MEDIA RELATION BASED AUTOMATIC CONTENT GENERATION METHOD ON SOCIAL P2P NETWORK

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ABSTRACT

Existing social media services are aimed at text based messages and information sharing. Recently, changes in the trend of sharing visual content using a social media service. Users may utilize various visual contents in the social group they belong, can create a new content for their interests.

In this paper, we propose a method to generate a media content automatically using information of media relation. We also design the MC (Media Container) for describing relationship among the media contents, and present a mechanism for combing media contents on social P2P network. The characteristics of social media, new content will continue to be generated, deleted and modified. Thus, the automatically generated media content does not reflect the newly added content for the same interest. In order to supplement these problems, we define the MC scheme to describe information of relationship among the contents using XML format, present the method for dynamically generating media contents with the latest contents which are reflected the user's interest. And through the development of the proto-type application, verify the method for automatic content generation using the MC is defined in this paper.

Keywords: *Auto-generated multimedia content, P2P Network, Social network, Media container, Media relation description*

1. INTRODUCTION

Most of the information exchanged in internet (particularly through social networks) is in the form of multimedia data. Each user in Internet (individuals, enterprises, territorial communities, etc.) becomes producer and consumer of contents. Development and increasing demand for multimedia data offer producers/consumers more choices and opportunities for sharing in collaborative environments [1]. A Social network provides a powerful means of establishing social connections and sharing, organizing, and finding content. Current file or video sharing systems which are mainly organized around content, a social network is organized around users. Video sharing has been an increasingly popular application in social network, enabling users to share their personal videos or interesting videos they found with their friends [2]. However, the development of the social network based video sharing system was elicited the requirements of the large server storage and bandwidth.

In recent years, much effort has been devoted to improving the client/server architecture for multimedia content sharing, with the peer-to-peer (P2P) architecture being the most promising. But, existing unstructured P2P search techniques create huge network traffic or they require high search overhead [3].

In order to overcome the existing social network and P2P limits, research in the fusion between both technologies is taking place steadily. In this paper, we propose the MC that can describe information of relationship among the contents which social network user is owned. Also, we present the method for media relation based automatic content generation on social P2P network. Using proposed method, a user is provided the latest content list which is reflected the user's interest, and creates a new media content using the relationship

information between the content described in the MC.

2. RELATED WORKS

Recently, there are number of studies to improving the client/server architecture for multimedia content sharing with the P2P architecture and social network service. Social networking is an online service, platform that focuses on reflecting of social networks of social relations among people who share interests and/or activities. A social networking essentially consists of a representation of each user (often a profile), his/her social links, and a variety of additional services [4]. Recent studies of P2P systems have provided useful solutions to improve the performance of content management in P2P networks, realizing an advanced method of content management by means of social relations of users on social network [5].

Reza Farahbakhsh [6] proposed a content retrieval method using the characteristics of a social network. The proposed algorithm, named SocP2P, uses social relation of peers to improve content management. SocP2P use interest similarity gestures (exhibited by the fact that both nodes are interested in the same content) to establish P2P links rather than relying on random associations or DHT (Distributed Hash Table) rules. Haiying Shen [2] proposed SocialTube, a novel peer-assisted video sharing system that explores social relationship, interest similarity, and physical location between peers in OSN (Online Social Network)s. SocialTube incorporates four algorithms: a social network (SN)-based P2P overlay construction algorithm, a SN-based chunk prefetching algorithm, chunk delivery, and scheduling algorithm, and a buffer management algorithm. Jung-Tae Kim [4] proposed the Place-Content-Social Network based content sharing model (PCS Model) which supports a sophisticated way of connecting user interests for sharing contents within the boundaries of the locations and social network information. The PCS model also provides a social trust for sharing contents based on the analysis of the attributes of the social contents including the user participation, communication patterns and contents sharing activities called the Social Activities.

The growth of mobile devices is making personalized content aggregation increasingly important. Not only is there increasing demand for timely updates on online information, but power and bandwidth limitations of the devices will require novel retrieval strategies. Retrieval scheduling algorithms could become basic infrastructure supporting the rapidly increasing number of personalized aggregation apps. Dan He [7] proposed a personalized content aggregation model that considers both the new content posting rate and user access rate. Furthermore, that model considers not only the number of missing posts, but also delay time for these missing posts. He proposed an optimal resource allocation algorithm, as well as an optimal retrieval scheduling algorithm to minimize the expected delay time of aggregation over multiple data sources.

If content aggregation from existing services that are already guaranteed in quality and popularity is possible, they easily create new service and quickly deliver lots of contents. Gyubaek Kim [8] proposed a new scheme for the content aggregation. It adopts a method of aggregating contents by category level. He also proposed the ontological categorization to solve that semantic mismatch between aggregating and aggregated categories.

3. MEDIA RELATION BASED AUTOMATIC CONTENT GENERAGTION METHOD

The proposed method for automatic content generation exchanges the content-related information on social P2P network. We defined the MC that is able to describe the content information such as the relationship among the contents, the location of content, and so on. In addition, we present the architecture and mechanism for the automatic generation of new content with the MC.

3.1 Exchange process of the media information in the P2P network

In order to create a new content which a user wants, it is necessary to collect the information of scattered contents. This information is made via sharing the content information that each peer is owned. In this paper, we use a similar structure to the existing P2P service. Figure 1 shows how to interact media contents among the peers.
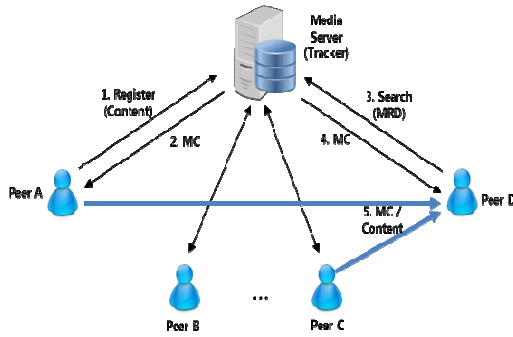
Figure 1: Data flow among the peers

Information exchanging among the peers proceeds in the following steps:

1. A user (Peer A) registers the content information that he/she would like to share with other users to the media server.

2. The media server (Tracker) updates the relationship among the existing contents and new registered content by using the content information. After then, the media server generates the MC that contains the media relation information, and sends the MC to the user (peer A). Through this process, all of the peers have the MC generated by the media server.

3. A user who wants to use the media contents (Peer D) requests the content information corresponding to the media server with his/her interests and content information described in the form of the MRD (Media Relation Description).

4. The media server retrieves the media content information is registered, and returns the set of the MC that contains the corresponding contents information to the user (Peer D).

5. The user (Peer D) requests the media contents to another user who have the media contents (Peer A, C) by using the location information of the content contained in the transmitted MC from the media server.

These processes to register content information and to consume the media contents are similar to the existing P2P Services. The media server performs the same function as the tracker that provides information of content peer in the conventional P2P service.

3.2 Structure of the MC

In the proposed method, the exchange of information among the media server and the peers/the respective peers is performed using the MC. The MC includes the basic information of the media content and the information of relation among the respective contents. Figure 2 shows the components to organize the MC.
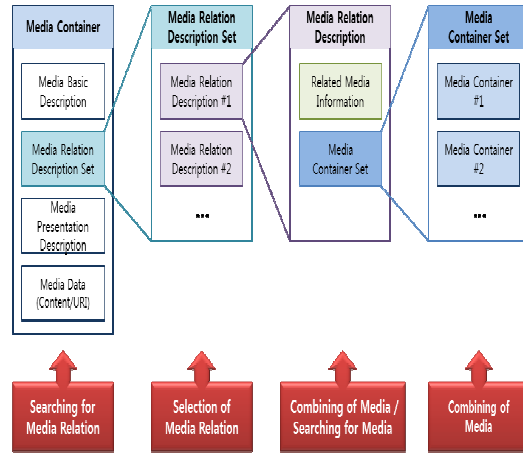

Figure 2: Structure of the Media Container

The MC is composed of Media Basic Description, Media Relation Description Set, Media Presentation Description and Media Data. Media Basic Description describes the basic information of the media contents such as media content title, keyword, creator, creation time, creation location and so on. These elements described in Media Basic Description are used important factors to determine the relation among the media contents. The MRD Set is composed of the independent MRDs. The MRD is made of the Related Media Information to describe the relation among the media contents and MC set which include the information of selected media contents. The Related Media Information is used to describe user's interests and the content information wanted by user. The media server can generate relations between each media contents by using the Related Media Information. The MC Set in the MRD contains the media location information which can be provided with the media content. Media Presentation Description is described information for playing the media content, Media Data is included information about the peer to provide the actual location of the media content. A user can consume the media content desired using these information.

Each component constituting MC is composed of a repetitive structure. It is possible to use these structural characteristics, describing the complex relation among the media contents. A user can be provided a list of media content about his/her

interest by using a seed MC which contains the MRD.

3.3 Mechanism of Content Generation

The proposed method for automatic content generation is composed the media server that manages/provides the content information, the content provider which provides actual media contents and the content consumer which consume the actual media content and the content information. Figure 3 shows the mechanism of this method.
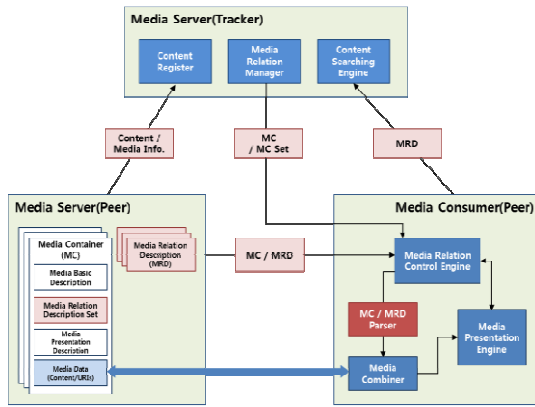

Figure 3: Mechanism of the proposed method

The media provider has the actual media content. All media contents are described in MC type through the registration to the media server. When the media provider receives request message from the media consumer, the media provider provides the actual media content to the media consumer. When the media server receives a registration request for the media content from the media provider, the media server generate the MC by using the information of the media content and returns it. Every MC has been given a unique ID, and is managed by the media server.

If the media consumer requests the media content information to the media server with the MRD, the media server retrieves the content information using the MRD received from the media consumer, and sends the MC that contains the selected media content information to the media consumer. MC is possible to contain ranking information of contents.

The media consumer can request the actual media content to the media provider using the media location included in the MC. Media Combiner combines the content received from each of the media providers, and generates a new content. When creating new content, the Media Combiner can take advantage of ranking information described in the MC.

The media consumer can be provided on a regular basis latest MCs from the media server using by the MRD include in the MC. By utilizing this, the media consumer can always maintain a content that is automatically generated to reflect the most recent media content. The MC has been described the basic information for one of the media content, Also, The MC may include the MRD set containing the information of the relationship among their content and the other contents and MC set that is detected by using the MRD. By utilizing the structural characteristics of the MC, users can be configured for various services.

4. IMPLEMENTATION

As described in the previous section, we have presented the method for generating new content that user's interest through the exchange with relationship information of content. We have defined the scheme of MC to describe relationship information of content using the XML format [9] [10] [11]. Also, we have developed an application to visualize relationship information among the contents that describe with the MC. The MC include the information of connection strength which is calculated the similarity between the relationship information of contents.

4.1 Scheme of the MC

We have designed the MC to describe the basic information of the media content, the relationship information among the media contents and the location information of actual media content based on the relationship information of the media content. We define MC including the MRD proposed in this paper using XML Scheme. Figure 4 shows scheme of the MC.
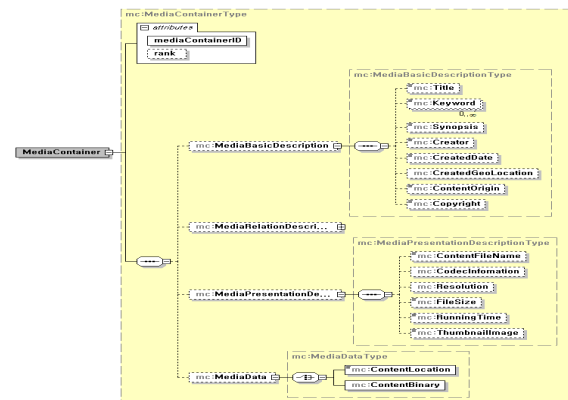

Figure 4: Scheme of the Media Container

The MediaContainer element serves as the root element of the MC format. This root element should be used as the topmost element in all information transmitted among the peers. The MediaContainer element provides individual description for the media content. The MediaContainer element composes with MediaBasicDescription, MediaRelationDescription, Media PresentationDescription and MediaData sub elements.

Table 1: Semantics of the element in the MC

Name	Definition
MediaBasic Description	Specifies the basic information of the media content such as title, keyword, synopsis, creator, creation date, created geo-location, content origin and copyright.
MediaRelation DescriptionSet	Set of MRD that describes the relationship information among the contents.
MediaPresentation Description	Specifies the information for presentation of the media content such as file name, codec, permitted resolution, file size, running time and thumbnail image.
MediaData	Specifies the physical information of the media content such as content location or content binary. It can be describe the interface to request the media content.
mediaContainer ID	Attribute for unique ID of the media container. It is mandatory attribute.
rank	Attribute to describe the information of connection strength which is calculated the similarity between the relationship information of contents. It is optional attribute.

The MRD is made of the related media information to describe the relationship among the media contents and MC set which include the information of selected media contents. The related media information is used to describe user's interests and the content information wanted by user. Figure 5 shows scheme of the MRD.
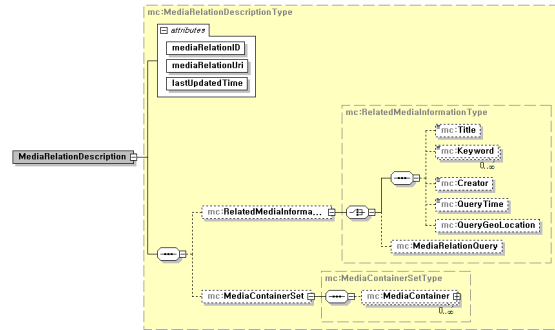
Figure 5: Scheme of the Media Relation Description

The MediiaRelationDescription element should be used as the root element to request the information of media contents to the media server or to response result of searching media contents from the media server. The MediaRelationDescription element composes with RelaedMediaInformation and MediaContainerSet sub elements.

Table 2: Semantics of the element in the MRD

Name	Definition
RelatedMedia Information	Specifies the relationship information of the media content. It can be describe classification for the media contents or a set of searching conditions such as keyword, creator, query-time, created geo-location and media relation query (i.e. MPQF [12] [13] [14], XQuery [15]).
MediaContainer Set	Specifies the MC set that include searching result of the media contents.
mediaRelation ID	Attribute for unique ID of the media relation information.
mediaRelation Uri	Attribute to describe the URI that is a location of the MRD.
lastUpdated Time	Attribute for latest updated time of the MRD.

4.2 Description of media contents ranking

The MC should be express the information of connection strength which is calculated the similarity between the relationship information of contents. The methods to get the degree of similarity are existed several ways. In this paper, we adopted the cosine similarity method which is the most widely used and high reliability [16] [17] [18].

The cosine similarity between two vectors is a measure that calculates the cosine of the angle between them defined by the equation (1).

$$similarity = \frac{A \cdot B}{\|A\| \|B\|} = \frac{\sum_{i=1}^{n} A_i B_i}{\sqrt{\sum_{i=1}^{n} A_i^2}\sqrt{\sum_{i=1}^{n} B_i^2}} \quad (1)$$

Ai and Bi are components of vector A and B respectively. The attribute vectors A and B are the term frequency vectors of the relationship information which are included the each media content. The ranking information, which is calculated the similarity between the relationship information of the media contents by the cosine similarity method, should be used to create a new media content.

4.3 Visualization of the media content relation
We have developed an application to visualize the connection relationship between the media content described using the MC that has already been defined.

Figure 6: An application to visualize the media content relationship

Figure 6 shows a keyword-based content relationship in Korean baseball domain. It is possible to create new content by connecting the related contents depicted in figure 6.

5.   CONCLUSIONS AND FUTURE WORKS

In this paper, we have proposed a method to generate a media content automatically using information of media relation. We have designed the MC for describing relationship among the media contents, and presented a mechanism for combing media contents by using the MC. In addition, we have defined the structure of the MC including the MRD using XML Scheme. And through the development of the proto-type application, verify the method for automatic content generation using the MC is defined in this paper. By using the MC and method for the automatic media content generation to be proposed in this paper, it can be applied to various services on social P2P network.

This paper was not treated some issues such as a content sharing among the heterogeneous social services, and so on. Such issues would proceed to feature works.

REFRENCES:
[1] Solomon Asres Kidanu, Yudith Cardinale, Gilbert Tekli and Richard Chbeir, "A Multimedia-Oriented Digital Ecosystem: a New Collaborative Environment", Computer and Information Science (ICIS), 2015 IEEE/ACIS 14th International Conference, 2015, pp. 411-416.

[2] Haiying Shen, Ze Li, Yuhua Lin and Jin Li, "SocialTube: P2P-Assisted Video Sharing in Online Social Networks", IEEE Transactions on Parallel and Distributed Systems, Vol 25, 2014, No. 9, pp. 2428-2440.

[3] Y. Huang, Z. Fu, D. Chiu, C. Lui and C. Huang, "Challenges, Design and Analysis of a Large-Scale P2P VoD System", in Proc. SIGCOMM, 2008, pp. 375-388.

[5] S. Buchegger and A. Datta, "A case for p2p infrastructure for social networks - opportunities & challenges", WONS '09, 2009.

[6] Reza Farahbakhsh1, Noel Crespi1, Angel Cuevas1, Sraddha Adhikari1, Mehdi Mani and Teerapat Sanguankotchakorn, "socP2P: P2P Content Discovery Enhancement by considering Social Networks Characteristics", 2013 IEEE Symposium on Computers and Communications (ISCC), 2013, pp. 530-533.

[4] Jung-Tae Kim, Jong-Hoon Lee, SangWook Kim and Ik Kyun Kim, "Social Content Sharing Model and System based on User Location and Social Network", 2013 IEEE Third International Conference on Consumer Electronics - Berlin (ICCE-Berlin), 2013, pp. 314-318.

[7] Dan He and Douglass S. Parker, "Optimized Retrieval Algorithms for Personalized Content Aggregation", Information Reuse and Integration (IRI), 2013 IEEE 14th International Conference, 2013, pp. 270-277.

[8] Gyubael Kim, "A Content Aggregation Scheme through an Ontological Cateegorization", Services Computing Conference (APSCC), 2011 IEEE Asia-Pacific, 2011, pp. 239-242.

[9] XML Schema Part 0:Primer, W3C Recommendation 2 May 2001, available at http://www.w3.org/TR/2001/REC-xmlschema-0-20010502.

[10] XML Schema Part 1:Structures, W3C Recommendation 2 May 2001, available at http://www.w3.org/TR/2001/REC-xmlschema-1-20010502.

[11] XML Schema Part 2:Datatypes, W3C Recommendation 2 May 2001, available at http://www.w3.org/TR/2001/REC-xmlschema-2-20010502.

[12] Shaolong Zhang, "A MPQF-Based Multimedia Database Retrieval System", Inforamtion Science and Technology (ICIST), 2012, pp.389-392.

[13] M. Gruhne, R. Tous, M. Dller, J. Delgado, and H. Kosch, "MP7QF: an MPEG-7 Query Format", In The 3rd International Conference on Automated Production of Cross Media Content for Multi-channel Distribution (AXMEDIS 2007). Barcelona, Spain, 2007, pp.15-18.

[14] M. Dller, R. Tous, M. Gruhne, K.Yoon, M. Sano, and I.S. Burnett, "The MPEG query format: unifying access to multimedia retrieval systems", IEEE MultiMedia, vol. 15, no. 4, 2008, pp. 82-95.

[15] W3C, "XML Query (XQuery)", W3C, Availble: http://www.w3.org /TR/xquery/, 2011.

[16] Huang. A., "Similarity Measures for Text Document Clustering", In Proc. of the Sixth New Zealand Computer Science Research Student Conference, 2008, pp.49-56.

[17] Tan, P., Steinbach, and Kumar, V., Introduction to Data Mining, Addison Wesley, 2007.

[18] Baeza-Yates, R. and Ribeiro-Neto, B., Modern Information Retrieval, Addison Wesley, 1999.