Server-Based User-Created Contents Processing System

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ABSTRACT

The web 2.0 is leading a rapid change of internet services. The UCC(User Created Contents) service is one of the representative internet services with web 2.0 paradigm. In this paper, we design and implement the UCC services prototype system for image and video. The proposed system does not need to install ActiveX and client programs on devices of users to edit their contents. All processes for editing UCC are conducted on the server. Our proposed system consists of the two components such as the multimedia editing subsystem and the metadata management system. They provide the API to UCC service developers or vendors. The multimedia editing subsystem supports editing for image and video, and the streaming services of video. The metadata management subsystem supports the metadata management and retrieval of image and video.

Keywords: *UCC, Web 2.0, Multimedia Editing, Metadata Management.*

1. INTRODUCTION

The web 2.0 which is summarized by keywords such as open, participation and public ownership is leading a rapid change of internet services. With the web 2.0, internet services have been evolved from services that producers provide the finished goods to services that users take part in creating them. By beginning the web 2.0 in earnest, the various business models are coming out to use contents created by a user.

The Times nominated "You" as man of the year in 2006 and UCC (User Created Contents) could represent it. In an aspect of open and participation of the web 2.0, creating and using UCC by users was being increased rapidly. With text and image posted on blog and mini homepage, UCC was popularized. Recently, usage of an UCC is being increased due to popularization of mobile phone, digital camera, PDA and so on[1][2].

Since 2006, UCC service has been progressed with image and video. In the domestic case, portal sites such as Yahoo, Naver and Daum, and companies providing UCC video services such as MNCAST[3], MGOON[4] and Pandora TV[5] provide the UCC services[6-8]. In the overseas case, Google, Yahoo and Sony are taking over UCC web sites. In particular, Google has a plan to preoccupy the UCC market by taking over YouTube[7][9].

With the web 2.0, one of the reasons of UCC boom is propagation of portable devices such as mobile phone, PDA,

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Digital Camera and so on. In the past, portable devices were only used to communicate with other peoples or connect a web site for retrieving and viewing UCC created by other users as a role of simple viewer. However, the recent portable devices support not only the technology of communications but also the ability to create image contents and video contents. Due to the advanced capabilities of portable devices, users create the multimedia contents with them, and provide the contents to other users through the popular websites. In order to edit multimedia contents made by using user's devices, existing editing methods have following phases: (1) Contents in the portable devices are moved to either a PC or a laptop. (2) The website of the professional UCC companies is connected. (3) Either ActiveX or client programs to edit multimedia contents are installed. (4) Multimedia contents in PC or laptop are edited. And (5) Edited multimedia contents are uploaded. PC and laptop-based multimedia contents processing systems, however, have some problems. To move multimedia contents in the portable devices to either a PC or a laptop, users must install the device driver of each device. So, multimedia contents created by heterogeneous devices can not be processed, before the device drivers were installed on a PC and a laptop. Second, capability of embedded MCU (Micro Controller Unit) is very limited. Repository also is so very small. Now, portable device's processing capability can process a simple task such as the size change, the color change and the rotation of image but can not yet do a complex task such as encoding, cutting duration of the video contents that are core of the UCC. Also, the existing approach based on installing ActiveX and client programs on a PC or a laptop is not applicable to portable devices. The reason is that ActiveX and client programs occupy much of repository.

We propose a novel system to overcome such problems. Server-based multimedia contents processing system does not require to install ActiveX or client programs on PC or laptop of a user. A user transfers contents in such devices to servers using communication technologies of devices. The server receives contents and requests of user, and processes them. Through open API used to process the multimedia contents, web-developers can reduce development costs and share development substances.

The rest of the paper is organized as following. We describe the structure of system in Section 2. We explain the primary functions of our system in Section 3. The implementation of our system is described in Section 4. We present our conclusion in Section 5.

2. THE PROPOSED MULTIMEDIA CONTENTS PROCESSING SYSTEM

2.1 The System Structure

In this paper, we propose the prototype system to develop UCC service for image and video. The proposed system is composed of the multimedia processing subsystem and the metadata management subsystem like a figure 1. The proposed system offers web server the communication technologies to serve UCC services and conducts communication through the web server and SOAP/HTTP. The multimedia processing system manages UCC media for image and video, and also offers editing and media service for enrolled UCC media by user. The metadata management system manages the metadata, reply and scrap information about UCC. Also, it provides the search function to quickly access UCC.

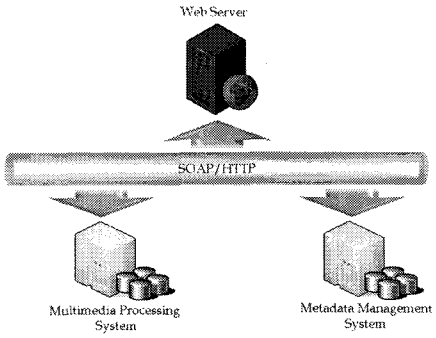

Fig. 1. The System Structure

For enrolled UCC by users, media is registered with the multimedia processing system and it is enrolled in the metadata management system needed to control and access UCC. In order to provide services for enrolled UCC, registered metadata is retrieved in the metadata management system and then services are requested to the multimedia processing system by using route information of UCC included in metadata. If the requested service is video, the multimedia processing system provides streaming services by interlocking the streaming server.

2.2. The Multimedia Processing System

The multimedia processing system manages enrolled UCC media, and offers registration and deletion function for enrolled UCC media to provide multimedia services. One of important functions in the multimedia processing system is to provide editing function for UCC media that is in a course of registration or was completely registered. Currently, the multimedia processing system offers 17 editing functions for image and 11 editing functions for video separately. It provides download, preview, media transmission and streaming service for enrolled image and video. The multimedia processing system conducts linked with the streaming server to provide the streaming services for video. In order to give UCC service for image and video in the cable and remote communication environment, the multimedia processing system convert registered UCC into stand format and then store it.

The multimedia processing system is composed of 6 components as shown figure 2. The communication interface transmits requests sent by web server to the inside of multimedia processing system by using SOAP communication. The communication interface provides the web server with the Open API. By receiving the service requests of the web server, it transmits the work request to lower components. The multimedia subsystem is composed with 4 sub-components that conduct real works corresponding to transmitted work requests from the communication interface. According to user's request to register or delete UCC, the media manage component stores

media at repository or delete it. In case of the video, it conducts a work to interlock with the streaming server. By providing edit function for UCC media that is in a course of registration or was completely registered, the image edit and the video edit convert enrolled UCC media into standard format that gives services for additionally registered UCC. The streaming management registers enrolled video with the streaming server to provide the streaming services, or deletes it. The internal communication offers the communication module to interlock either the streaming server or video codec. To give streaming services or editing video, two daemons is needed. One is for connection with the streaming server and the other is for accessing video codec. The multimedia daemon manages daemon which connects the streaming services or video editing function. Streaming Server is an application program which offers VOD service and real-time streaming services actually and is a linked module. In addition, it registers video with the streaming server to provide streaming services or deletes it. The repository management gives a function to store and manage the UCC media and real-time streaming data.

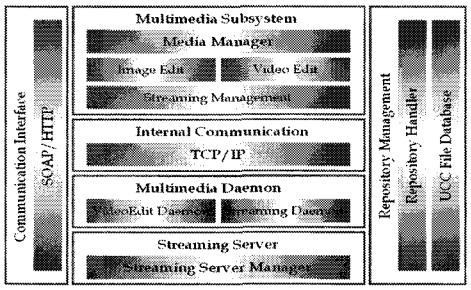

Fig. 2. The Multimedia Processing System

2.3. The Metadata Management System

The metadata management system manages metadata, reply and scrap information about enrolled UCC. Also, it offers a variety of search function to easily access enrolled UCC. According to requests of users such as enrollment, modification and deletion, the metadata management which is given by the metadata management system registers, modifies and deletes metadata of UCC media. The reply management stores, modifies or deletes reply for image and video. In order to share enrolled UCC, the scrap management function controls scrap information about UCC. If UCC is deleted, scrapped video is also deleted. The metadata management system offers search functions such as popularity-based search, date-based search, text-based search and locality-based search. Metadata management system supports interlocking with the database system for management of metadata.

Figure 3 represents structure of the metadata management system. The communication interface is composed of SOAP communication module that is for offering the web server services, and offers the Open API to web server. According to work requests of the communication interface, the UCC DB manager adds, deletes or adjusts metadata, reply and scrap information regarding UCC. It interlocks with the repository management for storing, alternation, or deletion of metadata, reply, and scrap information at the DB. The UCC retrieval management searches and then transmits UCC to quickly approach UCC requested by users. Also, it offers search functions for metadata and reply. By approaching real DB, the repository management stores both metadata and additional information, and provides search function for them.

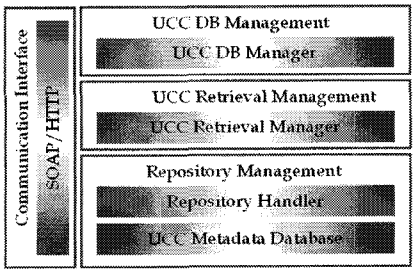

Fig. 3. The Metadata Management System

The metadata management system accesses real DB through the repository management for managing metadata and additional information about UCC. Real DB is composed of 10 tables for managing of metadata and additional information about UCC. The *imagemeta* table and the *videometa* table are tables that manage metadata for image and video. They manage title of UCC, user name, UCC explanation, enrollment time, public or not, scrap offer or not, files route, and so on. The *mediagroup* table stores group name, user name, group explanation, date of making group for managing enrolled image and video as one group.

The *imageposinfo*r table and the *videoposinfo* table stores enrolled spatial location of image and video to interlock with map data. In the case of image, special location information is stored. In the case of video, however, range information can be stored. The *imagescrapinfo* table and the *imageuccreply* table are used to control reply and scrap information about image. The *videouccreply* table and *videoscrapinfo* table manage reply and scrap information about video. The *keyframelist* is a table that stores a representative image for video and its number.

3. PRIMARY FUNCTIONS OF OUR SYSTEM

3.1. Media Management

To provide UCC services for image and video, our system supports functions that register, delete and modify media. UCC that is registered by a user can be modified and deleted. When modification and deletion of UCC media occur, they are processed in the multimedia processing system and metadata is modified and deleted in the metadata management system.

In our system, image types that can be registered are JPEG, BMP and GIF files, and video types are a series of MPEG, ASF, MOV, and AVI files. In UCC registration phase, a request to edits UCC can be required. Edited UCC is converted to file format providing services, and then converted UCC is stored in repository. At this time, image is transformed into JPEG and video are converted to FLV. In the proposed system, UCC registration producer is equal to figure 4.

In order to register UCC, a user transmits both UCC media

and information about UCC to web server. First of all, web server calls the API that is for registering UCC to the multimedia processing system. The multimedia processing system generate communication channel for the receipt of a media, and then store UCC media in the temporal repository. Stored UCC in temporal repository is converted to file that will serve services. A registration is completed. The multimedia processing system send web server both information about original UCC and converted UCC. The web server calls the API that is for storing information described by user and sent by the multimedia processing system. The metadata management system records metadata on the database and send the web server registration information. At this time, the metadata management system can store UCC as one of UCC by integrating numerous image and video, and create media group with respect to a number of UCC.

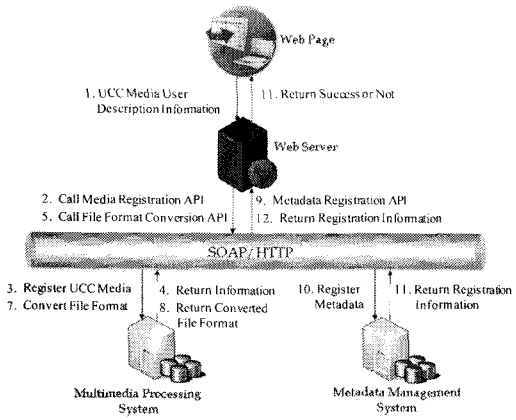

Fig. 4. UCC Registration Procedure

3.2 Media Editing

The Multimedia processing system supports editing function for image and video that are enrolled or are being registered. Figure 5 shows procedure to edit enrolled UCC.

User chooses UCC that will be edited and editing type to edit registered UCC, and then sends them to the web server. The web server calls the API that process UCC. The multimedia processing system edits UCC selected by user, and then sends web server information about edited file. The web server calls API that edits UCC. The multimedia processing system processes UCC selected by user, and then sends information about processed file to the web server.

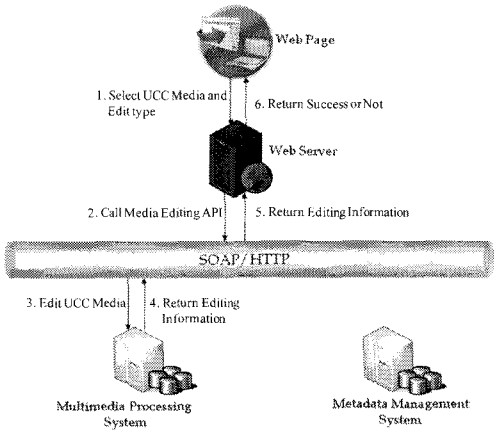

Fig. 5. Editing Procedure for Enrolled UCC

3.3 Media Services

Registered UCC provides various services according to the requests of user. In image case, it provides functions such as preview and view. In video case, it offers functions such as preview, VOD services and Live Streaming services. In order to provide UCC services, user first selects wanted UCC. For this, the metadata management system provides various search services. Figure 6 represents procedures to provide UCC according to the requests of user.

4. IMPLEMENTATION

The metadata management system is implemented using J2EE 1.4 and J2SDK 1.5 in Window 2000 server, and MYSQL is used as Database system. The multimedia processing system is implemented using J2EE 1.4 and J2SDK 1.5 in Solaris 8.0. In the multimedia contents processing system, Unreal Media Server[10] is used as streaming server and FFMPEG[11] is used as video codec.

In this section, we implement example web pages using our system, and describe usefulness of the proposed system. Figure 6 shows procedure to register video. In order to register UCC, user selects a file that will be registered. If user needs to edit a file, user can process a file in registration phase. In registration phase, user can describe UCC of title, explanation, public or not, scrap offer or not and so on. Above information is stored at imagemeta or videometa table.

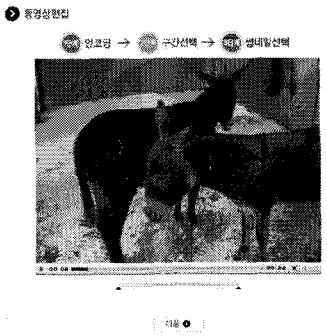

Fig. 6. Video UCC Registration

Figure 7 represents a screen where image is processed. In order to process UCC, user chooses UCC that will be edited and then can do editing selected UCC. According to processing request of user, the multimedia processing system interlocks either Image Edit component or Video component, processing UCC. Edited UCC is converted into a standard format that is for offering services, stored. It transmits processed information to web server.

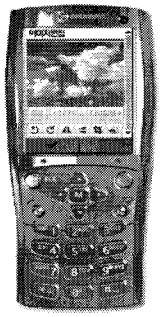

Fig. 7. Image Editing

Figure 8 shows a screen where a user retrieves UCC to be provided with UCC services. Our system provides 12-search functions. The search result is sent to a web server. In the case of image, metadata and image are sent, however, in the case of video, metadata and representative image are sent. In order to view image or play video, a user selects representative image for specific image or video. If a user chooses representative image for video, the multimedia processing system transmits the video to a user's device by interlocking the streaming server.

Fig. 8. UCC Search

5. CONCLUSIONS

As web 2.0 paradigm grows, many multimedia contents are generated by users and registered into internet services. In this paper, we have proposed a server-based UCC processing system which is adapted to portable devices. Existing multimedia processing systems have to install either ActiveX or client programs on a PC or a laptop for editing contents and all editing processes are conducted by PC or laptop of clients. However, our proposed system does not require to install ActiveX or client programs. So, we consider low capability of MCU and small repository of portable devices. In our system, a user uploads contents in portable devices to a server using wireless communications of devices and all of the processes are conducted on a server. Therefore, our proposed system can be adapted to popular hand-held devices such as a PDA and a cellular phone, which have not enough capacity. Although overloads of a server are expected, it can be overcome by conventional distributed computing techniques.

The proposed system consists of two components such as the multimedia processing subsystem and the metadata management subsystem. It provides developer with the API that is needed to develop UCC service. The multimedia processing subsystem supports the media management, editing of image and video and multimedia service for UCC. The metadata management subsystem manages metadata, reply and scrap information about UCC.

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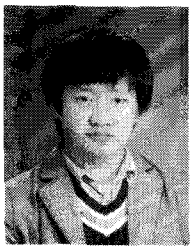

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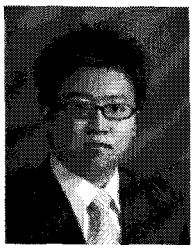

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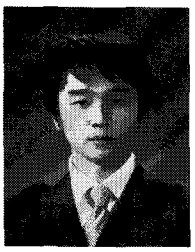

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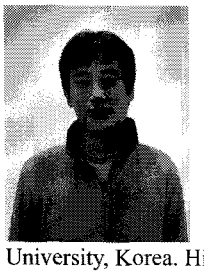

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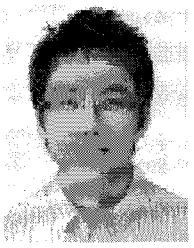

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