Article

A Novel Visual Narrative Framework for Tourist Map Design Based on Local Chronicles: A Case Study of the Songshan Scenic Area

Wenjie Zhen [1,2]**, Shifang Huang** [1]**, Zhihui Tian** [1,]*** and Xiaoyue Yang** [2]

[1] School of Geoscience and Technology, Zhengzhou University, Zhengzhou 450001, China; zhenwenjie@zzu.edu.cn (W.Z.); shifang116@gs.zzu.edu.cn (S.H.)
[2] School of Computer and Artificial Intelligence, Zhengzhou University, Zhengzhou 450001, China; yxyhh9811@163.com
*   Correspondence: iezhtian@zzu.edu.cn

Abstract: Tourist maps provide tourists with destination information that reflects their unique characteristics and cultural connotations and play an important role in attracting tourists and serving marketing purposes. However, existing designs of tourist maps often ignore the importance of cultural resource selection and the relationship between maps and structural linguistics, thereby affecting the narrative function and representativeness of tourist maps. This study utilizes the local chronicle as a data source and proposes a novel visual narrative framework (VNF) for tourist maps. The VNF combines Todorov's narrative hierarchy and Roth's visual storytelling tropes to establish a mapping between map elements and narrative elements. To demonstrate the effectiveness of the VNF, the Songshan Scenic Area was selected as a case study. By applying the VNF, highly characteristic and meaningful colors, figurative hand-painted symbols, and scene symbols are selected and integrated into the map design to enhance the artistic value and narrative of the map. This framework reveals the potential cultural value of local chronicles and can serve as a reference for other historical tourist cities, contributing to the preservation of local cultural heritage.

Keywords: tourist map; narrative map; local chronicles; map design

1. Introduction

As an important cartographic product, tourist maps provide tourists with information about cities or scenic spots, reflecting their unique characteristics and cultural connotations [1–3]. The traditional map poses a great challenge to the expression of local cultural connotations, because it focuses on the spatial features of the place, but it is difficult to grasp the temporal features [4]. Fortunately, the emergence of narrative maps offers new inspiration and methods for conveying the essence of local culture. By introducing narrative elements into tourist maps, tourists can gain a better understanding of local culture and plan their routes accordingly. Moreover, using cartographic technology to depict local culture not only creates a sense of place for tourists but also helps disseminate and protect local cultural heritage, which holds significant social value.

Travelling is a journey into the unknown, and reading maps is undoubtedly a direct way to learn about unknown areas [5]. Tourist maps are therefore the most important resource for tourists and should theoretically be able to answer all the questions about a destination visited by tourists [6]. Satisfying individual needs has become the primary focus of tourist mapping research [7–9]. Basic map elements are used to represent landmarks and points of interest to provide navigational guidance for tourists [9–11]. However, with the growing market demand, traditional maps that are monotonous and rigorous are no longer sufficient. Visually pleasing artistic maps and vivid narrative maps are increasingly valued in the field of tourist maps [12,13]. Meanwhile, the cultural value of cities and scenic

spots is recognized and explored by people; culture has become a significant aspect of the modern tourism industry [14]. Local chronicles, as a type of public cultural product, provide detailed records of local historical development and contain numerous unique historical and cultural resources, such as historical figures, events, customs, and cultural relics. They are closely related to cultural heritage and serve as highly representative local cultural resource. Scholars have attempted to develop map visualization methods based on local chronicles to reflect local cultural connotations [15]. However, the full potential of cultural resources in local chronicles has not been fully utilized. More importantly, previous studies lack an in-depth consideration of the relationship between maps and structural linguistics and focus more on the visual effects of maps. As a result, the narrative function and representativeness of tourist maps may not be guaranteed.

In light of these limitations, this study attempts to establish the relationship between maps and structural linguistics, as well as develop visual narrative elements to enhance the narrative of maps, while further exploring the potential cultural value of local chronicles. A novel visual narrative framework (VNF) is proposed for tourist maps based on local chronicles. This framework combines Todorov's narrative hierarchy [16] and Roth's visual storytelling tropes [17] to analyze the relationship between a narrative and maps. In the VNF, map space is divided into three types: structural space, logical space, and narrative space. The structural space includes the basic classification of narrative maps, i.e., the expressed objects (nouns) and their modifications (adjectives and verbs). The logical space is the restriction and transformation of the structural space; the expressed objects are described with different symbols and colors to form clues of the event. Sub-theme maps then are generated by combining relevant expressed objects through a specific logical relationship. The clues are organized into events. Lastly, in the narrative space, the sub-theme maps are displayed in multiple levels, orders, and sizes to express different narrative patterns and form the final theme map. In other words, a story is described through the presentation of various events. By establishing a complete narrative chain in the narrative map (parts of speech–clause–sequence–story), the VNF helps clarify the relationship between maps and structural linguistics. The Songshan Scenic Area was selected as a case study to demonstrate the effectiveness of the VNF. The results show that this framework improves the narrative capability, explores and displays more potential local cultural characteristics, and contributes to the protection and dissemination of local culture.

The remainder of this paper is organized as follows. Section 2 introduces works related to tourist maps. Section 3 proposes the visual narrative framework (VNF) and elaborates on the details of the VNF. In Section 4, experiments are conducted to apply the VNF to the Songshan Scenic Area, including an introduction to the experimental area, dataset, main steps, and the final cultural map of Songshan Mountain. Finally, conclusions are provided in Section 5.

2. Related Work

Traditional tourist maps utilize basic elements such as marks, symbols, colors, legends, and scale to represent landmarks and points of interest [9–11], or to display self-designed evaluation indicators [18,19] for cities and scenic spots. These methods fulfill the fundamental requirements of tourists, helping them choose potential destinations and plan their routes. The maps generated by these methods can be considered a scientific reflection of the functionality of maps at a material level. However, tourist maps also serve a marketing purpose [6], functioning as promotional materials for cities or scenic spots [20]. Therefore, they need to strike a balance between scientific functionality and artistic appeal. Art and science can convey information in different ways in cartography [21], and artistic tourist maps are better suited to meet the demands of the market economy. In this regard, while traditional tourist maps are practical, they often lack the artistic and aesthetic qualities that can enhance the overall experience. Accordingly, artistic maps have more aesthetic and collectible value. For instance, hand-painted tourist maps often offer a visually pleasing experience with hand-drawn routes and landmarks [12].

In addition to basic functionality and aesthetics, the design of tourist maps should also incorporate cultural elements. Urban culture encompasses the collective memories, lives, thoughts, and emotions of local people, as well as a wealth of diverse historical stories, making it a crucial factor in attracting both domestic and international tourists [14,22,23]. In this context, maps not only serve to enhance understanding but also evoke emotional responses from readers [3]. For historical cities in particular, tourist maps are not only part of the publicity of the local population but also the inheritance and protection of their cultural connotations. However, traditional tourist maps and artistic maps often overlook the urban cultural system and cultural characteristics. These maps tend to prioritize map technology and visual effects to showcase the spatial features of a place, neglecting the cultural value of maps and resulting in a homogenized presentation and design style. Yet, regional culture and customs are deeply intertwined with stories that possess strong temporal attributes, making it difficult to convey them effectively through traditional tourist and artistic maps [4]. As a result, scholars have explored the concept of story mapping or narrative mapping [24–26]. Narrative maps have emerged as a powerful tool for interpreting the cultural essence of urban spaces. For example, in 2020, Weng et al. designed a tourist map through a spatial narrative to reflect its artistic features [12]. Similarly, Su et al. proposed a readable framework in 2021 by distinguishing the narrative features and spatio-temporal dimensions of areas with historical cultural features to form a narrative map [13]. In 2022, Zhou et al. constructed an expression framework for regional culture based on the cultural gene and the cultural hierarchy theory and designed a tourism map using narrative techniques [27]. However, these studies have not fully elucidated the relationship between maps and structural linguistics, which is a prerequisite for effective storytelling [28]. Furthermore, the selection of cultural resources in these studies may be somewhat arbitrary, potentially affecting the narrative function and representativeness of tourist maps. Thus, the challenge of carefully choosing cultural resources that reflect local characteristics remains an important issue in the field of tourist maps.

In recent years, scholars have begun to pay attention to the potential cultural value in local chronicles and recognize the limitations of solely relying on the textual format of local chronicles, which hinders public use and understanding. For instance, He et al. developed a "Spirit-Sign" content framework based on local chronicles in 2022, focusing on urban characteristics and culture, and formulated a map visualization strategy that highlights traditional customs, famous people, buildings, and products [15]. However, there is still a scarcity of studies that explore the mapping of urban characteristics and culture using local chronicles, with existing research primarily focusing on geographical entities rather than cultural narratives.

Therefore, this study aims to enhance the cultural narrative function of tourist maps by the fundamental theories of structural linguistics and cultural resources in local chronicles, thereby supplementing the visualization strategy of local chronicles and promoting their cultural value.

3. Methods

To make the map display narrative, a visual narrative framework (VNF) is established by combining Todorov's narrative hierarchy [16] and Roth's visual storytelling tropes [17] to build the basic structure of the narrative map. As illustrated in Figure 1, the VNF divides the map space into three types: structural space, logical space, and narrative space. The structural space contains the basic classification of narrative maps, corresponding to the parts of speech in structural linguistics: nouns, adjectives, and verbs. Therein, nouns correspond to the expressed objects of narrative maps and are mainly presented as symbols. Adjectives are used to describe the characteristics of the expressed objects, mainly presented as symbols, colors, annotations, etc. Verbs are used to describe the change in the state of the expressed objects, mainly presented as symbols, colors, annotations, etc. The logical space is the restriction and transformation of the structural space, which further expands the basic classification of narrative maps. In the logical space, different parts of speech are

combined to modify nouns and enrich their semantic information to form clauses, i.e., clues of the event. Corresponding to the narrative map, the attributes and transformations of the expressed objects are described in various forms, such as concrete symbols. Clauses are then combined into sequences by introducing temporal, spatial, and other logical relationships. That is, the clues are arranged in a certain logical way to form different events. In the narrative map, events are expressed as sub-theme maps, each with a unique theme and containing multiple expressed objects with rich semantics. The narrative space focuses on the design of narrative patterns, including the setting and arrangement of narrative perspectives and narrative orders. Events are presented in different ways to describe a complete story. In narrative maps, stories are expressed as theme maps, which consist of multiple sub-theme maps displayed in multiple levels, orders, and sizes to express different narrative patterns.
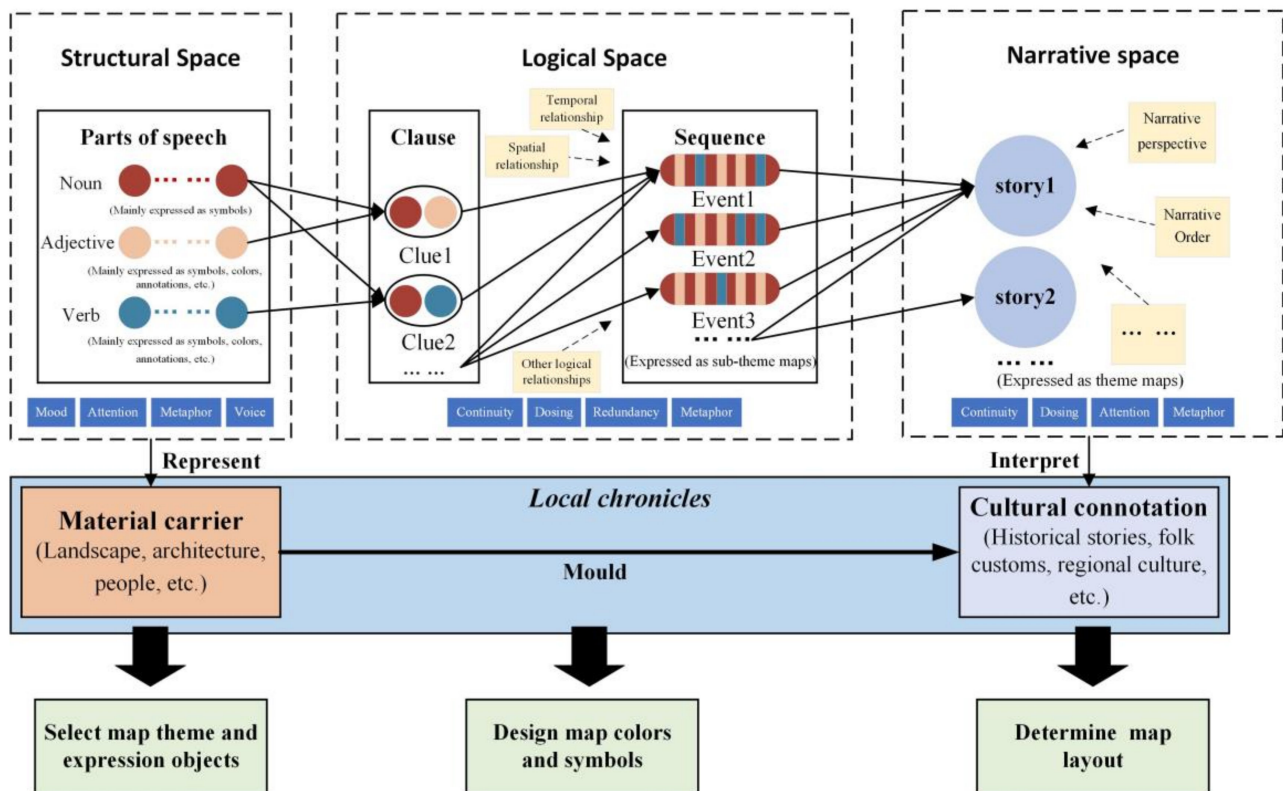
Figure 1. The visual narrative framework (VNF).

Meanwhile, to enhance the narrative of the map, Roth's visual storytelling tropes are introduced into the VNF, which includes seven types: continuity, mood, dosing, attention, redundancy, metaphor, and voice. Each type affects different map spaces (Figure 1), as follows:

- Continuity: In the VNF, the layout and design of map elements or sub-theme maps follow a certain logical relationship or narrative pattern, making narrative maps more memorable than other maps.
- Mood: In the color design stage, the VNF sets a visual tone consistent with the plot points, creating cognitive and emotional responses that change instantly with the story for readers.
- Dosing: In the sub-theme map, the VNF selects the most expressive plot to replace the entire affair. In the theme map, the VNF controls the narrative rhythm of the story through the block arrangement of the sub-theme map.

- Attention: By differentiating visual features and map layout, the VNF separately establishes visual hierarchies for the sub-theme map and theme map, guiding readers' visual attention.
- Redundancy: The VNF repeats important cultural information in the local chronicles to enhance the correlation between the sub-theme maps and highlight the unique cultural characteristics of the place.
- Metaphor: Metaphors are ubiquitous in the VNF, such as point symbols having concrete symbolic meanings, the sub-theme map using representative fragments to depict the entire story, and the theme map using multiple stories to express local culture.
- Voice: The VNF employs text of different colors, sizes, and styles to represent the voices of different roles, such as adding the voices of characters to enrich the story, adding the voices of designers to increase the coherence of the narrative, etc.

From the point of view of map design, the selection of the map theme and expression objects corresponds to the selection of nouns in the structure space of the VNF. The color and symbol designs involve both the structural space and logical space of the VNF, which corresponds to selecting adjectives and verbs and generating clues, representing modifications of expression objects. Once the color and symbol designs are complete, the sub-theme map is created by the spatial relationships between expression objects. Namely, in the VNF, different clues form events. In addition to the map title, legend, and textual explanation, the map layout design involves the narrative space of the VNF to merge these events into a comprehensive story using various narrative perspectives and orders. In the case of local chronicles, the entire process occurs to shape local cultural connotations through their material carriers. In the subsequent experiment, map design is used as the main thread to illustrate the application of the VNF.

4. Experiments and Results

4.1. Study Area and Dataset

The Songshan Scenic Area (Figure 2), located in Dengfeng city, Henan Province, China (34°25′–34°33′ N, 112°52′–113°05′ E), was designated as a World Heritage site in 2010 under the name "Historic Monuments of Dengfeng in The Centre of Heaven and Earth" [29]. Songshan Mountain is one of the Five Sacred Mountains of China and holds the esteemed position of being the central sacred mountain in the country; it is surrounded by eight architectural complexes built over nine dynasties. These architectural complexes serve as exemplary instances of ancient Chinese buildings dedicated to rituals, science, technology, and education. They also embody the profound cultural significance of the Songshan Scenic Area.
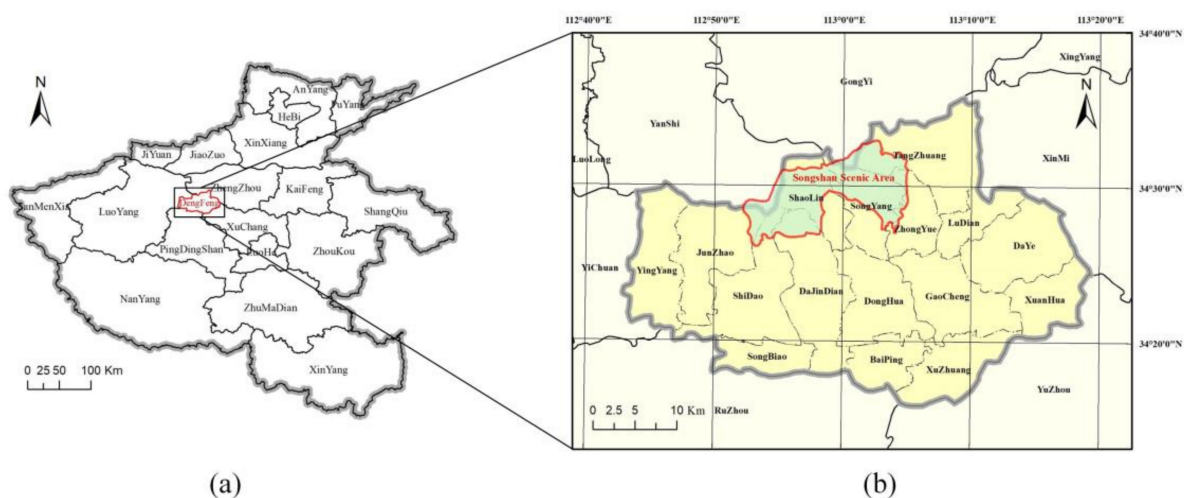

Figure 2. Location of the Songshan Scenic Area: (**a**) the location of Dengfeng in Henan Province; (**b**) the location of the Songshan Scenic Area in Dengfeng.

The Dengfeng City Chronicle is the primary data source for this study, providing comprehensive and authoritative information on various aspects of Dengfeng, including its natural, geographical, political, economic, social, and cultural history. The series is regularly updated and revised every 15 years, with the latest edition being from 2008 [15]. This edition is available in both paper and electronic formats and can be purchased online [30]. Specifically, the third volume of this edition, entitled "Zhongyue Songshan", provides detailed information on the historical evolution, natural scenery, and culture of Songshan Mountain. Furthermore, the edition includes two separate volumes dedicated to the cultural relics of Songshan Mountain and Shaolin martial arts, emphasizing the significance of Songshan Mountain to Dengfeng city [31]. Therefore, this study focuses on the study area of Songshan Mountain, aiming to preserve and perpetuate the cultural value of the Dengfeng City Chronicle, which plays a vital role in the development of the city's unique culture.

4.2. Main Steps

4.2.1. Map Theme and Expression Object Selection

One of the main functions of tourist maps is to showcase the unique characteristics and cultural connotations of a local area. To achieve this goal, this study utilizes the 2008 edition of the Dengfeng City Chronicle [31] as a data source and focuses on the distinctive Songshan culture as the map theme to complete the noun selection in the VNF. On this basis, three highly representative cultural contents are used as the primary expression objects of the map—imperial sacrifice, three religions, and Shaolin culture. The imperial sacrifice culture is at the core of the traditional culture of the Five Sacred Mountains in China, serving as the source of their fame and distinguishing them from other mountains. The three religions culture represents the convergence of Confucianism, Buddhism, and Taoism at Songshan Mountain, making it one of the most typical among the famous mountains in China. Shaolin culture, which encompasses unique elements such as architecture, religion, and martial arts, is a symbol of Songshan culture. Shaolin martial arts, in particular, are famous all over the world.

Subsequently, based on the theme content, the primary expression objects are further divided into secondary and tertiary expression objects, as shown in Table 1. Additionally, the map contains essential features like roads and rivers.

**Table 1.** Expression objects.

Primary Expression Objects	Secondary Expression Objects	Tertiary Expression Objects
The imperial sacrifice culture	Sacrificial sites Mountains Peaks	- - -
The three religions culture	Confucianism Buddhism Taoism	Relevant buildings Relevant buildings Relevant buildings
Shaolin culture	Zen culture Buddhist medicine Shaolin martial arts	Relevant buildings and tales Relevant buildings and tales Relevant buildings and tales

4.2.2. The Map Color Design

Color, as a visual variable for recognition and classification, helps to distinguish different expression objects, and enhances the aesthetic quality of the maps. Color also has narrative functions and is used to connect, transition, and enhance narrative elements in map design. By applying the VNF, the color design in this study incorporates the basic principles of figurativeness and symbolism [32] and four visual storytelling tropes: attention, metaphor, mood, and continuity (Table 2).

Table 2. Examples of the color design with the CMYK color system.

Theme	Color Lump	CMYK	Object
Theme map		C3M7Y9	Background color of the theme map
		C93M88Y89K80	Text
The imperial sacrifice culture		C82M49Y51K2 C89M76Y60K31 C93M88Y83K75	Background color
		C3M2Y2	Sacrificial site
The three religions culture		C3M2Y2	Background color
		C70M45Y49	Confucianism
		C29M35Y70	Buddhism
		C51M42Y41	Taoism
Shaolin culture		C6M11Y31	Background color

The color design involves the use of changes in color intensity and contrast to convey different visual levels of expression objects (attention). Generally, the color changes in expression objects within the same visual level should be smooth to avoid unnatural transitions, while the color contrast of expression objects at different visual levels should be strong to highlight the expression theme and narrative clues, e.g., the background colors and colors of expression objects in Table 2. Meanwhile, the selection of colors often carries deeper meanings and influences readers' emotional responses to the expressed objects mapped (metaphor and mood). For instance, in the sub-theme map of the imperial sacrifice culture, three dark colors are chosen to create a bronze-like texture that symbolizes power in ancient China and also establishes a solemn, serious visual tone for readers (Figure 3a). In the sub-theme map of the three religions culture, common clothing colors are used to represent Confucianism (cyan), Buddhism (earthy yellow), and Taoism (gray) (Figure 3b). The white background represents the fusion of these three religions at Songshan Mountain. Finally, logical unity is maintained in the color design (continuity). As an example, the earthy yellow color, used in the sub-theme map of the three religions culture, is also employed as the background color in the sub-theme map of Shaolin culture, facilitating a smooth transition of the same visual elements.
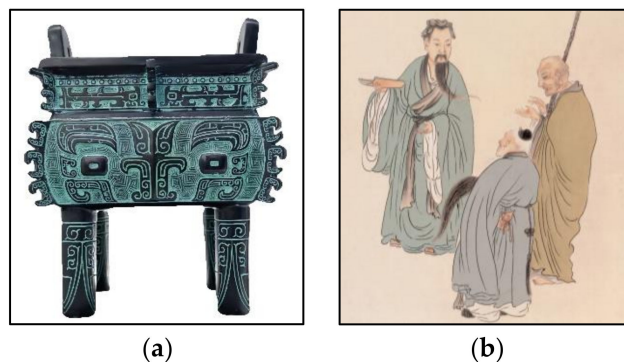

(a)   (b)

Figure 3. Sources of inspiration for the color design: (**a**) Bronze ware—ding; (**b**) Three religions: Confucianism, Buddhism, and Taoism.

4.2.3. The Map Symbol Design

Symbols play a crucial role in conveying the physical characteristics, classification logic, and hierarchy of expression objects. Similar to the color design, in addition to the basic principles of figurativeness and symbolism [33], the symbol design in this study also incorporates six visual storytelling tropes: attention, metaphor, continuity, dosing, redundancy, and voice (Table 3).

Table 3. Examples of the symbol design.

Theme	Category	Name	Symbol
Sub-theme map cues	Scene symbol	The imperial sacrifice culture	
		The three religions culture	
		Shaolin culture	
The imperial sacrifice culture	Abstract symbol	Peak	
		Road	
	Hand-painted symbol	Sacrificial site	
		Mountain	
The three religions culture	Abstract symbol	River	
		Road	
	Hand-painted symbol	Academy	
		Tower	
		Temple	
		Daoist temple	
		Cave	

Table 3. *Cont.*

Theme	Category	Name	Symbol
Shaolin culture	Abstract symbol	River Road	
	Hand-painted symbol	Pagoda forest	
		Shaolin pharmacy	
	Scene symbol	Thirteen stick monks save Tang emperor	
		Bodhidharma faces the wall	
		The second ancestor seeks Buddhist doctrine	

The symbols on the map can be categorized into three types: abstract symbols, hand-painted symbols, and scene symbols. The three types establish the visual hierarchy of symbols and express their importance (attention). The visual level and importance of abstract symbols, hand-painted symbols, and scene symbols increase in sequence. Hand-painted symbols and scene symbols are created by visualizing real scenes that help readers make associations. For example, sub-theme map cues are represented by scene symbols, facilitating readers in the shifting of their focus and thoughts. Abstract symbols on the map possess more concrete symbolic meanings. Furthermore, hand-painted symbols and scene symbols often express more profound meanings (metaphor). For example, the imperial sacrifice culture is the primitive worship of the emperor to heaven and earth. The ding, which is an instrument and symbol of power in sacrificial ceremonies, is used to symbolize the sacrificial site in the sub-theme map (Figure 3). In the sub-theme map of Shaolin culture, the scene symbol "Thirteen stick monks save Tang emperor" represents a crucial tale in the development of Shaolin martial arts, which in turn expresses the important inheritance of Shaolin culture. Meanwhile, the design of symbols of the same type in the map adheres to the principle of continuity (continuity). For instance, in the sub-theme map of the imperial sacrificial culture, different ding symbols are designed based on the sacrificial levels, with more intricate ding representing more solemn ceremonies. Additionally, scene symbols follow the dosing principle, capturing the entire tale within a single image, like the scene symbol "Thirteen stick monks save Tang emperor" (dosing). To emphasize their uniqueness or guide readers' attention, important expression objects are repeated on the map (redundancy). For example, Shaolin Temple, being a crucial site of Songshan culture, is depicted in both the sub-theme map of the three religions culture and the sub-theme map of Shaolin culture. Lastly, the scene symbol is complemented with the author's voice text to enrich the whole story (voice). For instance, the designers' voices are added around "The Bodhidharma faces the wall" and "The second ancestor seeks Buddhist doctrine" to illustrate how these two tales relate to Buddhist medicine and Zen culture.

4.2.4. The Map Layout Design

The main objective of map layout design is to effectively organize expression objects in order to create a cohesive narrative. In this study, by applying the VNF, the map layout design incorporates four visual storytelling tropes: continuity, metaphor, attention and dosing.

The theme map in this study is of A2 size (420 × 594 mm). Except for the title at the top and the legend at the bottom, the entire page is divided into three subspaces to describe the three representative cultural contents of Songshan Mountain (Figure 4). Each subspace contains a textual explanation and a narrative space for a culture; they are visually linked by their respective sub-theme map cues. The theme map follows a narrative order from a large scale to a small scale (continuity). The imperial sacrifice culture describes the reverence that people have for heaven and earth. The three religions culture represents the unique ideology of social groups. Shaolin culture is an important component of the three religions culture (metaphor). The three cultures, ranging from heaven and earth to the crowd, decrease in scale sequentially. The three cultures are presented in the order from top to bottom, which aligns with the general habits of readers. Meanwhile, the sub-theme map cues guide the readers' gaze and establish the first layer of visual hierarchy. As readers explore the sub-theme map cues, their gaze naturally shifts to the corresponding narrative spaces, forming the second layer of visual hierarchy. Different narrative spaces consist of different expression objects, constituting the third level of visual hierarchy (attention). This visual hierarchy effectively helps readers understand the design intent of the map. Lastly, the selection of the three cultures follows the dosing principle, representing the rich and colorful cultural heritage of Songshan Mountain (dosing).
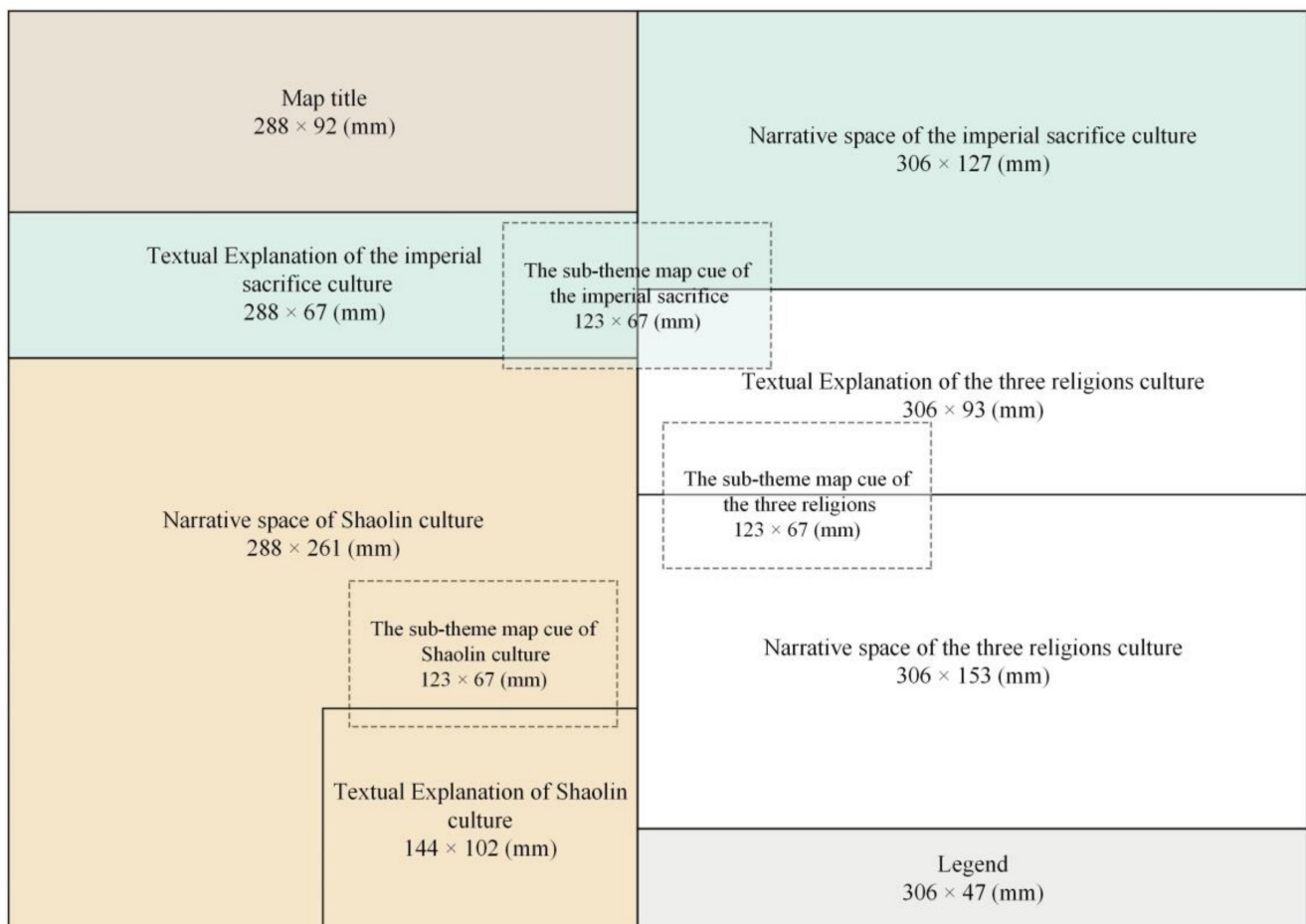

Figure 4. The layout of this map.

4.3. Results

The final map, entitled "Songshan Mountain Culture Map", is presented in Figure 5. By utilizing the VNF, the map visualizes the three cultures of the Songshan Scenic Area as mentioned in the local chronicles, effectively reflecting their cultural significance. The map demonstrates a well-balanced overall presentation. In addition to catering to the general readers' preferences, the unconventional color selection in the sub-theme map of the imperial sacrifice culture will also first attract readers' attention, which is a planned beginning. It is worth noting that a sub-theme map may have multiple modifications of the same expression object; the VNF allows the use of multiple adjectives to describe the same noun. For instance, in the sub-theme map of the three religions cultures, religious buildings are symbolized, and colors are also added to represent their respective religions. Meanwhile, in different sub-theme maps, the same expression object is modified in distinct ways; that is, in the VNF, different adjectives are used to describe the same noun in different sequences. As an example, the Zhongyue Temple is described using the ding symbol in the sub-theme map of the imperial sacrifice culture, while the hand-painted symbol is used in the sub-theme map of the three religions culture. Specifically, a creative diagram is designed for the imperial sacrifice culture, and necessary textual explanations are added to the map. These methods enhance the comprehensibility of the information conveyed through the map.

Figure 5. Songshan Mountain culture map.

5. Conclusions

This study proposes a novel visual narrative framework (VNF) for tourist maps by combining Todorov's narrative hierarchy and Roth's visual storytelling tropes to analyze the relationship between narrative and maps, and it develops visual narrative elements to enhance map narrative. A cultural map of the Songshan Scenic Area was created using

the VNF. The cultural information of the scenic area was collected from the Dengfeng City Chronicle, and specific content representing the local characteristics was selected. Through the VNF, highly characteristic and meaningful colors, figurative hand-painted symbols, and scene symbols were selected and combined in the map design to enhance its artistic appeal and narrative. Compared with previous research, Weng et al.'s method [12] and Zhou et al.'s method [27] lack in-depth discussion on narrative theory, focusing on cartographic techniques and visual effects of tourist maps instead. The crucial aspect of this study lies in the theoretical connection between maps and structural linguistics, serving as a framework for guiding the establishment of tourist maps. Compared with the method proposed by He et al. [15], both studies propose a visualization strategy based on local chronicles. However, they differ in their emphasis. While He et al.'s method concentrates on geographical entities and proposes a "Spirit-Sign" content framework to depict the cultural characteristics of cities, it does not encompass the narrative aspect. By contrast, this study recognizes that the rich and colorful cultural stories represent the external expressions of local people's memories, lives, thoughts, and emotions [13]. These stories are an indispensable part of local culture and form the core content of this research.

This study makes three innovative contributions: First, the visual narrative framework establishes a clear mapping of map elements and narrative elements, helping to clarify the relationship between maps and structural linguistics. Second, by incorporating local chronicles as a source of cultural information, this study not only enhances the reliability of tourist maps but also enriches the carrier form of local chronicles, making them more accessible to the public and facilitating their rational utilization. Third, this study extends the application of visual storytelling tropes from theory to practice and serves as a reference for the future design of narrative maps. The proposed methods can also be applied to the local chronicles of other historical tourist cities. The resulting cultural map can serve as a part of the tourist map to attract more tourist attention, while also making proper use of local chronicles and protecting local cultural heritage.

This study has several limitations. The VNF only considers narrative grammar in structural linguistics, while ignoring the composition and organization of other narrative elements, such as plot, characters, and environment, as well as their relationship with map elements. Additionally, the narrative space of the VNF involves narrative perspectives and orders, but it is difficult to reflect these elements in map design. Different narrative perspectives (e.g., first-person, third-person) and orders (e.g., narration, flashback) can evoke varying emotional responses in readers. Future research could explore the inclusion of multiple narrative elements, perspectives, and orders in tourist maps, which may be an important means of increasing the attractiveness of tourist maps.

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References

1. Mulazimoglu, E.; Basaraner, M. User-centered design and evaluation of multimodal tourist maps. *Int. J. Eng. Geosci.* **2019**, *4*, 115–128. [CrossRef]
2. Sun, L.; Shen, Z. Cultural research on tourism map creation and design. *Think Tank Era* **2018**, *168*, 244–245.
3. Field, K.; Demaj, D. Reasserting Design Relevance in Cartography: Some Concepts. *Cartogr. J.* **2012**, *49*, 70–76. [CrossRef]

4. Mocnik, F.-B.; Fairbairn, D. Maps Telling Stories? *Cartogr. J.* **2018**, *55*, 36–57. [CrossRef]
5. Brown, B. Working the problems of tourism. *Ann. Tour. Res.* **2007**, *34*, 364–383. [CrossRef]
6. Yan, L.; Lee, M.Y. Are tourists satisfied with the map at hand? *Curr. Issues Tour.* **2015**, *18*, 1048–1058. [CrossRef]
7. De Carolis, B.; Cozzolongo, G.; Pizzutilo, S. Generating personalized tourist map descriptions. In *Innovations in Applied Artificial Intelligence*; Ali, M., Esposito, F., Eds.; Springer: Berlin/Heidelberg, Germany, 2005; pp. 259–268.
8. Lin, C.-H.; Chen, J.-Y.; Hsu, S.-S.; Chung, Y.-H. Automatic tourist attraction and representative icon determination for tourist map generation. *Inf. Vis.* **2014**, *13*, 18–28. [CrossRef]
9. Grabler, F.; Agrawala, M.; Sumner, R.W.; Pauly, M. Automatic generation of tourist maps. *ACM Trans. Graph.* **2008**, *27*, 1–11. [CrossRef]
10. Medynska-Gulij, B. The effect of cartographic content on tourist map users. *Cartography* **2003**, *32*, 49–54. [CrossRef]
11. Sarikanon, C.; Sahachaisaeree, N. Graphical design features responding to tourist mapping need: A case of Bangkok's maps for foreign tourists. *Procedia Soc. Behav. Sci.* **2010**, *5*, 1226–1231. [CrossRef]
12. Weng, M.; Song, X.; Wang, L.; Xie, H.; Zhang, P.; Su, S.; Kang, M. A tourist map of Xi'an: Combining historical city characteristics with art. *J. Maps* **2020**, *16*, 195–202. [CrossRef]
13. Su, S.; Zhang, J.; Du, Q.; Kang, M.; Weng, M. Narrative map design for the areas with historical cultural features—Readable framework and visualization strategy. *Sci. Surv. Mapp.* **2021**, *46*, 194–201.
14. Patuelli, R.; Mussoni, M.; Candela, G. The effects of World Heritage Sites on domestic tourism: A spatial interaction model for Italy. *J. Geogr. Syst.* **2013**, *15*, 369–402. [CrossRef]
15. He, X.; Liu, C.; Wu, L.; Wang, Y.; Tian, Z. Thematic Content and Visualization Strategy for Map Design of City-Specific Culture Based on Local Chronicles: A Case Study of Dengfeng City, China. *ISPRS Int. J. Geo-Inf.* **2022**, *11*, 542. [CrossRef]
16. Todorov, T.; Weinstein, A. Structural analysis of narrative. In *NOVEL: A Forum on Fiction*; Duke University Press: Durham, NC, USA, 1969.
17. Roth, R.E. Cartographic Design as Visual Storytelling: Synthesis and Review of Map-Based Narratives, Genres, and Tropes. *Cartogr. J.* **2021**, *58*, 83–114. [CrossRef]
18. Li, H.; Li, M.; Zou, H.; Zhang, Y.; Cao, J. Urban sensory map: How do tourists "sense" a destination spatially? *Tour. Manag.* **2023**, *97*, 104723. [CrossRef]
19. Omarzadeh, D.; Pourmoradian, S.; Feizizadeh, B.; Khallaghi, H.; Sharifi, A.; Kamran, K.V. A GIS-based multiple ecotourism sustainability assessment of West Azerbaijan province, Iran. *J. Environ. Plan. Manag.* **2022**, *65*, 490–513. [CrossRef]
20. Brown, A.; Emmer, N.; van den Worm, J. Cartographic design and production in the Internet era: The example of tourist web maps. *Cartogr. J.* **2001**, *38*, 61–72. [CrossRef]
21. Krygier, J.B. Cartography as an art and a science? *Cartogr. J.* **1995**, *32*, 3–10. [CrossRef]
22. Strauser, J.; Stewart, W.P.; Evans, N.M.; Stamberger, L.; van Riper, C.J. Heritage narratives for landscapes on the rural-urban fringe in the Midwestern United States. *J. Plan. Lit.* **2022**, *37*, 188. [CrossRef]
23. Antoniou, V.; Ragia, L.; Nomikou, P.; Bardouli, P.; Lampridou, D.; Ioannou, T.; Kalisperakis, I.; Stentoumis, C. Creating a story map using geographic information systems to explore geomorphology and history of Methana peninsula. *ISPRS Int. J. Geo-Inf.* **2018**, *7*, 484. [CrossRef]
24. Caquard, S. Cartography I: Mapping narrative cartography. *Prog. Hum. Geogr.* **2013**, *37*, 135–144. [CrossRef]
25. Caquard, S.; Cartwright, W. Narrative Cartography: From Mapping Stories to the Narrative of Maps and Mapping. *Cartogr. J.* **2014**, *51*, 101–106. [CrossRef]
26. Caquard, S.; Fiset, J.-P. How can we map stories? A cybercartographic application for narrative cartography. *J. Maps* **2014**, *10*, 18–25. [CrossRef]
27. Zhou, L.; Ouyang, F.; Sun, Y.; Chen, W.; Li, Y.; Zhao, R. Integrated Sustainable Development of Culture into Tourist Map Design: A Case from Foshan, China. *Int. J. Environ. Res. Public Health* **2022**, *19*, 14191. [CrossRef]
28. Lévi-Strauss, C. *Structural Anthropology*; Basic Books: New York, NY, USA, 2008.
29. Skowron-Markowska, S.; Nowakowska, M. Chinese destinations related to martial arts tourism from the UNESCO perspective. *Sustainability* **2021**, *13*, 7581. [CrossRef]
30. WANFANG DATA–Dengfeng City Chronicle. Available online: https://fz.wanfangdata.com.cn/details/newLocalchronicle.do?Id=FZ201746566 (accessed on 22 November 2023).
31. Lv, H. *Dengfeng City Chronicle*; Zhongzhou Ancient Books: Zhengzhou, China, 2008.
32. Skopeliti, A.; Stamou, L. Online Map Services: Contemporary Cartography or a New Cartographic Culture? *ISPRS Int. J. Geo-Inf.* **2019**, *8*, 215. [CrossRef]
33. Su, S.; Wu, L.; Du, Q.; Kang, M.; Weng, M. Theoretical framework and case study of urban cultural atlas design. *Sci. Surv. Mapp.* **2021**, *46*, 145–152.