An Analysis and Decision Support System for Museum Management Based on Visitor's Action Log

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1. INTRODUCTION

As the development of ubiquitous environment and technology in modern society, kinds of exhibition guide systems, like voice guide system PDA and mobile phone are introduced to improve museums' technological modernization. The use of personal mobile handheld devices such as mobile phone, Personal Digital Assistants (PDAs) that replace the traditional paper guidebooks is becoming a common sight at various heritage sites all over the world. However, most of them are just focused on advancement of media information system but not on these content's design and research of user's opinion.

The exhibits or guide information were just provided from one side to another and it was not enough to make visitors satisfied. To provide a better service for various visitors, it is important for museum to grasp the behavior of visitors, the visitors' opinion about the exhibits and the layout of the exhibits or the routes where visitors often take around the exhibition area. In general, museum has to do some questionnaires and pursuit observation of visitors inside the exhibition area to get the information on the visitors' opinion about the exhibits. But the investigation on the situation of exhibition is not easy to be held frequently, for such work is very costly and time consumption. Based on the information derived from questionnaires and pursuit observation, museum may re-arrange their exhibits in a better pattern. With the advances of mobile information technology, it is possible to collect accurate information on visitors' behaviors or activities over time, space. Because the visitors' activities information can be transmitted automatically with wireless communication, it is much easier and cheaper to collect visitors' behavior information over the all visiting period.

In this research, we present a data survey and monitor system that provides museum evaluation tool based on visitors' behavior and activities information.

2. GENERAL SYSTEM

Museums are organizations rich in content and their mission is to bring people closer to artifacts and the meanings they convey, which is manifested. The collections of artifacts are at the core of the museums. However, the visitors must be provided with information in order to be able to assign meaning and interpretation related to the artifacts. The general guide system we considered is shown as Fig.1. In exhibition area, there are some infrared transmitters which provide guide contents or position ID information, some RF base stations, which are used to receive message sent out from mobile devices. Visitors use mobile devices to get guide contents, view the contents. Also the visitors' activities log information will be sent to the RF base station through a wireless communication. In office area, there is analysis and decision support system (ADSS), ADSS is composed of a server that stores all the information for evaluating the usages of the exhibits and contents, and several clients that can access the server to show some survey result based on request.
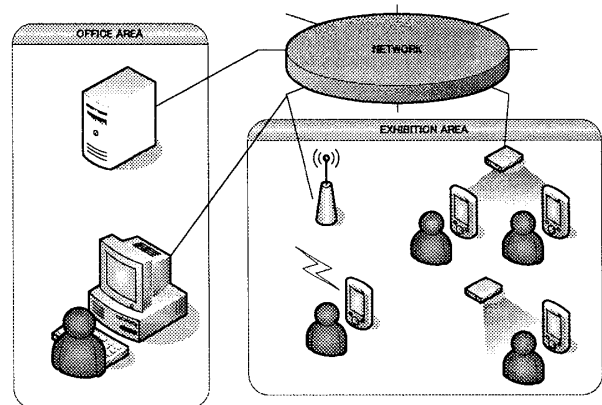

Fig 1. General System

To realize evaluation of the exhibition in museum, the survey system should provide the following basic functions. 1) monitor the current position of individual visitor; 2)show the visiting route of individual visitor; 3)measure the usage time of mobile device; 4) calculate the staying time in statistics, such as average time, deviation and etc.; 5) the number of visitors who visited the specified exhibition area; 6) other statistic computations.

3. ADSS DESIGN

As shown in Figure 2, ADSS contains two parts: five databases and 3 main program modules. The five databases store mobile device information, exhibits information, visitor information, guide contents information and visitor activities information. The three main program modules are basic registration manager program, data analysis & data visualization manager program, and dynamic data input manager.

The basic registration manager program (BRM) is used to initialize the five databases and modify the

databases on mobile device information, exhibits information, visitor information, and guide contents information. But it will not modify visitor activities information database. Dynamic data input manager program (DDIM) will execute the task for update the visitor action information database. The program will access the ftp server specified beforehand, if there are some new log files transferred from RF base station. As core module in ADSS, data analysis and data visualization manger program (DADVM) mainly obtains information from the above five database according to the request from the clients, and process the information and output them at a visual format.
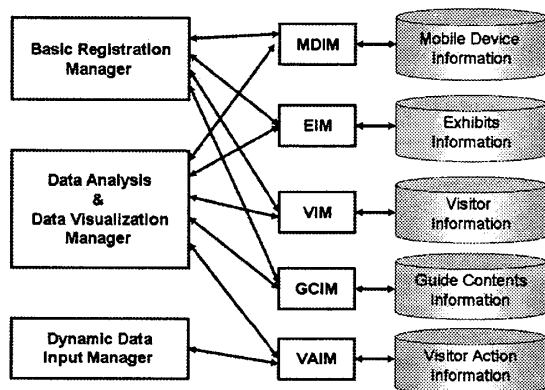

Fig. 2 ADSS Structure.

For example, if museum want to know the visiting situation of some exhibits, such as average staying time, a request will be sent to DADVM. DADVM will find the exhibits' ID from exhibits information database, then searches related log records in visitor activities information database. The log records on individual exhibit will be calculated statistically to derive the average staying time for it. If several exhibits are specified, rating functions will be provided also. The rating data will be shown in a bar graph.

4. ADSS IMPLENTATION

Recently, the uses of the data base increases in the development of the Web application. .NET is prepared in Visual C # as a function to develop the application that cooperates with the data base easily. To implement the system, we adopt Visual C#.NET as the development environment. The detail about the environment are as followings:
   OS: Microsoft Windows XP Professional
   Database: Microsoft SQL Server 2005.
   BRM& DDIM: C#, Microsoft Visual Studio 2005.
   DADVM: ASP+C#, Microsoft Visual Studio 2005.

Fig.3 illustrates the survey output of number of visitors for a specified exhibition area. With the bar graph, the trend can be shown clearly. Of course,

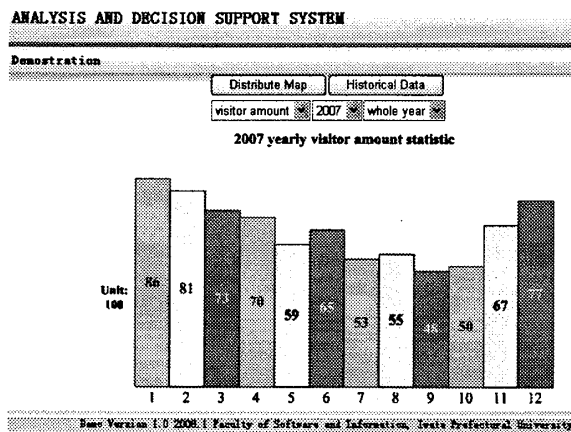other graph style will be provided if necessary.

Fig. 3 Output of ADSS

5. CONCLUSION

In this paper we have present a new approach and prototype system to evaluate the performance of exhibition management with surveying the visitors' activities log information. The information provided by the system may help museum to grasp the behavior of visitors in numerical value.

The DDIM has been implemented, and a function test will be done to confirm its performance. BRM and DADVM is under development. The data visualization is a useful function for museums, we are designing the interface now based on some comments and suggestions. As future research, we plan to held a field experiment in a local museum.

6. REFERENCE

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