

The Implementation and Application of A Self-help Guide System of Large Images

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Abstract. In this paper, we use the Conquering Demons Mutiny murals which is the two-dimensional large images exhibited in the 254th grotto of Dunhuang Mogao Grottoes as the experimental objects, and we have designed and implemented a self-help guide system of large images in handheld device based on image retrieval. Users use the Android handheld device to collect the local images that they are interested in, and upload them to the background server so that the images can be recognized in local areas. At the same time, users can retrieve some media contents related to the images. The results will be returned to the handheld device and displayed. The background server contains the contains the HTTP protocol network server and the streaming media server based on RTSP protocol. The HTTP protocol network server is responsible for communicating with the clients on the Android platform, while the streaming media server based on RTSP protocol provides audio and video streaming service for the users. The core algorithm of image retrieval is integrated into the server by means of JNI, and MySQL is used to store and manage data. In this paper, we introduce each module and link of the self-help guide system of large images in handheld device based on image retrieval from the perspective of system. We focus on the hardware and the architecture of the system, the way of server-building, the core algorithm for image retrieval, the progress of building a streaming media server and its applications and the design for the clients of Android platform.

Introduction

A guiding system is a specific mechanism that is used for providing key responses or information for the visitors. Guiding systems are widely used at many places in our real world [1,2,3,4], especially prevalent at universities. However, traditional guiding systems, which use static paper media (e.g. posters or boards), certainly have several disadvantages: for instance, without real-time interaction with users and monotonous. In the recent modern stage, computerized presentation of multi-media has been discovered for many clear advantages over paper media such as ease of updating, dynamic text presentation, inexpensive customizability, interactivity, connectivity, and the capability of presenting other media simultaneously [5,6,7,8]. In this paper, we use the Conquering Demons Mutiny murals which is the two-dimensional large images exhibited in the 254th grotto of Dunhuang Mogao Grottoes as the experimental objects, and we have designed and implemented a self-help guide system of large images in handheld device based on image retrieval. Users use the Android handheld device to collect the local images that they are interested in, and upload them to the background server so that the images can be recognized in local areas. At the same time, users can retrieve some media contents related to the images. The results will be returned to the handheld device and displayed. The background server contains the contains the

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System Architecture

The whole system architecture is shown in Figure 1.

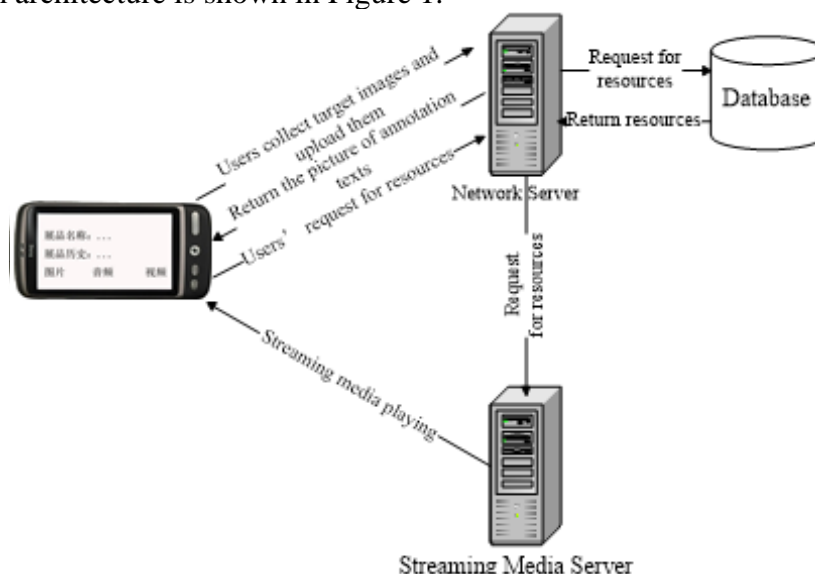


Figure 1. The Architecture of the Self-help Guide System of Large Images in Handheld Device Based on Image Retrieval

The Building of the Network Server and the Core Algorithm of Image Retrieval

As shown in Figure 1, we build the network server based on HTTP protocol for the system to communicate with the clients. We choose Tomcat with a version of 6.0.30 as the network server here to provide the network service for a plurality of clients.

We also need deal with the core algorithm of image retrieval on the server. The data processing flow chart of the whole system is shown in Figure 2. As shown in the diagram, the blue part stands for off-line processing and the red part stands for the process of the users' online operations.

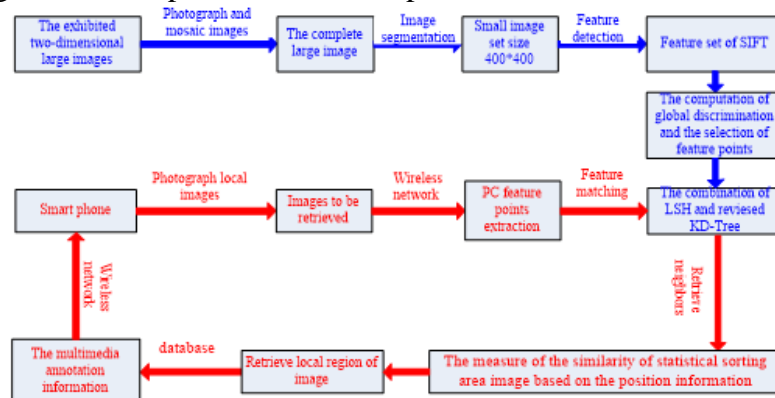


Figure 2. The Data Processing Flow Chart of the Whole System

Here we combine the module of the network server based on HTTP protocol with the core

module of image processing and retrieval by means of JNI.in order to pursue the high efficiency for the module of image processing and retrieval,we usually use C Language to code the corresponding parts,while the part of network service is written by JAVA. JNI is an effective method to integrate JAVA with C.

The building and Applications of the Streaming Media Server

In order to realize that the clients can get audio and video data on the mobile device in real time, the system provides audio and video resources by means of streaming media.That means users do not have to wait for downloading audio and video.Instead, they can directly listen to audio and watch a video online with the help of streaming media.

The streaming media broadcasting here uses RTSP streaming media protocol.We need to build a streaming media server solely,which is independent of the network server.We use the Darwin Streaming Server which is open source,provided by Apple Inc.We can not only provide users with streaming media service but also manage multimedia resources like audio and video data via the Darwin Streaming Server,with which we can also control and make statistic analyses of users' access and flow.It is essential to pay attention to that the simple MP4 format video files can not be played via streaming broadcasting. Thus we need dispose of such files with a method called "hint". "Hint" aims to index the files with the format of MP4 according to the RTSP protocol.In this way, such files can be played via via streaming broadcasting for their support for protocols like RTSP.

RTSP is short for Real Time Streaming Protocol.It defines how to delivery multimedia data through IP network effectively.It is a description protocol from a client to a server.RTSP is a streaming media protocol to control the transmission service with real-time characteristics.However,the protocol itself don't transmit data.Instead, the transmission service provided by the bottom layer protocol like RTP is used to transmit data.It provides the control function of media stream,such as play, pause and fast-forward etc.RTSP defines the messages ,the operation methods,the status codes and the header fields ,which are used in the process of control.And it also describes the interaction with RTP.RTSP is established by reference to HTTP/1.1.It is similar to HTTP/1.1 in the aspects of grammar and operations.And The extension mechanism of HTTP/1.1 can be applied to RTSP in most cases.

The Design of Clients On the Android Platform

We have developed the client software on the platform of Android.The client software mainly consists of several modules such as the operations on the local camera of a mobile phone,image compressing aiming to compress the images to reduce the amount of uploading data, multithreading, network transmission based on HTTP and the streaming media playing based on RTSP by means of VideoView and MediaPlayer.The screenshots of the operation interface of the Android platform are shown in the following figures.Figure 3 shows some text annotation information about the local region of the image retrieved.Figure 4 shows some annotation information for audio and the picture of the local area of the large image retrieved.Figure 5 shows the annotation information for the video of the local area of the large image retrieved.Figure 6 shows the words ,pictures and audio submitted by users.



Figure 3 The Display Interface of Text Annotations of the Local Area of a Large Image



Figure 4 The Display Interface of Annotation Information for Audio and the Picture of the Local Area of the Large Image Retrieved

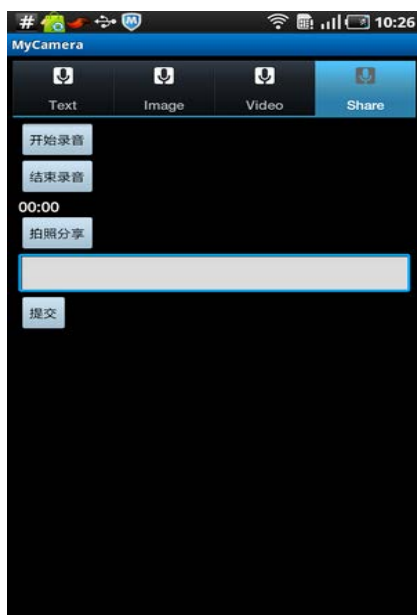


Figure 5 The Display Interface of Annotation Information for the Video of the Local Area of the Large Image Retrieved

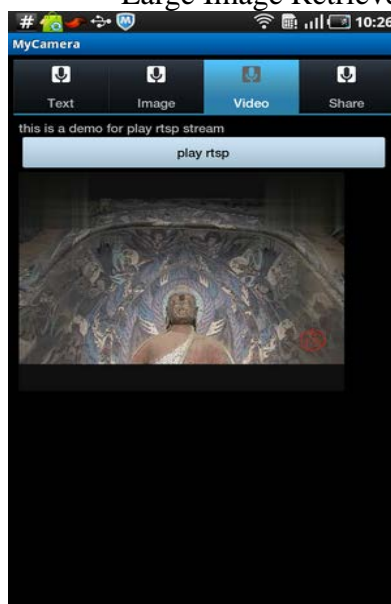


Figure 6 The Uploading Interface of Users' Sharing Information in Local Area of a Large Image

Conclusion

In summary, this paper introduces the design and implementation of a self-help guide system of large images in handheld device based on image retrieval. We focus on the hardware and the architecture of the system, the way of server-building, the core algorithm for image retrieval, the progress of building a streaming media server and its applications and the design for the clients of Android platform. Further more, we show the screenshots of system pages effect. This work is partially supported by Zhejiang Provincial projects (2014C31075), the National Nature Science Foundation of China (61201446), and the National Key Technology R&D Program projects (2012BAH43F03, 2013BAH27F01, 2013BAH27F04).

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