Combined with augmented reality navigation applications in the library

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Abstract

Due to the increasing popularity of mobile devices and network caused by the traditional way of navigation has been gradually combined with the convenience of mobile devices, and the integration of voice, video, wireless transmission and database technology, through real-time Internet transmission to develop a mobile navigation system.

Mobile navigation system does not require a lot of written information, they provide a lot of information can be stored and organized, and can be combined with virtual reality and augmented reality technology, when the navigation application can be used as large-scale exhibition. Currently mobile navigation systems are also widely used in museums, galleries, libraries and other exhibitions in historic buildings.

Thus, in the case of scientific and technological progress, more diversified ways of learning, and the library is also actively provide opportunities for mobile learning through mobile devices. This article will explore the current situation combined with augmented reality mode library in navigating, and future trends provide mobile learning in the library.

Key words: Augmented Reality, Mobile navigation

Introduction

With the rapid development of computer and network information technology, libraries' book resource management efficiency has significantly improved. A library is an important venue for knowledge provision and exchange. Effective provision of library resources for access by readers has long been most important. Readers' access to a library to look for various resources is a frequent occurrence, but readers' unfamiliarity with the library environment or library signage lacking in clarity and poor overall library space or route planning are problems that often arise. In this case, library navigation services become all the more important.

Due to advancements in mobile technology in recent years, many libraries have begun providing information services supported by mobile devices. For example, mobile library websites provide library related information, including library services and collections, as well as library catalog search, portable exhibition information, topic guides, e-journals, opening hours, and other information, which can suitably fit into all mobile device carriers [1]. Nowadays, more and more libraries are building mobile websites that allow users to access data at any time.

In addition to providing information, in terms of library navigation implementation, traditional library navigation is designed for the library to enable freshmen to learn about the library through educational courses or activities. However, this mode is prone to a number of drawbacks. For example, guides' touring effectiveness is less ideal in exhibition venues packed with people; there is less flexibility as visitors cannot go around as they wish, visitors must follow the guides and must be very attentive, and personnel costs are too high.

Navigation service is one of the important services provided by libraries, museums, and other exhibition venues. During an ongoing tour, visitors' interest in the visit can be enhanced through personnel or system guide and illustration, which in turn, help them relate to the visit and gain in-depth knowledge of exhibited objects and exhibition venue [2].

On the library's part, navigation service function is for readers who have come for the first time to understand the geography of the library, the locations of the books, the distribution of inquiry staff, the purpose and activities of the library, various tools and resource utilization information and the like.

Most people have more or less had the experience of borrowing books in the library. For readers who visit the library for the first time, different types of information are located in different locations and floors in the library.

Without spatial arrangement and guidance cues, the library would be a maze. In general, to access library collections, the reader searches for a book on the library website, records the call number, and finds the book on the shelf through the call number. If this search mode can be simplified and the book positioning method designated on a mobile device, the utilization of library collections can be greatly improved.

Virtual Reality

Due to the rapid upgrading of computer performance and network transmission in recent years, virtual reality applications have become more extensive than ever. The most common applications include computer games, virtual campus, museum navigation, etc. However, since virtual scenes are getting sophisticated and more complex, completed files are also getting larger. In particular, as computer games are already available in CDs that allow the user to pre-install all the scenes on the user's computer, bulk data download is not an issue. On the contrary, virtual navigation systems mostly require immediate download to watch, bulk data will need lengthy download time, which will severely affect the user's navigation smoothness. At the same time, since the user is basically exposed to unfamiliar virtual scenes for the first time, the problem of the user not knowing their whereabouts often arises, thus the greatly diminishing navigation effectiveness.

Augmented Reality

Augmented reality refers to real-time calculation of camera image locations and angles, coupled with corresponding image technology. The goal is to apply virtual images on the screen in the real world and further carry out interaction. With the advancement of technology, the performance of devices in-use has also continued to improve. In terms of augmented reality performance, breakthroughs continue to be achieved, thus a more extensive use.

Augmented reality refers to a computer monitor that adds virtual information to the user's sensory perception converted computer monitor. It is usually worn on the user's head, through which images and text are added to images generated from the user's observation of the surrounding environment. The virtual information can be presented in other sensory forms, such as auditory or tactile. Through the augmented reality system, the user's head position and direction can be tracked, which will allow additions to be aimed at the world the user sees. The augmented reality system and the virtual reality system have one fundamental difference; that is, virtual reality attempts to replace the real world, while augmented reality adds information to reality, as shown in Fig. 1 [3].

Fig. 1 Mixed Reality.

Application of augmented reality in library navigation

With the continuous progress of mobile technology and the popularity of wireless network environment, global positioning system (GPS), and wireless radio frequency identification technology, mobile technology has gained attention from education and business fields [4]. Its application scope has also continued to spread [5]. According to the classification of mobile technology, mobile device types featuring high individuality and high portability are the most common devices in daily life and are the most associated with mobile technology, such as mobile phones, personal digital assistants, tablet PCs, notebook computers, and handheld game machines. This type of highly individualized and portable devices is usually designed for single users. Connected to network technology, these devices can be connected to easily achieve communication and information exchange among users, as shown in Fig. 2. Therefore, considering the current mobile device popularity, low Internet costs, simple operation, high portability, and lower operating system software development costs, multimedia information and context-aware characteristics that can interact with the existing environment can be presented. Therefore, these devices are often selected by a museum exhibition venue or library navigation system.

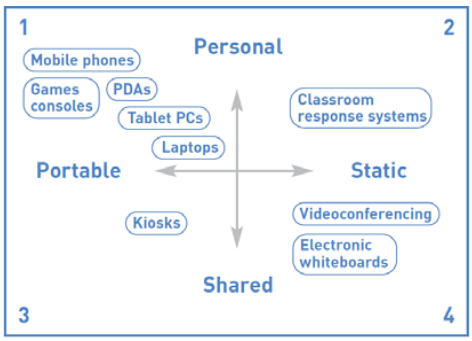

Fig. 2 Classification of mobile technologies

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The navigation system provides user target information in advance through the media. Overall, the navigation system can provide users with unknown information and display the most unique aspect of it, allowing user to increase in familiarity with the destination, thereby saving time and achieving efficiency. The function of navigation is to convey messages, allowing users to achieve aided learner cognition through its attributes and maximizing learning results. Information dissemination must find balance between established extension and connotation [6]. During the information delivery process, the transmission end and the receiving end are often involved. Therefore, a navigation system has to find positioning between the extension and connotation. If hypermedia's immediacy and interactivity can serve as directions, the inadequacy of the navigation system in terms of information transmission can be improved.

Some library webpages at present describe situations inside libraries through text; others use images to present the library furnishings. As a result, information presentation lacking vividness or low user interaction may result. In traditional library navigation, the navigation function of image or text descriptions is a more common method. Most libraries' navigations are limited to text and images. Although flash players are used to produce animations, only floor plan configuration diagrams can be viewed, which lack interaction. Therefore, the production of a highly interactive library navigation system is a service of great importance to libraries at present.

In order for users to freely browse and interact in 3D dynamic scenes, libraries use virtual reality technology for image presentation, so that readers will get the feeling of being personally on the scene and achieve better learning results without having to make a personal visit. In addition, through image software and program design, users can click 3D library images with their mouse. Pluralistic media, such as images, voices, text, and so on are used to introduce the library, enabling users to learn about the library through more diverse ways.

Additionally, libraries can apply augmented reality technology in library collections management and reader services (i.e., book search). In physical book storage, we know how cumbersome returning a large quantity of books to their locations can be, and how misplacements can be frequent occurrences. Currently, foreign research institutions have developed augmented reality software that saves librarians considerable time and trouble in the management and search of books.

Using the camera on a phone, the software can read the bookshelf and determine if the books are placed in their correct locations based on the call number information. Then, augmented reality technology can be used to label misplaced books on the screen, and the corrections of the books can be indicated, allowing users to return books with ease. In addition, the software will also assist in inventory taking, generate a list of library books, and list which books are actually on display shelves in the library.

Conclusions

In view of the increasing popularity of mobile devise and wireless network services, general users' need for mobile library services, whether in terms of personal services or library space navigation, have gradually been met through mobile devices. If communication costs can be reduced with growing mobile service popularity in the future, users' various library needs will also increase. Due to the development of digital technology and communication technology, mobile phones, tablet PCs, and other mobile devices have gained greater popularity. The mobile phone penetrate rate is almost 100% (i.e., everyone has one). On the other hand, mobile Internet users have also increased every year, and many services have no geographical restrictions. Mobile network has integrated with communication and the Internet, which will only become more popular in the future. Under this trend and in consideration to individualized needs and service modes acceptable to users, libraries should actively contemplate on and plan mobile service modes and provide more convenient services.

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