RESEARCH ARTICLE OPEN ACCESS

Metadata Based Approach For Web Multimedia Model

Siddu P. Algur[1], Basavaraj A. Goudannavar[2], Prashant Bhat[3]
Professor[1], Research Scholar[2*], Research Scholar[3]
Department of Computer Science,
Rani Channamma University, Belagavi
Karnataka - India

ABSTRACT
Due to the rapid growth of digital information over the Internet, it is becoming very important to extract useful information from web multimedia data. The WWW (World Wide Web) provides a simple and effective means for users to retrieve multimedia data on the Internet. Nowadays web multimedia data are used in a much more natural and mature way. Rapid increase in the huge amount of multimedia data over the internet, there is emerging trend to study, modeling and retrieve, and mining the multimedia data from the internet. Due to complex and unstructured nature of the web multimedia data, it is difficult for mining and processing effectively. To overcome from this problem, this paper proposes a new web multimedia data model for presenting web multimedia data components integrating large amounts of data of different types such as text, images, video and audio, with its metadata values for mining and processing web multimedia data effectively.
Keywords:- Web Multimedia, Web Multimedia Model, Multimedia Metadata.

I. INTRODUCTION

The advances in computer and network infrastructure together with the fast evolution of digital data are resulted in the growth of attention to the digital multimedia development over the web. The scientific community has increased the amount of research into new technologies, with a view to improving the digital web multimedia utilization: its archiving, indexing, accessibility, acquisition, store and even its process and usability. All these parts of the web multimedia utilization lead to the necessity of the extraction of all important information of web multimedia by means of lack of metadata. Over the last few years there has been observed an increasingly use of web multimedia data in the collection of web digital libraries. This fact automatically requires not only the transmission but also the store and the process of the relevant information are essential [1].

Web digital libraries evolved from traditional libraries during the information age, have become important platforms for information retrieval from the Internet. However, due to the rapid expansion of multimedia data in the collection of web digital libraries, such as text documents, video, audio and image data, traditional information retrieval approaches became inadequate to the management of large unstructured multimedia data. The reasons are-firstly, support of interaction with multimedia data is insufficient. Users are usually passive roles only provided with one-way access to multimedia data. Even though web multimedia data carry a rich amount of information, difficulty has been acknowledged in systematic management of such unstructured data. Secondly, there are models that associate web multimedia data with the keywords for information management and retrieval, where web multimedia data are often stored as object attributes with low granularity, which is prone to cause data redundancy and can hardly support content-level information retrieval. Thirdly, distributed structure, considered as one of the optimal solutions for developing search engines [2][3], with advantages in information retrieval from massive data, is also facing a big challenge in the efficient organization and management of web multimedia data. For web digital libraries, an effective way of managing multimedia data has to be able to automatically handle the embedded information in its content. In traditional libraries, users can find desired objects from the multimedia archives by using indexing tools like cards. By analogy with that, a structured index can also be established for the content of web multimedia data in web digital libraries, so that the embedded information can be exposed for retrieval, and un-ordered multimedia data can be translated into index-based data which is more suitable for storage and access control with fine granularity. Therefore, proper data models are needed for organizing and managing massive web multimedia data, which should be able to provide web multimedia information retrieval service for web

digital libraries by means of multimedia metadata and multi-level semantic data mining. In response to such need, this paper proposes an efficient data model for web multimedia data by means of multimedia specific metadata.

II. RELATED RESEARCHES

A framework for customizable metadata authoring that addresses the issues and challenges is described by the authors Valentina Malaxa and Ian Douglas [3], and observed that, there is an obvious requirement for metadata as a means for exchange, discovery, and sharing of digital objects. Metadata is used by the applications, repositories, content creators, and system developers. In environments in which there are potentially huge amount of objects available, the metadata must be sufficient, effective, accurate, and complete. This observation has identified challenges related to users' needs, metadata standards, and learning environment and proposed solution these challenges. Users require better interfaces to support their goals and better guidance than that available in standards documentation. During this research, collaborative editing was identified as being one of the critical features in achieving quality metadata.

Multimedia storage structure and data organization methods are the key technology affecting the development of the digital library [4]. This designs a novel data model, and efficiently realizing the organization of multimedia data. The innovation point expresses as: It provides different fine granularity control on the media content, and sharply reduces the information redundancy within the media and among the medias, meanwhile better support the content-based retrieval with enhances the ability of abstraction and generalization of the model, which can support a variety of media objects, studio, or the performance of the query.

Andreas Pleub [5] presented a model-driven development approach for interactive multimedia applications. It consists of the Multimedia Modeling Language (MML) and automatic transformations into code skeletons for different platforms. MML is platform independent and bases on existing modeling approaches like UML, user interface modeling approaches, and multimedia modeling. The resulting modeling language provides support for integration of software design, media design, and user interface design. In addition, it allows modeling advanced concepts of media objects, such as interactivity and dynamic alterations. Both, models and transformations, are defined in compliance to the concepts of Model-Driven Engineering.

The author Hasan Harasis [6], proposed an efficient interactive model for multimedia application. This model combines the advantages of aspect programming and objects oriented programming. As a result, our proposed model applies a structure for multimedia applications that has good reutilisation of code in other applications and objects storage in databases. In this approach, the time required for realization of an entire multimedia application was decreased and the size of the executing file became smaller. Using this model it is possible to develop very efficient multimedia applications [6].

The authors Patrizia Asirelli [7], proposed an initial prototype version of the infrastructure has been developed that integrates the prototype versions of the MPEG-7 feature extraction and database units. This prototype was demonstrated some of the technical challenges faced in integrating multimedia metadata. On the whole, the architecture proposed here enables media to be combined and managed [7]. In addition valuable semantic services can be supported, such as semantic search and retrieval, algorithm discovery and application and semantic annotation.

The emerging standards of SMIL, SVG and MPEG-4 provide a new process for authoring and presenting multimedia documents, also known as multimedia integration and synchronization. It introduces a new multimedia type which enables the integration of a rich set of media into more complex structures and provides news interaction capacity in multimedia presentations. Macromedia Director, MPEG-4 and X-SMIL can be used for this purpose. These tools provide a sophisticated high level graphical editing interface like timeline and layout views for integrating and synchronizing a set of media. However all of them still require the author a long and relatively complex authoring process, especially when fine-grained synchronization is desired. For example, an author wants to display a text introducing a character in a video when this character occurs on screen. The authoring process requires the manual determination of the temporal information, the begin time and the stop time, of the appearance of the character in the video and the absolute temporal placement of the text along with this temporal information. The difficulty involves the effort taken to determine temporal information inside the video, because current multimedia authoring tools do not support media content analysis and visualization of high level content structures of video. It becomes more complex when making a hyperlink on the video character or making a text following the video character because the author needs to determine not only temporal information but also spatio-temporal information of the character. At this point, the most important standard multimedia integration model SMIL fails to integrate these specification needs. However, it has been observed that, following are the several limitations of the existing models [8].

- ✓ The existing models do not address how to extract the search items from the web multimedia files/data.

- ✓ Extraction of audio and visual information from web multimedia files is time consuming.
- ✓ Retrieval of video clip segment from web multimedia is very tedious work.
- ✓ Retrieval of images from web multimedia data is requires more time.

Manual extraction of the features of web multimedia is time consuming

III. THE PROPOSED WEB MULTIMEDIA DATA MODEL

The objective of the proposed model is to extend the limitations to the existing multimedia model. To meet scope of the proposed model, the model extend its limit to multimedia object-specific metadata. The web multimedia data is composed of four basic objects- text, image, audio and video. Each web multimedia object has metadata values, a logical structure and an interpretation of the content for that value. The metadata value of a web multimedia object must be described in the web multimedia data model. The Fig.1 shows the proposed web multimedia model, which describes multimedia objects and its structure with metadata repository.

This model can be used to decompose the web multimedia data into its basic objects- text, image, audio and video, also the model extracts web multimedia object specific metadata and stores in a repository using appropriate available tools, so that the mining task will be effective and efficient for knowledge discovery. There could be sufficient metadata or insufficient metadata for multimedia objects. If sufficient metadata are available for the web multimedia objects, then knowledge discovery will be more effective. There are many tools available to decompose the web multimedia object meaning that, it is possible to retrieve individual components/object from multimedia data. To separate and extract audio and video from audio-visual data, a tool called, 'Oxelon Media Converter', can be used, also to extract images from video data; 'XVideo Converter' tool is available. The web multimedia text object has text specific metadata such as, language of the text, font information, quality of the text, number of lines and characters etc. The web multimedia image object has image specific metadata such as, image format information, resolution, dimension, compression, color mode etc. To extract text metadata, a 'Metadata Extraction Tool' is available which is developed by National Library of New Zealand.

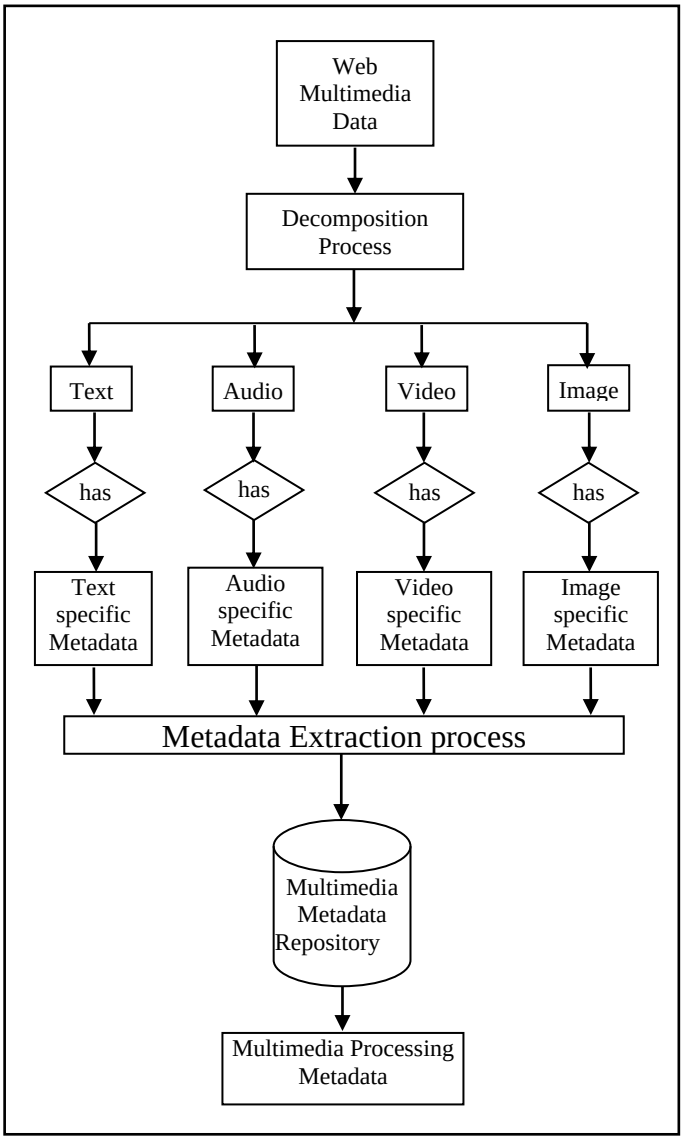

Fig.1: Proposed Web Multimedia Model

The web multimedia video object has three types of video specific metadata- technical metadata, web metadata as well as descriptive metadata. The technical metadata includes format and structural information about the video object, such as- format, bit rate, resolution, aspect ratio etc. The web metadata includes both implicit and explicit metadata such as- URL and website information, ratings, likes, dislikes comments etc. The descriptive metadata of web multimedia object includes descriptions and summary about the content of the object. To extract video specific metadata, 'MediaInfo', 'InfoExtractor' tools are available. Similarly, the web multimedia audio object has audio specific metadata such as- audio track information, audio bit rate, channel information, duration of the audio etc. To extract audio specific metadata, MediaInfo tool is helpful. Further, all types of metadata are

stored in a repository for processing and mining web multimedia data.

IV. A DOMAIN SPECIFIC APPLICATION OF PROPOSED MODEL

The proposed web multimedia metadata model has been designed as the assembly of modules dedicated to the description of separable aspects of an object's description. Some modules are centered on web multimedia object specific metadata. In the following, we concentrate on metadata for news video object; however, these characteristics can be generalized to other video domains. The news domain application of proposed model is presented in Fig.2. The domain specific model use to present the main concepts with their attributes and relationships.

The news domain describes the common features of multimedia objects. In this section we focus on news video object, by showing how objects of video data have relations among remaining multimedia objects (one-to many relationship) using descriptive metadata. For example, the audio in video object may have relationship with multimedia audio object; the texts in video object may have relationship with multimedia text object; the resolution of video object has relationship with multimedia image object, etc. For the personalization system to purpose, we require acquisition of structural and satisfied metadata describing the news sectors. In our model, this is captured by reading the close description text metadata. A more suitable approach of obtaining this metadata is directly from the news providers. User Metadata Since we use cognitive filtering, our user profile corresponds closely to metadata available for each news segment (i.e., user metadata are nearly identical to content metadata). We thereby choose a descriptive user profile constructed by observing user manipulations of previously constructed news story sequences.

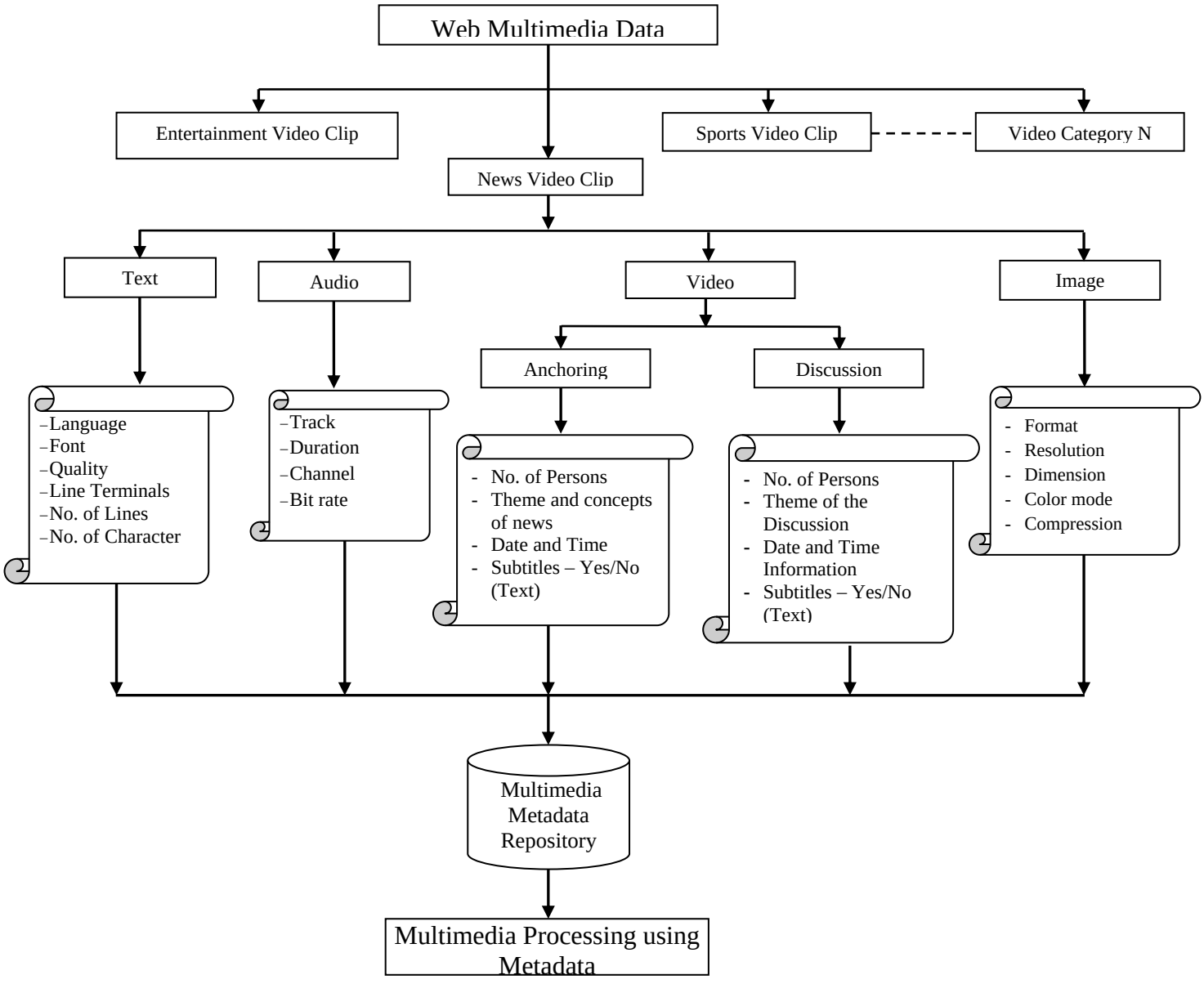

Fig.2: Metadata based Web Multimedia Model for News Domain

For these users descriptive metadata such as audio, text, and video also have the additional attributes of playout times and required bandwidth associated with them. It thus becomes necessary for the system to be aware of the timing and bandwidth characterizations of a multimedia object when requested, so that appropriate resources can be reserved to ensure the timely delivery of data. The use of metadata to support database browsing or personalization functions is significant due to the potential bandwidth used in video delivery.

V. CONCLUSIONS

In this paper, we proposed an effective and efficient web multimedia data model by reviewing the existing multimedia models and their limitations. Using different available tools, the proposed model decomposes the multimedia data into its basic components- text, image, audio and video and extracts respective appropriate metadata for basic components for multimedia processing and mining purpose. To demonstrate the proposed model, a domain specific illustration is presented for news video domain.

REFERENCES

[1] Dim P. Papadopoulos, , Vicky S. Kalogeiton, Savvas A. Chatzichristofis, Nikos Papamarkos, "*Automatic summarization and annotation of videos with lack of metadata information*" Elsevier http://www.elsevier.com Volume 40, Issue 14, 15 October 2013, Pages 5765–5778.

[2] Brunelli, R., Mich, O., Modena, C.M.: A survey on the automatic indexing of video data. Journal of Visual Communication and Image Representation. 10(2), 78-112(1999).

[3] Valentina Malaxa, Ian Douglas *"A Framework for Metadata Creation Tools",* Interdisciplinary Journal of Knowledge and Learning Objects Volume 1, 2005.

[4] Lin Liu, "A Data Model with Multimedia Retrieval", The Third International Conferences on Advances in Multimedia, IARIA, 2011. ISBN: 978-1-61208-129-8. Advanced Science and Technology Letters Vol.48 (CIA 2014), pp.47-50. ISSN: 2287-1233.

[5] Andreas Pleuß , "Model-Driven Development of Interactive Multimedia Applications Towards Better Integration of Software Engineering and Creative Design", München, den 25. Februar 2009.

[6] Hasan Harasis, "New Interactive Multimedia Application Model Using Objects Storage In A Database", Journal of Theoretical and Applied Information Technology, 20th February 2014. Vol. 60 No.2, ISSN: 1992-8645, E-ISSN: 1817-3195.

[7] Patrizia Asirelli, Suzanne Little, Massimo Martinelli and Ovidio Salvetti, "MultiMedia Metadata Management: a Proposal for an Infrastructure", MultiMedia Metadata Management: a Proposal for an Infrastructure, submitted SWAP 2006.

[8] Tien Tran-Thuong, Cécile Roisin, "Multimedia Modeling Using MPEG-7 for Authoring Multimedia Integration", *MIR'03*, November 7, 2003, Berkeley, California,
USA. 2003 ACM 1-58113-778-8/03/0001.

BIOGRAPHIES

Mr. Basavaraj A. Goudannavar is pursuing Ph.D programme in Computer Science at Rani Channamma University Belagavi, Karnataka, India. He received BCA and MCA degrees from Karnatak University, Dharwad, Karnataka, India, in 2005 and 2008 respectively. His research interest includes Data Mining, Web Mining, Web multimedia mining, and Knowledge discovery techniques. He published 02 research papers in International Journals and International conferences He has attended and participated in International and National Conferences and Workshops in his research field.

Mr. Prashant Bhat is pursuing Ph.D programme in Computer Science at Rani Channamma University Belagavi, Karnataka, India. He received B.Sc and M.Sc (Computer Science) degrees from Karnatak University, Dharwad, Karnataka, India, in 2010 and 2012 respectively. His research interest includes Data Mining, Web Mining, web multimedia mining and Information Retrieval from the web and Knowledge discovery techniques, and published research papers in International Journals. Also he has attended and participated in International and National Conferences and Workshops in his research field.

Dr. Siddu P. Algur is working as Professor, Dept. of Computer Science, Rani Channamma University, Belagavi, Karnataka, India. He received B.E. degree in Electrical and Electronics from Mysore University, Karnataka, India, in 1986. He received his M.E. degree in from NIT, Allahabad, India, in 1991.He obtained Ph.D. degree from the Department of P.G. Studies and Research in Computer Science at Gulbarga University, Gulbarga.

He worked as Lecturer at KLE Society's College of Engineering and Technology and worked as Assistant Professor in the Department of Computer Science and Engineering at SDM College of Engineering and Technology, Dharwad. He was Professor, Dept. of Information Science and Engineering, BVBCET, Hubli, before holding the present position. He was also Director, School of Mathematics and Computing Sciences, RCU, Belagavi. His research interest includes Data Mining, Web Mining, Big Data and Information Retrieval from the web and Knowledge discovery techniques. He published more than 40 research papers in peer reviewed International Journals and chaired the sessions in many International conferences.