang, X.D. (2021). Application of illustration design in hand-drawn city maps. *Package & Design*, 6, 98-99.

- Xie, Q.W.(2016). Status and prospects of the domestic hand-drawn map market. *Drama House*, 11, 274.
- Yin, J., Su, Z.S. (2013). Research on functional animation design based on iOS Platform. *Journal of Machine Design*, 30(9), 120-122.
- Yang, L.W., Wang, Y.Z. & Gao, Y. (2019). Simulation of ecosystem nice flow in Dahuaishu all cester memorial garden. *Journal of Shanxi University*, 42(02), 473-481. Hongtong, Shanxi.
- Keller, C.P., Richmond, E.R. & Heggen, O. (2000). The role of the map in internet-based travel destination marketing. ICA Commission on Maps and the Internet Symposium, Knoxville, Tennessee.
- Robert, R.E. (2014). 100 Ideas that changed graphic design. *Cartography and Geographic Information Science*, 41(1), 111-113.
- Lorenz, A., Thierbach, C. & Baur, N. (2013). Map design aspects, route complexity or social background? Factors influencing user satisfaction with indoor navigation maps. *Cartography and Geographic Information Science*, 40(3), 201-209.
- Zhang, X.L.(2019). On the value of handdrawn urban maps. *Art Science and Technology*, 32(05), 103.
- Nicholas, G., David, B. (2015). *The new medium: Key concepts*. Liu Jun. Zhou Jingnan, Translation, Shanghai, Fudan University Press.
- Liu, J.L.Y.C., Zeng, X. & Tang, F.P. (2015). Effects of county scale land use change on carbon emissions: Taking Hongdong County of Shanxi Province as an Example. *Bulletin of Soil and Water Conservation*, 35(1), 262-266.
- Li, C.L. (2018). A folklore interpretation of the cultural phenomenon of the great locust tree. *Journal of Zhongyuan University of Technology*, 29(02), 13-16, 40.