Integration and Innovation of Visual Image Design of Luoyang Ancient City Based on Artificial Intelligence with Artistic Symbol Perspective

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Abstract: China's ancient cities are famous all over the world, and not many of them have been preserved to this day, and the ancient city of Luoyang is one of them. A good visual identity design is important for is the rejuvenation of the city's historical and cultural atmosphere and vitality. This study proposes that by implementing a visual identity design with artistic and symbolic perspectives, the ancient city can be made to conform to the modern life and cultural attitudes of the historic district. It is also expected to enhance the economic advantages of the city. This paper makes comprehensive use of research methods such as literature review, fieldwork, case studies and visual analysis AI experiments. An in-depth understanding of the history and culture of the ancient city of Luoyang is provided, and existing research is interpreted and analysed. The paper concludes with a case study, visual analysis and artificial intelligence experiments to innovate and design a unique visual image symbol for the ancient city from the perspective of artistic symbols and fusion and innovation design practice. The conclusions of this study provide valuable references for future research on the visual identity of the ancient city of Luoyang.

Keywords: Luoyang Ancient City; Cultural Heritage; Visual Identity Design; Artistic Symbols; Economic Development; Artificial Intelligence Style Migration

1 Introduction

Chinese historical cities are not only precious cultural heritage, but also represent the cultural characteristics of cities. Therefore, the protection of the ancient city is crucial. The visual image design of ancient city culture is not only a promotional tool, but also an important manifestation of the vitality and characteristics of the spatial environment and intangible cultural heritage in historical cities through design.Due to various internal and external factors, the ancient cities in Henan are slowly decaying and losing their original charm and vitality. Luoyang has been one of the eight ancient capitals of China since the Xia Dynasty more than 4,000 years ago, and is the oldest historical and cultural city in China. However, the current planning of the ancient city is not reasonable, which also leads to the gradual disappearance of cultural heritage and social civilization within the ancient city area [1].Therefore, this study is

based on the overall visual image design of Luoyang Ancient City under the perspective of art symbols under artificial intelligence, and finds out the current problems of Luoyang Ancient City through the field visit and research; through the methods of case study, visual analysis, and artificial intelligence experiments, it seeks to find a kind of branding design scheme for Luoyang Ancient City according to local conditions. Let the ancient city of Luoyang bloom again cultural heritage, promote traditional Chinese culture, release economic benefits, radiation and regional economic development.

2 About this research

2.1 The Historical and Cultural Value of the Ancient City of Luoyang

Luoyang, an ancient city in China, holds a significant place in the country's history as one of the eight ancient capitals. It served as the capital from the Xia Dynasty to the Shang, Western and Eastern Zhou Dynasties, and witnessed the rise and fall of 13 dynasties over a period of 4,000 years. As a result, Luoyang has become the oldest historical and cultural city in Chinese history, with the most established and sustained capitals (Fig. 1) [2]. Luoyang, situated in the western part of Henan Province, boasts a humid climate and is home to several rivers such as the Luo, Huang, Yi, and Jian rivers. This ideal environment has made it a more developed agricultural area, perfect for growing plants and crops. Throughout history, the terrain has been the primary criterion for establishing a capital, and its merits and demerits have determined the success or failure of the establishment of the capital. In addition, the development of agriculture, economy, and the smoothness of trade and commerce are closely related to the convenience of transportation. The geographical and climatic advantages of the Luoyang region made it an ideal location for the ancient capital. This is evident from the fact that 13 dynasties, such as the Eastern Zhou, Eastern Han, Cao Wei, Jin, Northern Wei, Sui, Tang, Houliang and Cong Tang, chose to establish their capitals here. As a result, Luoyang was known as the imperial capital for over a thousand years[3].

Fig. 1 Panoramic view of the ancient city of Luoyang （Xie Meijing, 2009）

Luoyang, an ancient city in China, was first built in the Jin Dynasty, taking the original Song Dynasty 'Henan Province' as a reference. It is also known as the 'Old Town' as it has not changed much over the years, making it the only well-preserved ancient city in Luoyang. Due to its strategic location, the city houses many historical monuments, including the famous Dong Gong Ancestral Hall, and landmarks of the Luoyang City ruins from the Sui and Tang dynasties. The old quarter of the ancient city has been a thriving commercial area since ancient times and remains so today. This area is known for its characteristic old street vibe and

is home to one of the biggest and most prominent folkloric features - the snack street of Luoyang. The snack-based business model offers a variety of flavors and specialties, making it a unique experience to explore and smell the fragrant snacks in this neighborhood full of ancient charm(Fig. 2). The ancient city embodies traditional Chinese culture and folklore through the preservation of its original buildings, creating a strong sense of life.

Fig. 2 The ancient city of Luoyang - Special Folk Snacks (Photo during my fieldwork)

2.2 The significance of the value of artistic symbols

In the words of Pierce, a renowned American pragmatist philosopher, symbols can be considered as an identity or an alternative to something[4].Chinese semiotician Zhao Yiheng defines symbols as a perception that carries meaning[5]. Scholars have defined symbols in various ways, accommodating an infinitely expanding extension at different levels. These symbols can be linguistic, pictorial, mathematical, or cultural. The definition of symbols extends to every field, including art theory and cognitive science[6]. According to Cassir, humans no longer inhabit a purely physical universe, but rather a symbolic one[7]. Symbols have a wide and meaningful definition in the human world, and art symbols in particular have a strong communication value for design. They effectively allow viewers to receive messages and convey cultural and meaningful ideas through art. As such, art and design symbols should be established based on fundamental characteristics of human physiology, behavior, natural conditions, economy, and social culture[8]. Artistic symbols are an iconic element in design. This study aims to examine the creative and innovative solutions proposed for the visual identity design of the ancient city of Luoyang, specifically from the perspective of artistic symbols. The goal is to propose a design solution for the innovative construction of the ancient city of Luoyang that takes into account the local context and aligns with design principles.

3 Research Objective

To determine the cultural value of the ancient city of Luoyang in China.

To analyze the visual image design of ancient Chinese cities from the perspective of artistic symbols.

To determine the visual image design plan for the ancient city of Luoyang from the perspective of artistic symbols.

4 Methodology

4.1 Field visits and research

The fieldwork for this study was conducted in the local area of Luoyang. Specific problems that exist in and around the ancient city were researched and analyzed through observation. Additionally, the current visual and urban design of the ancient city was studied and analyzed. The findings from this research are expected to contribute to the overall study.

4.2 Case Study

This study conducts a field visual image design and case study of the unique cultural construction of the ancient city of Xi'an in China. The visual image design is analyzed primarily from the perspective of artistic symbols, providing valuable reference for this research.

4.3 Artistic Observations (Visual Analysis)

In this paper, the researcher will adopt Ocvirk's [9] theory of organic unity to analyse creative and artistic elements in the study of visual identity design of urban culture, which includes symbolic artistic elements. This paper utilizes the cultural perspective of the ancient city as the basis of design to create new artistic symbols that can be applied to a variety of products and aspects.

4.4 Experimental Data

The researcher based on the more obvious visual image of the ancient city of Xi'an, for example, this study used the finding part of the design of the practice of picking part, extracted from the ancient city of Luoyang city wall elements, Luoyang peony flower petal elements to make the graphic, the use of artificial intelligence style migration of the experimental method of fusion and innovation.

5 Literature review

5.1 This article provides an analysis of the current state of cultural research in the ancient city of Luoyang.

Zhang Bo[3]his study on the renewal of the ancient city of Luoyang and the core tourism attraction enhancement measures highlights the importance of expressing the city's unique locality and constructing the ancient capital culture during the renewal process. The article also provides specific methods to address Luoyang's core tourism attraction and design through the renewal design of the ancient city. List some typical references: In 'A Study on the Application of Traditional Cultural Forms in the Development of Tourism Souvenirs in Luoyang'. In her article 'A study on the revitalisation of historical districts based on the concept of intangible cultural heritage protection', Li Yao[1] argues that design can play a crucial role in optimizing lifestyles by guiding human values. She suggests that designers should utilize design to protect old streets while preserving the heritage development of national cultural characteristics and integrating modern culture. The design of old streets

should aim to preserve the cultural characteristics of the people while achieving sustainable development through the integration of modern culture. Yuan Jin's [10] paper titled 'The Reconstruction of the Folklore Spirit of Place: An Account of the Conservation of the Historical and Cultural Quarter of Qinghefang, Hangzhou' highlights the importance of the concept of 'spirit of place' in folklore conservation. This concept helps us understand the intricate relationship between the reconstruction of physical structures like ancient buildings and the reproduction of folklore spirit. The paper suggests that branding is an effective way to preserve this folklore and communicate it to the wider audience.

This study focuses on the design of the overall visual image of the ancient city, the system design and the spiritual and cultural material carrier from an artistic symbolic perspective, in order to provide a reference for the conservation and heritage development of Chinese cultural heritage from a design perspective. Utilizing the expertise of a team, an extensive research will be conducted in the Luoyang area. The research will include a case study of the construction of the ancient city of Xi'an and will be combined with the local situation to carry out a specific analysis. This study is of utmost importance and will contribute to the inheritance and development of Chinese cultural heritage and creativity. Furthermore, it will support the expansion of local economic construction.

6 Findings

6.1 A Field Survey Data and Problem Analysis of Luoyang Ancient City

The old city of Luoyang is located within the Hui Min District, which is poorly constructed and managed. The residents of the old neighborhood have low economic income and old living environment. Due to the chaotic functional zoning of the old neighborhood, this has given the old neighborhood a negative reputation of being "dirty, messy and poor". As a result, the original ancient appearance of the area has vanished.

1. The overall urban planning could be improved by addressing the inadequacies in the planning of the ancient city. This includes a lack of attention to preserving the original style and colors, as well as the overall visual image design. Additionally, there is a need to prioritize the preservation of the ancient city in its entirety. (Fig.　3-4).

2. The economic development of the ancient city is hindered by a lack of iconic cultural and creative products, visual image signs with artistic symbols, and extended development of peripheral products. This has resulted in a weak concept of economic development, where the primary focus is on making a living rather than promoting development. Functional integrated planning is also lacking.

3. From the current situation in the old city, the overall awareness of environmental protection planning is weak. To ensure sustainable development and continued prosperity, it is necessary to address these problems one by one. To meet the current challenges, it is crucial to establish an appropriate iconic and symbolic visual identity. An effective way to do this is to promote and protect cultural heritage through design.

Fig. 3 Cluttered functional zoning in the ancient city of Luoyang (Photo during my fieldwork) (Left twice pohoto)

Fig. 4 The modern commercialization of Luoyang's ancient city gates is abrupt (Photo during my fieldwork)

6.2 A brief analysis of the visual identity design of the ancient city of Luoyang from an artistic symbolic perspective

6.2.1 Case Study - Visual Identity Related Design of the ancient city of Xi'an

Xi'an, an ancient city located in Shanxi Province, China, was historically known as Chang'an and Gaojing. Xi'an was designated as a "World Historic City" by UNESCO in 1981 [11-12] .It is considered one of the most important birthplaces of Chinese civilization and the Chinese nation, as well as the starting point of the Silk Road [13-14]. Thirteen dynasties established their capitals here [8], making it a significant historical site. The city is well preserved and showcases the regional and historical character of ancient Xi'an.2023 In February, we conducted a site visit to the ancient city of Xi'an to capture the current planning and visual identity of the city, including the design of its periphery. From the perspective of overall cultural and creative tourism products, Xi'an has much to offer this study. For example, the Drum Tower is a famous tourist attraction in Xi'an and a landmark of the ancient city. Through the cultural creative design, the visual image design of the city is extended by using the Drum Tower as an artistic symbol.

In addition to the Drum Tower, Xi'an is also home to the ancient city walls which encircle the city and serve as a testament to its rich history and culture. These walls are not only a beautiful sight to behold, but also a great restoration of the city's cultural heritage.These include a range of IP creations with a warrior culture theme, such as the 'painted little warrior' series (Fig. 5, left) and the 'Tang Imperial Army' ice cream (Fig. 5, right). The design of cultural creations in Xi'an reflects the integration of ancient cultural and creative elements. This breaks away from traditional stereotypes in city planning and allows for innovation in the inheritance and development of traditional culture. Artistic symbols are used to embody pictorial

representations that draw on original meaningful things to express their meaning [8]. In order to achieve cultural creative innovation in an ancient city, it is necessary to break through traditional forms, particularly in the symbolic definition of visual imagery. As a result, the cultural creative design of the visual image of Xi'an, an ancient city, holds great significance for this study.

Fig.5 Xi'an ancient city wall series of cultural and creative IP Fig.ures (Left) (FromSouhu Website)
The "Imperial Army of the Tang Dynasty" cultural creation ice cream (Right) (FromSouhu Website)

The ancient city of Xi'an is a stunning sight to behold at night (Fig. 6). Its overall planning and the restored appearance of its historical sites make for a memorable experience. Notable landmarks include the Drum Tower and the Ancient City Wall, as well as the popular Terracotta Warriors and Grand Tang Hibiscus Garden. These landmarks are especially popular at night, as they create a dream-like feeling of traveling back to the Great Tang Dynasty of Chang'an. The China-Central Asia Summit took place on May 18-19, 2023 in Xi'an, Shaanxi Province. This event marked China's first major diplomatic gathering of the year, and the welcome party was held at the Da Tang Fu Rong Garden (refer to Fig. 7 from CCTV News). The relationship between China and Central Asia dates back more than 2,100 years ago when Zhang Qian, a Chinese envoy from the Han Dynasty, traveled from Chang'an to the West, which opened up friendly relations between the two regions. Over the centuries, China has worked alongside the peoples of Central Asia to promote the emergence and prosperity of the Silk Road, resulting in a historic contribution to the interchange and enrichment of world culture. The Chinese poet Li Bai, who lived during the Tang Dynasty, wrote a famous line that reads, 'When we join hands again in Chang'an, we will look again at a thousand pieces of gold.' It is of great significance that we are meeting in Xi'an today to renew a thousand years of friendship and open up a new future[15].

Fig. 6 The overall night atmosphere of the ancient city of Xi'an (Photo during my fieldwork)

Fig. 7 Asia Summit Grand Tang Furong Park Welcome Party (From CCTV News)

6.3 Visual identity design for the ancient city of Luoyang

To fully showcase the charm of the ancient city of Luoyang, it is crucial to establish a unique visual and cultural identity that is specific to the city. Furthermore, developing a distinct urban color that is exclusive to the ancient city will help it stand out from the rest of Luoyang. The visual aesthetics of a city are crucial in creating a distinct image. This can be seen in the color scheme of ancient Suzhou and Paris, which contribute to the overall impression of the city. Additionally, a cohesive design plan for advertising signs throughout the neighborhood is necessary for a unified visual image. Table 1 outlines the proposed design plan for the entire visual image.

Table 1 Visual Identity Design Plan for the ancient city of Luoyang   Source Self-made

Overall visual design of the ancient city		Area-specific integrated design	
①Urban Visual Identity Design - Guidance System Redesign Planning s	This study focuses on the redesign planning of a guide system for the ancient city of Luoyang, taking into consideration traffic, commercial, and cultural tourism aspects to develop a unique urban visual identity design.	①Characteristic scenic area overall image design	The scenic guide system, the character and integrity of shop signs in the pedestrian street, and the enhancement of the spirituality of residents and merchants are crucial aspects of the overall image design of the ancient city.
②City visual identity design - overall city colour planning	The redesign of the ancient city of Luoyang focuses on preserving its unique colour culture while maintaining its original ancient style.	②Development and design of cultural and creative products	This study focuses on the development and design of cultural and creative products that are unique to the ancient city of Luoyang. These products will be integrated into the overall visual image of the Luoyang region, which will help establish the region's distinct cultural characteristics, exclusivity, and independence.
③Urban Visual Identity Design - Typography Planning	The typographic design for the ancient city of Luoyang showcases regional cultural colors, incorporating Chinese calligraphic fonts and	③Cultural advertising and promotion design for tourist attractions	Scenic area website design; Scenic area cultural advertising animation propaganda; H5 mobile design

	artistic symbolic elements like the peony flower and the Longmen Grottoes. This unique typography design is specific to the Luoyang region.		
④Urban visual identity design - advertising design planning	This study focuses on the planning and design of advertising campaigns, including the development of distinctive street billboards and shop signs. Additionally, it explores the use of city culture advertising campaigns, H5 animations, and other related techniques to promote effective communication and engagement with target audiences.		

6.4 Extraction of Artistic Symbol Elements in Luoyang Ancient City and Creative Design Practice of Artificial Intelligence Style Migration Integration

The design elements are derived from the elements of the city wall of Luoyang ancient city and the extraction of the petals of Luoyang peony flowers, which are flattened and graphicised as artistic symbols for deformation and creative innovation. Adopting a bipartite and continuous design method, a new creative graphic is generated. The colour scheme is extracted from the blue brick colour of the ancient city wall and the colour of the peony flower in Luoyang area, which makes the overall design flat and graphic (Fig. 8), and can be more widely extended and applied to the visual image publicity design of the ancient city of Luoyang.

Fig. 8 Original Symbol Element Graphic Design - Luoyang Ancient City Element Creative Pattern Design

The graphic symbols of Fig.8 are fused with AI style migration technology, and the resulting new visual effects can provide designers with new design ideas.

The innovation of image style migration is mainly to use the full Convolutional neural network architecture in the field of artificial intelligence deep learning to fuse the target image and style image[16], so as to make the target image style migration and transformation, and finally achieve innovation.

This article adopts a pre training model based on the PaddleHub framework, namely stylepro_ Artistic model. This model network is StyleProNet[17], with a model size of 28 M, which is small in scale and fast in response. The pre-training dataset uses the MS-COCO [18] dataset as the target content side image, and the WikiArt dataset as the style side image.

The main core code is as follows:

```
result = stylepro_artistic.style_transfer(
    paths=[{
    'content': 'changchengLY.jpg',
    'styles': ['pic6.jpg']}],
    alpha =0.2,
    visualization = True)
```

Paths is the image path, which contains content and styles parameters. Content refers to the target image path, and styles refers to the style image path; The alpha parameter refers to the intensity of the conversion, with a value between 0 and 1, defaulting to 1; The visualization parameter refers to whether to save the results as images, with a default value of false.

The content parameter of this article is set to the original symbol element image path of Luoyang Ancient City, that is, the image path named changchengLY.jpg, and the style parameter is set to the style image path. The style image is as follows (Fig. 9):

Fig. 9 The style image   Sourced from the author's original pattern design

The core of style transfer lies in the value of the alpha parameter. In this article, the alpha parameter is set to 0.7 and the visualization parameter is set to True. The resulting style innovation image is shown in the following (Fig. 10) :

Fig. 10 Innovative Patterns Generated with Artificial Intelligence Style Migration Techniques

7 Discussion

Luoyang, the ancient imperial capital for a millennium and the birthplace of Chinese civilization, boasts a rich history and culture that surpasses any other region. Its contributions to the development and construction of China are unparalleled. In terms of Confucianism and Taoism, as well as the traditional culture and openness of the Chinese nation, Luoyang stands out among all other cities. In an interview with Luoyang Daily, Zhou Chang highlighted that despite being a one-thousand-year-old capital, Luoyang's urban planning was not perfected due to historical factors. Additionally, the consciousness of protecting the ancient city was not strong, resulting in the current development of the ancient city of Luoyang not being proportional to the city's status today[19].Although renovation projects for the ancient city of Luoyang are underway, most of them focus on urban planning rather than a complete brand visual identity design for a systematic and holistic renovation. In order to fully demonstrate Luoyang's intrinsic charm and enhance its luster, it has become increasingly important to conduct urban design from a holistic perspective. It reflects the city's level of construction management and cultural preservation. Understanding the significance of protecting historical and cultural districts, as well as preserving excellent historical buildings, is a crucial measure of a government's ability to govern effectively[20]. Considering the current issues and circumstances surrounding the ancient city of Luoyang, it is imperative to increase efforts towards regulating and renovating the city.In the process of renovating Luoyang's ancient city, it is crucial to consider the local conditions and analyze specific issues. The renovations and adjustments should be made in accordance with the actual situation and style of the ancient city, aiming to achieve the best possible outcome within the maximum capacity. This will enhance the overall image of the city and create a unique business card image [21].

This study examines how regional design solutions can be used to create a new type of ancient city culture that reflects the emotional implications of folk culture. The research emphasizes the importance of design innovation in promoting the sustainability of traditional Chinese lifestyles and guiding contemporary views on life, values, and consumption.

8 Conclusion

As a thousand-year-old imperial capital, Luoyang has a deep historical and cultural heritage. The promotion and protection of the cultural heritage of the ancient city of Luoyang is also one of the important tasks that the country is currently prioritizing in the development of historical and cultural cities and the protection of historical monuments in response. Through the field survey, we learned that there are some problems existing in Luoyang ancient city, including chaotic overall planning, unhygienic environment, lack of awareness of historical monument preservation, lack of established visual image, and loopholes in visual design. Despite these challenges, Luoyang is currently focusing its economic development on tourism and is making progress. However, the key to ensuring sustainable development is to enhance the tourism experience and increase the city's attractiveness to visitors.This will establish a distinctive brand image for the whole city. The study is conducted through field visits, research, case studies and visual analysis, such as analyzing the visual image design of the artistic symbols of the ancient city of Xi'an, incorporating a series of intellectual property rights and cultural and creative design to create an exclusive city business card for the ancient city of Luoyang. In addition, the

innovation of this study lies in the method of artificial intelligence (AI) experimentation by integrating creative design practice with AI style migration technology. It is mainly based on the problem of the vacancy of the visual image design of the ancient city of Luoyang, adopting the design of the visual image symbols of the ancient city of Luoyang, extracting the elements originating from the ancient city, and integrating the designed pattern with the artificial intelligence technology model. This idea, in the future, can broaden the creative ideas of designers and hopefully open up new ways for the dissemination of the visual image of the ancient city. This research not only aims to utilize the power of traditional culture, promote the cause of local characteristics, and ensure that it can promote local economic development.

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