A STUDY ON THE DESIGN PRINCIPLES OF MUSEUM GUIDE SYSTEM BASED ON INFORMATION AFFLUENCE THEORY

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Abstract: Based on information affluence theory, this paper investigates the design principles of museum tour guide system. Four design principles are proposed: information screening, information organization, interaction design and personalized recommendation, and the specific implementation methods and design points are discussed respectively. At the same time, this paper also analyzes the interrelationship and influence of each design principle, as well as the future trends and challenges in the design of the tour guide system, to provide new reference ideas for the design and optimization of the museum tour guide system.
Keywords: information affluence theory; museum tour system; design principles; user experience

1 Introduction

With the upgrading of people's cultural and entertainment consumption, museums have gradually become one of the important cultural consumption places for people. However, during the museum visit, visitors are faced with a large amount of information and exhibits, which are prone to information overload and fatigue and affect the visitors' visiting experience [1]. In order to solve these problems, museum tour guide systems have emerged, which can provide visitors with tour routes, exhibits introduction, interactive experiences, and other services to improve visitors' visiting efficiency and experience.

However, there are still some problems in the design of the current museum guide system, such as information overload, poor information quality, and poor interactive experience, which need to be further studied and optimized [2]. Therefore, based on information affluence theory, this paper discusses the design principles of museum tour guide systems to improve visitor experience and satisfaction and further promote museum development and cultural heritage.

2 Overview of information affluence theory

2.1 Basic principles and development history

Originally proposed by American psychologist George Miller, information affluence theory refers to the upper limit of the human brain's ability to process information [4]. In the 1960s, he published an article titled "Information Poverty in Psychological Research" in the journal Psychological Review, in which he proposed the concept of "magic number seven", which means that the human working memory capacity can only hold about seven information units at most. Miller's research showed that people are more likely to remember and understand short, well-organized information rather than unorganized, difficult-to-understand information.

Later, information affluence theory was further developed and refined. Canadian psychologists Robert Evans and Paul Nordhaus introduced the concept of "information richness" in 1985, which suggests that when information is presented at a rate, quantity, complexity, and variety that is within the processing capacity of the human brain. The feeling of information affluence arises when the rate, quantity, complexity and variety of information presented are within the processing capacity of the human brain [5].

The basic principle of information richness theory is that people are more open to new information and challenges and more likely to remember them when the amount of information is within a manageable range. However, when the amount of information exceeds the processing capacity of the human brain, people feel information overload and fatigue, have difficulty understanding and absorbing more information, and may even become resistant to it.

With the development of information technology, the theory of information affluence has been gradually extended to the digital domain. The abundance and exponential growth of information in the modern technological environment has made information affluence theory even more important. Information affluence theory is also widely used in the fields of designing user interfaces, education, and advertising. It has become one of the key principles of information design, interaction design and user experience design.

2.2 Application value of information affluence theory in museum guide system

As a kind of public cultural place, the purpose of museum is to inherit culture and promote civilization, and the tour guide system, as one of the important service facilities of museum, can not only help visitors better understand the cultural heritage in the museum, but also improve their visiting experience [6]. However, because the amount of information in museums is usually very large, visitors are prone to information overload and fatigue, which affects their visiting effect and experience.

In this case, information affluence theory can provide useful guidance and ideas for the design of museum tour guide systems. According to the

information affluence theory, the guide system should focus on the screening and organization of information to avoid the negative effects of information overload on visitors. At the same time, the design of the guide system should also fully consider the cognitive characteristics and needs of visitors, and provide personalized services to meet the different needs and expectations of visitors.

3 Design Principles and Implementation Methods

3.1 Information Screening

When designing the museum guide system, it is necessary to first understand the information needs and interests of visitors. Through questionnaires, interviews, etc., the basic information, purpose of visit, and concerns of visitors are collected to provide basic data for subsequent information screening and organization.

Based on visitors' information needs and interest points, the museum can collect and organize relevant information data, such as exhibit introduction, historical background, artist information, etc. In terms of information screening, keyword filtering and expert review can be used to ensure that the information content provided to visitors is accurate and reliable.

3.2 Information Organization

When designing the information architecture of the museum guide system, the classification and association of information needs to be considered [7]. By developing an information classification system and establishing a knowledge map, the museum's information resources are effectively organized and managed so that visitors can quickly and accurately find the information they need.

In order to better present the information content, the museum guide system needs to use a variety of visualization and presentation methods, such as images, videos, and virtual reality, in order to meet the needs and preferences of different visitors. In addition, the tour guide system needs to consider issues such as compatibility and responsiveness of different devices.

3.3 Interaction Design

The user interface design of the museum guide system should be simple, clear, and easy to operate and understand [8]. By using icons and labels, the complex functional modules are simplified into intuitive interface elements to improve the user interaction experience and satisfaction.

In terms of interaction methods, museum guide systems need to consider the actual needs and situations of visitors and provide a variety of interaction methods, such as voice recognition and gesture control. At the same time, the tour system also needs to provide timely and accurate

feedback mechanisms, such as voice prompts and vibration feedback, to help visitors better understand and use the system.

3.4 Personalized Recommendations

Personalized recommendation is a very important design principle in the museum guide system, which can help visitors find the exhibits and topics they are interested in more quickly and accurately, and improve the quality and satisfaction of their visit. In the specific implementation, appropriate algorithms and methods are needed to build personalized interest models based on visitors' behaviors and preferences in order to provide more accurate and tailored recommendation services [10].

Personalized recommendation algorithms include collaborative filtering, content-based filtering, and hybrid filtering. Collaborative filtering is a method to recommend similar content to visitors based on users' historical behaviors and preferences, and using the preference information of similar users. Content-based filtering, on the other hand, is based on the content and attributes in the tour guide system, and uses the analysis of visitors' historical behaviors and preferences to recommend similar content to visitors. Hybrid filtering combines collaborative filtering and content-based filtering, combining the advantages of both to provide more accurate recommendation results.

4 Interrelationship and influence of design principles

Information filtering, information organization, interaction design, and personalized recommendations are the four basic design principles that need to be considered when designing a museum tour system. Information filtering and information organization help visitors get the information they need quickly and accurately, while interaction design and personalized recommendations provide a more personalized and interactive user experience that meets the diverse needs of visitors. These principles complement each other and together provide a comprehensive and personalized visitor experience.

There is also an interrelationship and influence between the different design principles in the specific implementation. For example, the results of information screening and organization directly affect the accuracy and effectiveness of personalized recommendations; the quality of interaction design and feedback mechanisms affect visitor engagement and satisfaction, and thus the effectiveness of personalized recommendations and information screening. Therefore, when designing a docent system, the influence and role of each design principle needs to be considered comprehensively to create a system that works in concert.

5 Future Trends and Challenges in the Design of Museum Guided Tour Systems

5.1 Technology and Application Prospects

As technology continues to advance and application scenarios expand, museum tour systems will also evolve in the direction of being more intelligent, personalized, and immersive. For example, the application of technologies such as artificial intelligence, virtual reality, and augmented reality will allow visitors to have a richer, more in-depth experience during their visit. At the same time, the application of technologies such as cloud computing and big data allows the tour guide system to better process and analyze visitors' data and provide more accurate and targeted services [11].

5.2 Changes in visitor needs and experiences

As visitors' needs for museum visit experiences continue to improve, the tour guide system also needs to be more relevant to the actual needs and experiences of visitors. For example, for different visitor groups, different services and contents can be provided to meet their different needs and interests; in response to visitors' feedback and evaluation, real-time adjustment and optimization can be made to improve the stability and reliability of the system.

5.3 Data security and privacy protection

Data security and privacy protection issues also need to be fully considered when designing and developing museum tour systems. Future museum tour systems need to pay more attention to data security and privacy protection, and use more secure and reliable data encryption and data storage technologies to ensure that visitors' data and privacy are effectively protected.

6 Conclusion and Outlook

The design of a museum tour guide system is a complex process that balances information delivery and visitor experience. Based on information affluence theory, this paper proposes four design principles: information filtering, information organization, interaction design, and personalized recommendation, and discusses and elaborates on each design principle in detail. These principles are interrelated in practical application and together constitute the overall implementation strategy of the museum tour guide system.

In the future, museum tour systems will face new challenges and opportunities. On the one hand, continuous technological advances and innovations will provide richer and more diverse tools and instruments for the development of the docent system. On the other hand, the needs and experiences of visitors are constantly changing, requiring tour guide systems to be constantly optimized and upgraded to meet the diverse needs of visitors. At the same time, data security and privacy protection have become important issues in the design of the tour guide system.

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