The Cloud Design System Building Research of Tourist Souvenirs

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Abstract. With the development of the society and the improving of people living standards, tourism industry becomes a sunrise industry. However, it is not conducive to the healthy development of the tourist industry that simply rely on ticket sales and government support way. From the angle of protecting Chinese traditional culture and improving the level of museum tourism development, converting the way and the idea of museum management, we put forward the concept of tourist souvenirs cloud design system. Tourist souvenirs cloud design system based on the digital museum, full use digital resources to build design repository, full use of the advanced technology, such as cloud computing, internet of things and cloud manufacturing, provide sustainable and systematic technical support of tourist souvenirs development. In this paper, we form the architecture design of the tourist souvenirs cloud design system, at the same time we verify the feasibility of cloud design system through the application of actual case. Tourist souvenirs cloud design system is not only conducive to the sustainable and healthy development of the tourist industry, but also is of great significance for the healthy development of cultural creative industry.

Introduction

Tourist souvenirs is the new way to improve museum operation ability of themselves, it can solve the problem of the museum public welfare funds through tourist souvenirs development and sales, and in turn to promote the museum present environment and operating conditions. Tourist souvenirs design belongs to the category of culture creative design, culture is the embodiment of a nation’s comprehensive strength and international competitiveness, is the important carrier of national culture, and is also the core of the national soft power.

We need first to solve the problem of cultural creativity for the cultural and creative product design of tourism industry. For the development and sale of tourist souvenirs, the cultural creativity is the core, the technology is the means, the product is the carrier, and market is platform. Under the background of informatization and networking, the development of cultural creative industries can use big data technology, integrate the existing cultural resources, establish big data platform, we can provide technical means and market trading platform for the cultural creativity industrialization development, create better culture product and more abundant material and cultural life.

For the tourist souvenirs creative design, the design resources is rich that as the carrier of the museum collection resources. As of May 2013, there are 96 museums of the highest level museum for the whole of china, the Palace Museum, national museum of china, Shaanxi history museum and so on are national level museum which total are 10 places, all there 10 highest
level museums have their own special website, and display the most representative of cultural relics and fine art through constructing the corresponding contents of the digital museum, these digital material provide the information basis for the coming of big data era of tourist souvenirs creative design.

Big data can provide resourceful and convenient retrieval design resources for cultural creative, in addition, it is a viable path to realize the industrialization of cultural creative thorough the deeply exploring of cloud technique in big data environment and play to the depth fusion of science and technology innovation and cultural creativity. If we want to transfer a good cultural resources or a good cultural creativity to a cultural product, we must lend to the corresponding technical means and must be supported by modern science and technology [1]. The purpose of culture creative product design based on big data environment is to deeply develop cultural creative products through using the integration of computer aided design technology and excavating the creative resources that matched with design originality. The last aim is to realize the industrialization of culture creative product design through the culture creative resource sharing and products trade under the cloud platform.

The Cloud Design Concept of Tourist Souvenirs

Cloud design is based on the cloud manufacturing, it extend and change for the existing network design and service technology, make to virtualization and sterilization for all kinds of design resources and design ability, and realize the intelligent, multi-win-win situation, generalize and efficient sharing and collaborative [2, 3]. Cloud design is a new concept after the cloud computing, which mean is to put more design components integrated into the internet, let more design resources shared on the internet by design software, each finished product design or elements all can be shared and become useable design resources for other designers as long as the designer is willing to, and these resources can be provided online store, so that tens of millions of designers can form a powerful, huge inventories of cloud design network.

Tsinghua university’s Wei Yibin and Tian ling [4] think that cloud design is a new type of design mode that developed on the basis of network design. Cloud design organizes all kinds of design resources use network; provide various services for on-demand of designers under the corresponding platform support. Cloud design can effectively organize the internal and external resources of the trans-regional and cross-industry enterprises to realize the resource sharing and collaborative design which same as the network design.

The cloud design system for tourist souvenirs creative design is refers to the intelligent digital culture products online design and sale platform, which can integrate creative design resources and computer aided intelligent design technology, realize the resource sharing and cultural creative products cloud manufacturing that all based on the digital resources.

Museum cultural relics have the properties of precious historical value and artistic value; they can’t be hand-on ponder and research by designer like a regular item for. Through method of the cloud design, we can collect the digital information for museum cultural relics, and make the massive design material and resources as design big data, which meet the requirements of the protection of cultural relics, at the same time which accord with the greening, intelligent and networked innovative design for era requirement.
The Cloud Design Path of Tourist Souvenirs Creative Design

The Composition of Tourist Souvenirs Cloud Design System

The composition of tourist souvenirs cloud design system is shown in figure 1.

![Tourist Souvenirs Cloud Design System Diagram](image)

Figure 1. Tourist Souvenirs Cloud Design System Diagram.

Tourist souvenirs cloud design platform composited as four parts: the design resource database, creative design, product manufacturing and product sales, between the four interrelated each other and constitute a closed loop system, and all services to the cloud design platform.

Tourist souvenirs creative design need to have rich resources as the source of design, we can convert cultural relics to digital resources through establishing digital library on the basis of the museum resources, that can allow designers to study and looking for inspiration, as part of the cloud design platform. Creative design is the core of the tourist souvenirs design system, the cloud design platform can provide technical support for the tourist souvenirs creative design through the computer software technology and using the intelligent methods combined with the latest design concept and design method.

Cloud manufacturing technology provides industrialization support of for product design. Tourist souvenir creative design industry is different from the design and manufacture of specific industrial products, it involve more wider areas, more complex types, involve different processing materials and manufacturing technology. We can provide technical support for the designer to solve design problems through using the cloud technology to combine with different manufacturers and share the manufacturing resources.

The network marketing of products is a relatively mature “Internet +” technology, tourist souvenir cloud design system integration product sales is not the same as simple electric commerce, but by collecting terminal customer feedback information, through large data analysis technology, filter out the customers’ needs, the system provide data support for the cultural product design of satisfy customer aesthetic tendencies and use requirements.

The Realization of Tourist Souvenirs Cloud Design System

1) The construction and application cultural relic resources knowledge base under the mode of cloud design.

The culture resource database under cloud design mode oriented culture creativity, design services, and other related industries, using the digital and information technology, based on the
cloud design platform, collect, screening, repair, classification, storage and management the cultural resources, so to achieve the construction and application of cultural resources knowledge base. The project build a cultural resources knowledge base through using a classification standard for mass culture resources data, so it can have a good infrastructure, provide resources application for cultural creativity, design services, and other high-level related industry services, thus to promote the development of the whole tourist souvenirs creative design industry, promoting the fusion of culture creative design and related industries.

Cloud design knowledge base model is shown in figure 2.

![Cloud Design Knowledge Base Model](image)

By building the knowledge base, we can realize the integration and sharing of the design resource in global and system level, transform the scattered, independent, heterogeneous data resources into standard, specification knowledge. In data processing layer, we can use thus as the basic data sources that exist in the museum and civil cultural relics, the intangible cultural heritage and other patent literature exists in every social main body, standard file, the file of products, product material, journal articles, web information, the data administrator can transform the raw data to reliable through using data correlation analysis tools and knowledge processing tools to processing, purification, extraction for document, picture, audio/video, database, etc.

In the cloud knowledge management, the system establish a unified classification system for the various cultural creative design knowledge resources and the design task, have semantic consistency in the description, expression and understanding for knowledge service with the mission requirements, facilitate knowledge management and matching with the specific design task. The system facilitate computer processing through the study of the knowledge ontology description properties, definition class and class hierarchy, defining the general attributes of attributes and the relationship between the class definition. Platform knowledge base building uses the top-down hierarchy method, followed by the abstract service concept, service knowledge, related knowledge and the basic knowledge. The lower inherited the upper abstract characteristics, represents the entity knowledge that more specific or little scope than the upper. The bottom is the most specific concept system.
Cultural creative design knowledge retrieval is a process that the knowledge base system according to the external service concept, acquisition, matching correlation knowledge forms the certain knowledge collection. The different position end user can retrieval, browse and download, share the knowledge in knowledge base through the network and authenticated using a search engine, advanced permissions users can real-time write and annotations the related data and information.

(2) Data mining CAD technology in the cloud design system

The effect of tourist souvenirs cloud design for design services embody based on the big data supported design knowledge base, it can provide data mining and intelligent push for creative design, and through the intelligent user demand big data analytics provide auxiliary creative design, complete computer aided creative design work through combining with computer aided intelligent design system.

![Figure 3. The Creative Design Model of Tourist Souvenirs Cloud Auxiliary Design System.](image)

The creative design model of tourist souvenirs cloud auxiliary design system is shown in figure 3. In big data environment, through the internet to collect user data, use fuzzy demand description, clustering analysis and other methods, the system proceed data acquisition and mining, obtains user behavior useful information, maximum mining and acquire user potential psychological factors and demand, forecasts the related areas development trend, implement the user requirements intelligent processing through combining with the intelligent push technology and improving the success rate of information push.

(3) The combination CAD technology of Kansei image and shape grammar

On the basis of the large data supported design knowledge base auxiliary creative design technology, we further reference on the study of the Kansei engineering theory [5-7], build user-oriented perceptual image user demand requirements method, combine with use demand database under large data environment, provide more targeted positioning for creative product design through clustering analysis and push technology. We carry out tourist souvenirs creative design that combine with Kansei engineering by analyzing and extracting of the cultural relics design prototype in design resource library.

Tourist souvenirs creative design is a process of systematic and serration, creative design can be applied to different target carrier, also can convert and extend for modeling characteristics, so as to realize continuously design derivatives, it is an effective way that the shape grammar design strategy. In the 1970 s, MIT professor George Stiny firstly put forward the concept of shape grammar who continue to use the concept of generative grammar in linguistics [8], namely through
the relationship and rules of shape’s grammar to describe the spatial organization or modeling of design. Shape grammar can generate new shape and maintain the brand continuity by according to certain rules in product derivation [9, 10]; it can also derive new product design [11]. For Tourist souvenirs creative design, through formulating reasonable inference rules, combining with the specific technology, materials and other material factors, we can obtain more excellent design scheme through shape deduction.

**Verified Applications**

The page navigation area divide the cloud design platform into five main parts of design repository, creative space, industrialization, sales channels and designer club. Design repository provides design knowledge and design material. Creative space provide the function of intelligent CAD, we can directly open the 2d and 3d CAD software that commonly used in personal computers, can also open special CAD tools which integrated in the system. Industrialization provides the professional knowledge of commonly used processing manufacturing, material, structure, process of tourist souvenirs, and provides technical support for the implementation of the creativity industrialization. Sales channels provide the function of electronic commerce, it can provide different trade channel for different customers such as dealers and terminal customers. Designer club provides a communication platform for the creative designer.

We can achieve information retrieval in this page, otherwise, it integrate the commonly used retrieval system such as digital museum, literature search, patent retrieval and design web site on the right side of the page which can allow designers to find useful resources conveniently in various fields and wide range. Design repository allows somebody login as designer or administrator, it can also be retrieved information as tourists. If you login as a designer, you can save the retrieved useful information into personal information library, also can add other useful network information acquired by one retrieved of literature and patent to design repository. If you Login as an administrator, you can precede database management, can effectively arrange the design resources that collect by designers and classify deposited in the design database, so, those resources can be search and use by other designers, and so we can make the cloud platform database unlimited expansion.

The information resources of the design repository of tourist souvenirs cloud design platform can be obtained and expanded by the three ways, one is from the digital museum resources of existing cultural relics protection agency, second is from data resources of the relevant cultural relics and intangible cultural heritage which collected by platform managers using digital means, third is the relevant digital resources which added by the designer as an open platform user in accordance with specification. In some way of information retrieval and presentation, we can carry on the data mining by using knowledge discovery in database technology and association rule, and sort those data according to the correlation and the similarity, the eventually content presented to the designers users in multimedia way.

In specific design repository, we can use classification retrieval way, click to the relevant images retrieved, list all text and audio/video of related objects which related with design on the new page. We can also enter the word you are searching, the system will automatically retrieve the repository, we not only can find itself concept, cultural image and its successful corresponding design work of the keywords, but also can get its sub-concept. Such as, if we input “auspicious clouds pattern”, the system will automatically list not only related cultural image, cultural implication, the matched product design factors and the related design case of auspicious clouds patterns, but also can obtain
the pattern design of strong Chinese cultural characteristics which corresponding with auspicious clouds pattern such as dragon and phoenix patterns, Chinese embroidery, etc.

In this case, we use a golden grain tank parrot collected in Shaanxi history museum as the prototype; achieve it through fully mobilizing the design element in design knowledge library, extracting the surface graphics of cultural relics on, and combined with the tang dynasty Silk Road culture exchange background.

The creative design page of cloud design platform, mainly including “User demand library”, “Creative elements”, “My design”, “Creative deduct”, “Scheme evaluation”, and so on. The function of “User demanded library” is sorted out call user demand information. “Creative elements” link design repository for designers to carry out a specific design project, provide data mining and intelligent push technology, it can help designers to quickly find creative design elements related or similar of design goals through the information retrieval function of the “creative elements”. “My design” is equal to the designer personal folder, used to hold the designer personal completed or ongoing design projects, support to set up personal style design repository according to individual be fond of and design material library related one project as a unit, allow designers quick open project design program. “Creative deduct” is the core of intelligent cad module, “Creative carrier” is used to set or select a carrier of the creative products (such as silk, office stationery, paper products, etc.), “Factor decomposition” is used to decompose the creative elements, so that to carry out the modeling deduct of shape grammar. Using the elements (patterns extracted from the surface of cultural relics) to expand shape deduction that combined with the design target requirements and accordance with the established rules, in the same way, we can integrate constantly improve creative elements into a piece of design work through apply the factions of “shape”, “material” and “color” items. “Scheme evaluation” use to evaluate one or more same theme works that designers have completed, the evaluation strategy includes two aspects, one is to evaluate pros and cons of design schemes through the fitness analysis for user demand and product design which combined with the user requirements information collected in the user demand library and using the Kansei image method, the second is to use the fuzzy analytic hierarchy process to realize the scheme evaluation by setting index weight and expert assignment score.

Conclusions

Cloud design platform is a kind of effective means under the information environment which fully use big data advantage for culture creative design. In this paper, through discussing the specific strategy of culture creative product design based on the big data environment, we analyzed the basic technical route for carry out the design material arrangement and collection, user requirements elicitation and use, computer aided creative design by using cloud computing and the internet of things technology, shown the reliability of cloud design platform combined with specific projects using. Practical application shows that it can forward the width and breadth of design through using the concept of cloud design system for the designer to organic tidy the voluminous design materials. It can realize the big data sharing and effective communication and exchanges between the designers by using cloud design platform. It also can effectively improve the development efficiency and design quality of culture creative products through using Kansei image and shape grammar methods to expand design deduction and deepening. All those are of great significance for improving the overall level of cultural creative industrial. At present, the concept of cloud design system is still in the initial stage, we will further rationalize the architecture of cloud
design system, and the next step research will be constantly perfect the intelligent design technology and improve the level of collaborative design between designers.

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References


