# The Implementation of the Smart Festival Management Model using Streaming Service based on the Complex Recognition

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#### Abstract

The Festival management has the required elements of making support to the visitors about the festival programs and giving the fun of the festival by building the best possible service environment reflected the characteristics of visitors. In this paper, we propose the implementation model of the smart festival management using streaming service based on complex recognition for the festival management by using a variety of IT technique such as QR Code, NFC, GPS, Streaming Service, and Location Service. By using this system, it can be provide convenience to visitors through audio/video streaming service and information of the status of the event hall and increase interoperability of the manager through demand forecasting.

**Keywords:** Festival Management, Streaming Service, QR code, NFC tag, GPS, Location Base Service, Smart Phone

#### **1. Introduction**

Recently, the festival has been growing interest with the spread of cultural life. In particular, local cultural festivals are being created through various agencies of local governments. These festivals systems activate the local culture and local income directly or indirectly. However, in reality, there are many festivals that are generated based on the exhibition administration. And those festivals do not make the creation of an active market and post management. As a result, the system environment that can create value to local residents based on the systematic deployment and management system of the festival is required [1]. And also, through growing the Information technology and audio/video transmission and spreading a various mobile device that is included high-feature sensors, users are demanding a variety of services. For these requirements, in this paper, we propose the smart festival management system providing complex recognition-based streaming service that can support systematic management and aggressive promotion for the efficient festival service. With this system, visitors will be able to use the information easier and festival manager can be use the visitor information as the post management and statistics. Therefore, it can be ensure efficient management and viability of the festival. The remaining parts of the paper are organized as follows, In Section 2, we discuss the related technology for the smart festival management. In Section 3, we propose the system model that is complex recognition-based streaming service for the festival. Section 4 presents an implementation model in this system and Section 5 concludes this paper.

# 2. Related Works

# 2.1. Festival Management Elements

The elements for making a festival management system consist of festival planning, operation, evaluation and analysis. First, in the festival planning, it is need to determine the impact factors for successful management of the festival and need to consider the elements of the regional characteristics and economic factor. Second, in the festival operation, it is need to an effort to prevent problems during the events; aggressive marketing reflected the characteristics of the festival and promotional activities to reflect the needs of visitors. Third, the festival evaluation and analysis are required the process of a thorough internal analysis for the effect of the events and visitors characteristics to make the festival equipped with a sustainable and viable [2][3]. In this paper, we propose the service implementation model that is included various information technologies to increase operational efficiency of the festival. The proposed system includes the ability to deal with various situations through the entire process of the festival using streaming server and smart phone based on the visitor activities. For the implementation of this service, we use various technical services such as the location-based service, NFC technique, QR code, streaming service, GPS and so on.

# 2.2. NFC Service

Near Field Communication (NFC) technique is a set of short-range wireless technologies and is able to read from and write information to RFID/NFC tags and was used for the implementation of the two presented interaction techniques. And also NFC techniques are already available in the mobile phones such as smart phones and it is predicted that several hundred million NFC equipped mobile phones will be used in 2013 [4]. The NFC protocol is based on a wireless interface and also it is known as peer-to-peer communication protocol that establishes wireless network connections between network appliances and consumer electronics devices. The interfaces operate in the unregulated RF band of 13.56 MHz and have the operating distances of 0~20 cm. This NFC protocol also distinguishes between two modes of operation: Active mode and Passive mode. In the Active mode of communication both devices generate their own RF field to carry the data. And in the Passive mode of communication only one device generates the RF field while the other device uses load modulation to transfer the data [5]. The tags can range in complexity. Simple tags offer just read and write semantics, sometimes with one-time-programmable areas to make the card read-only. More complex tags offer math operations, and have cryptographic hardware to authenticate access to a sector. The most sophisticated tags contain operating environments, allowing complex interactions with code executing on the tag. The data stored in the tag can also be written in a variety of formats. In this paper, we use NFC tags to save and notify the information of the contents in the specific areas that is unable to provide the GPS sensing data such as indoor area for the festival service management.

# 2.3. QR Service

The QR code is a kind of matrix symbol that was developed by the Japanese company Denson-Wave in 1994. The code has quiet zone, position detection patterns, separators for position detection patterns, timing patterns, alignment patterns, format

information, version information, data, and error correction code words [6]. The main features of QR code contain high data capacity, high speed scanning, small printout size, advanced error correction, and freedom direction scanning.

The QR codes which have the freedom scanning direction can store 7,089 numeric characters and 4,296 alphanumeric characters, and 1,817 kanji characters and can get the content from a barcode quickly and easily with Smart Phone. And also the codes carry data on both horizontally and vertically, thus QR codes are better than 1D barcodes in data capacity. Even if 50% areas of barcode are damaged, QR codes still can be recognized correctly [7]. In this paper, we use QR code to support the information of the contents that is unable to provide the GPS data such as inner area for the festival service.

# **3.** Complex recognition-based Streaming Service for the Smart Festival Management System

#### 3.1. The Proposed Service System Architecture

The complex recognition-based streaming service system includes the ability to deal with various situations through the entire process of the festival using streaming server and smart phone for the activities of the visitors. They are shown in Figure 1.



# Figure 1. Festival Streaming Service Architecture and Elements of the Service

#### 3.2 The elements for the System Operation

The elements of the complex recognition-based streaming service system and operation through the entire process of the festival are described as follows.

#### Management of Registration and Entrance for the visitor:

Visitor registration process is done through the box office and information desk. When the visitors fill out the application form, the visitor can received the QR code which is created by

the festival management system and the system send the code to the user smart phone. The QR code is used to enter and exit to the festival area. And the QR codes give the visitor the admission of the special event area in the festival. The manager of the festival can utilize the using data of the QR for the festival participants and the tendency of the users as statistics data.

#### **Festival Application Service based on Smart Phone:**

The application based on smart phone has the service that can provide real-time audio and video data streams of the schedules and festival services information based on a map, user location, QR code, and NFC. And also the application give the status of congestion in the event areas based on proximity sensing. So the visitor can enjoy the festival service comfortably. This application can operate with the complex recognition-based streaming server through entire process of the festival, and provide the various services of the festival based on the user situation.

#### **Complex Recognition-based Streaming Service:**

The Streaming Service provides the festival information services for the outdoor and indoor areas. The outdoor streaming service operates with a map, GPS and proximity sensor. The outdoor service detects the event to enter and exit the specific space and give the information of the area event and schedule in real time. And also can notify a crowded situation of the specific area based on the map. And indoor streaming service operates with NFC and QR code in the area that can't be use the GPS data. The visitor can contact special item or services to know the information with smart phone. When the phones detect the tags, it requests the streaming service about the item.

# 4. The Smart Festival Management Implementation Model of the Complex Recognition-based Streaming Service

# 4.1 The Software Architecture for the Streaming Service

We propose an implementation model of the complex recognition-based streaming service for the smart festival management system based on the open source. The system has two parts that is client and server parts. And also the system has various modules such as application module, streaming module, NFC module, QR module, GPS, Maps, database and network modules. This system consist of Dawin Streaming Server for Audio and Video Streaming Service, Android system for smart application program, Zxing library for QR code module, NFC, GPS and Map Service. The service system software architecture is shown in Figure 2 and Figure 3.



**Figure 2. Festival Client Software Architecture** 

Figure 2 show the architecture of the festival client software. It includes modules such as QR, NFC, GPS, Map and Streaming and it manage situations of the festival and visitors.

The client service operates with festival streaming server. It manages user, festival status and streaming data. In the user manage, it create QR code for the user and register the user data, In the festival status manager, it operate services based on user location with GPS and Map data and also it can search the information using QR code and NFC tags. In the streaming control manager, it control the streaming data based on user request. The streaming data send by broadcast and the client can receive the required data for the user.



Figure 3. Server Software Architecture

And Figure 3 show the architecture of the festival server software. It includes management functions for the visitors and streaming data. After registration of the visitors, the visitors can receive the streaming services of the festival contents.

The server software architecture has user manager and streaming control manager. In the user manager, it registers user identification in database and sends the identification to the smart phone. In the streaming control, it has various contents for the service to send visitors. It sends the content using broadcast service for user requirement. Each elements and approach methods is described in the next section.

#### 4.2 The Implement for the Management of the Visitors

In this section, we present the flow of the registration and management of the visitors. The visitors receive the user identification code using QR and then can use this QR code for entering and exiting the event section and the gate of the festival. And the manager of the festival can manage and use the actions of the visitors. The flow of the entering and exiting with QR tag is shown in Figure 4. First, User can download the festival client app in the market, after the user download the app, the user can require QR code for user identification to the festival server, and then the festival server register the user data and make QR code for the user and send the QR code to the visitor. The QR code can use for the entrance and exit of the festival area. The server permits the special area to the visitor when the visitor want to enter the area by identify the QR code. And the server adds user count for the area. It can use for the congestion status. If the user exits the area, the server subtracts a user count. When the user enter the area, the user can contact the information of the festival by using QR code and NFC tags based on user location based service. It is easy and efficient to use the service.



Figure 4. User Control Flow of Registration, Entrance and Exiting

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Figure 5. Interface of Login and Identification

And Figure 5 show the interface for the user login and identification QR code. When the visitor buys the ticket, the ticket has user id. If the user is first login status, the application requires the password setting. When the user make login, the user can find the user identification QR code.

#### 4.3 The Implement for the Management of Status of the Festival

The Visitors can use the service for the status of the festival when they entered into the festival area based on user location. It can trace user location and check the status of congestion in the event area with a map. This interface is shown in Figure 6.



Figure 6. Festival Status Interface based on a Map

The application operates based on the map using location based. The user can find user location and specific areas that show congestion status. When the user moves to the specific area, it makes traces. And the application has various menus such as streaming service, service type, in and out manager and tag services.

International Journal of Multimedia and Ubiquitous Engineering Vol. 8, No. 2, March, 2013



**Figure 7. Festival Application Start Process** 

When the application start, UserMap object initialize GPS and get start point for user. And also UserMap initialize the path of user and then It create specific areas on the map that is received from streaming server.



Figure 8. In-Process for the Festival Application

The In-Process make admission for the visitor. First, the process get identification and location information from user and GPS data, and then it send user data to area, the Area object send the In-Process data to streaming server. The streaming server check the user and if the user call allow admission, the streaming server add congestion count of the area and then send the URI information of area for playing the contents of the area. When the UserMap object receive the URI information, the UserMap change area status and then play the content of the area.



Figure 9. Streaming-Process for the Festival Application

In the streaming process, First, startStream() function get the identify and location information for user and then It add user path in the Path object. And It send user data to Area object. In the Area Object, the user data are checked whether it is in the area or not. If it is in the area, It send the request of URI for Area that is contain the streaming information of the area. When it received the URI information, it change area status and make a stream. And then play the stream when the user entered in the specific area.



Figure 10. Tag-Process for the Festival Application

In Tag-Process, when UserMap object recognize the content of Tags, it check what kind of called tags and then get the information of tag of NFC or QR code. And also it get the user data. And it sends the request of the tag information with the tag information and a user data to the streaming server. When the streaming server received the request, it sends the URI information for the tag. UserMap can create the stream of the tag and play the stream when it received URI information.

#### 4.4 The Implement for the Streaming Service

The streaming service can be used in the indoor and outdoor area through a variety of approaches. This service approach that is included indoor and outdoor process is shown in Figure 11. It consists of a smart phone, streaming server, GPS, QR, NFC tags in the specific area.



Figure 11. The Approach of the Streaming

In the streaming process, the festival client sends the user data, location information and the required content information to the streaming server. When the server receives the requirement of the user, the server services the appropriate contents by broadcasting. If the content is servicing already, it send the parts that passed already, and others parts use existing streaming data. It can reduce network traffic.

The festival client has four method of approach to use the streaming service. First, it can use when user entered the specific area based on user location and proximity sensing. Second, It can use when user contact the QR tag that is attached on the stuff. And also user can use the NFC tags with smart phone for the resisted streaming contents. The QR code and NFC tag is used in the inner area that can't use GPS data. And last, the streaming service finished when the user exits the specific area. And the management of the entering and exiting for user in real time can recognize the congestion easily so that user can enjoy the festival efficiently. And the approach makes the efficient management for festival manager. In the Figure 12, we show the detail process of the indoor area.



Figure 12. The streaming service for indoor area

The event of streaming service will occur in the various situations such as entering and exiting the specific area, contacting contents. The client system transfer user information, current location and content name to the streaming server when an event occurs, And then the streaming server save the user and location information, and process the audio or video service to the visitor in real time. And indoor streaming service shown as Figure 12 operates with NFC and QR code in the area that can't be use the GPS data. It can be used when the visitor want to know a detail information of the contents or to receive the additional service about the contents.

# **5.** Conclusions

With the growing of the cultural life, there are a variety of local cultural festivals that is made by agencies of local governments. It will require systematic management and operation through expansion of scale of the festival. The festival management system has a lot of various elements such as planning, operation, evaluation and analysis. Especially, the implementation of the operation of the festival is very important for the user satisfy with the efficient planning. And also well-defined planning and the statistics of an execution result need to support the higher quality service environment. So in this paper, we proposed the complex recognition-base streaming service implementation model for the efficient operation in the festival. The proposed the implementation model for efficient festival management was made by a variety of IT technique such as QR Code, NFC, GPS, Streaming Service, and Location Service. It can be provide convenience to visitors through audio/video streaming service and information of the status of the event hall and increase interoperability of the manager through demand forecasting. The proposed system covered various situations through the entire process of the festival using streaming server and smart phone with a various approach to the visitor. Using the proposed system, it will be able to manage the festival systematically and to provide aggressive promotion to the visitor. And visitors will be able to access the contents easier and enjoy the festival. And also the management of the festival could lead to the better festival by utilizing event-related and visitor-related data.

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