Managing Multimedia Data: A Temporal-Based Approach

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Abstract

Implement a proper method in multimedia data management is important to support multimedia application's domain. The method is to ensure that the process of data store, retrieving and manipulation in a distributed environment can be conducted in an efficient manner. A reliable or appropriate format of record structure in multimedia data management tool is required in order to trace validation and transaction of multimedia data. Hence, the concept of temporal database can be applied to overcome this situation. The paper presents the development of the temporal based multimedia data management model. The two elements of time will associate into the model to fulfill the requirement. Transaction time and valid time will monitor the changes (event) and transaction that happen to the multimedia data stored in a database. The use of time elements provided a new schema to query multimedia data based on past, current and future time. The designed model is implemented under web services based environment by utilizing J2EE platform. Applying this implementation approach is believed to provide application sharing under multiple environments, reduce complexity and cost savings.

Keywords: *Multimedia database, temporal database, multimedia data management, web services*

1. Introduction

Database is defined as a software system to organize, store and retrieve large amounts of data easily. Database management system is measured based on storage capability, indexing technique and classification technique. Classification involves the process of data categorization and development of data hierarchy. The process of sorting data based on some key or feature indications is performed during an indexing process. These techniques are used to support primitive database operation such as retrieve, update, insert and delete. All the technique mentioned above will affect faster browsing, faster query and reduce time usage.

The conventional database management system (DBMS) stored information that always considers being true or valid at the current time. Old data or previous data are no longer available or overwrite by a new data during update process [1]. Temporal database is known as a time-oriented database that involves the use of time elements associated with the object in a database. In a temporal database which supported time-varying information, the used of time elements capable to maintain and stored old and new data. A time element is stamped into a database or table to monitor the changes (event) and transaction that happened to the data. Previous, present and future data can be retrieved based on user requirement. The time elements considered in a temporal database are transaction time and valid time [2, 3, 4, 5, 6].

In general, the definition of valid time and transaction time are as follows [2, 5, 7]: *Transaction time* is the actual time recorded in the database at the time the data is entered and *valid time* is the actual or real world time at which point the data is valid. In other words, valid time is the time when the data was entered becomes true or takes effect to the domain of application.

Based on the two time elements stated above, temporal database can be divided into three types. Firstly, rollback database is a database that contains the transaction time only [8, 9]. It supports the recording of past and present data because a transaction time value cannot be after current time. Historical database contains valid time only [8, 9]. It relate to the past, present or future facts in reality. The database that contains both transaction time and valid time is called bitemporal database[8][9]. In various temporal research papers the theory of time-element can be divided into two categories: intervals and points [3, 5, 10]. If T is denoted a nonempty set of time-elements and d is denoted a function from T to R+ which is the set of nonnegative real numbers then: t is classified as an interval if d(t) > 0 and otherwise, t is classified as a point. According to this classification, the set of time-elements, T, may be expressed as $T = I \cup P$, where I is the set of intervals and P is the set of points.

To extend the scope of temporal dimension, [11] have presented a model which allows relative temporal information e.g., "event A happened before event B and after January 01, 2012". [11] have suggested several temporal operators could be used in describing the details of relative temporal information. Those operators are equal, before, after, meets, overlaps, starts, during, finishes, finished-by, contains, started-by, overlapped-by, met-by and after.

There are two main approaches for modeling temporal database: tuple time stamping and attribute time stamping [8, 10]. In the tuple time stamping, time varying attribute is represented together with non-temporal attribute or gathered into separate relation to reduce data redundancy. Tuple time stamping uses First Normal Form (1NF) relation concept to represent the data model. In the case of attribute time stamping, the concept of None First Normal Form (N1NF) relation is used. Here, time elements are attached to each attribute value [8, 10, 12]. Using attribute time stamping approach, the entire data and history about object can be stored in one tuple. Each value in a tuple are not affected by update process do not have to be repeated.

Temporal database researchers try to standardize and put temporal database theory into practice. [13] underlined that three approaches can be applied in developing of temporal database:

- Use the type date provided by a non-temporal (any commercial) DBMS and build temporal support into application.
- Extend a non temporal data model to a temporal data model by embedding time attributes to each data.
- Develop a new temporal database system from scratch.

The first and second approaches are very practical and utilized by the [14, 15, 16] application model. Both approaches do not change the existing database technology. It just creates a new method to support temporal application on top of existing non-temporal DBMS. [14] thought that change request process in a software life cycle should have its own valid time and transaction time for the retrieval efficiency and valid time recognition purpose. There are many applications that can benefit from a temporal database such as in financial, insurance, medical, reservation and inventory system. Table 1 presents the comparison between conventional database and temporal database.

Table 1. Comparison of Conventional Database and Temporal Database

Conventional Database	Temporal Database
Overwrite previous data	Retain previous data
Changes are viewed as modifications to the state in database	Changes are viewed as additional to the state in the database
Considers data that being true or valid at the current time. No information about the past data	Incorporate time dimension in the system to monitor the changes that happened to the data
Efficient access to present or current states	Efficient access to past, present and future states

In this paper we are intent to introduce a new model for multimedia data management which integrates with temporal elements. This paper is organized as follows. The related works of the multimedia data management application are placed in Section 2. This section discusses and defines several weaknesses exist in the related work. Section 3 presents the proposed model. Section 4 describes the development architecture of the proposed model under web services environment. Last section will conclude the research work.

2. Multimedia Data Management Systems

Multimedia data management systems already existed whether in heritage artifacts, medical environment, military or phone mobile. Multimedia data can be represented as digital images, audio, video, animations and graphics together with text data [17]. Multimedia data contains an enormous amount of information. This information is in the form of identifiable "features" in the multimedia data. Video data contains timing data that can be used to track the movement of an object from frame to frame. Meanwhile, audio data contains certain identifiable features such as words, sounds, pitches and silent period [18].

The explosion of multimedia content in various aspects such as in databases, broadcast and streaming media has generated new requirements for more effectiveness access to these global information repositories. Issues relate with multimedia data management systems are always focusing on the multimedia data modeling, huge capacity storage management, information retrieval capabilities, media integration and presentation. Each type of multimedia data requires a different method of stored and amount retrieval. An efficient multimedia data management is highly required because it will improve the process of multimedia information discovery especially for decision making application, business marketing and intelligent system [1].

Multimedia database management system support facilities for the indexing, storage, retrieval and provides a suitable environment for using and managing multimedia data. In 1987 first multimedia database system ORION was developed for storing and querying proposes. The role of MDMS is still in the early stages until in 1996, the evolution of MDMS happened where the research and development activity become active [19]. The performance of MDMS is enhanced to support complex function such as in indexing and classification to ease multimedia data retrieval. Table 2 summarizes several previous works of multimedia data management system.

From the study done, we are realizing that the huge size of multimedia data requires an effectiveness technique to ensure the data management process can be executed efficiently. Most of the researchers tried to define various ways of how to manage multimedia data but they do not apply the temporal concepts in it. We have found several weaknesses in current multimedia data management model such as:

- The models are developed based on snapshot relation. The existing data value is overwritten by a new incoming value during update process.
- The models do not consider temporal elements (transaction time and valid time) to monitor all the changes occurred to multimedia data stored in a database.
- All the history data in the database cannot be organized and traced based on time-information data.

Table 2. Several Previous Work of Multimedia Data Management System

Author/Year	Aim	Method/Implementation
H. Xu, H. Qin and M. Li (2009) [20]	Proposed web services application which can be accessed by user trough wired and wireless technology. The system handled text based data.	Four-tiered web-based client-server architecture was adopted. Every module of the system can be access by user through PCs and PDAs.
Ogescu, C., Plaisanu, C. and Bistriceanu, D. (2008)[21]	Developed web based clinical portal (MIDAS) oriented on managing medical data (text and images).	The MIDAS tool provides medical information and medical case studies in order to optimize the diagnosis and decision process. The registered user can update profile, can register new medical cases, can view favorite cases and can upload significant medical images to describe the case.
S. Cosmin Stoice (2010) [22]	Proposed system that presented the performances of a MMDBMS when executing text-based and content-based queries of medical image.	The execution time was measured for SELECT operations over a database containing 10 records, 50, 100, 1000, 2000, 5000, 10 000, 50 000 and 70 000 records.
Shahiduzzaman M. M, N. Mahmuda and U. R. Akond Ashfaque (2010) [23]	Provides new technique in captures, upload and download image or video. The proposed technique increased the storage capacity and provides the benefits of security and portability.	Used J2ME application by extending Input Stream, Output stream and RMS in order to support storing, uploading and downloading images and video files.

3. Temporal Based Multimedia Data Management Model (TempMD)

This research is trying to introduce a new model of multimedia data management model that integrates with temporal elements by extended RDBMS software platform. The proposed model used *Tuple Timestamped Single Relation* (TTSR) [10] approach. The continuously of changes happened to multimedia data will be stored without deleting the old version. The collection of changes happened to multimedia data should be organized into a systematic way for the purpose of retrieval and valid time recognition. The temporal elements are added as an additional attribute in relation to ensure the user will get the up-to-date of multimedia data. Temporal database systems keep the evolution of data during insertion and updating process by associating timestamps to them [24]. In this context, temporal multimedia data management aspects are including:

- The capability to detect the amount of changes in a multimedia data over a certain period.
- To keep track of all the transactions and history status of the multimedia data based on past, present and future.
- To enhance the query of multimedia data based on time dependencies.

3.1. Modelling the TempMD

Two (2) elements of time is proposed in the model are transaction time (tt) and valid time (vt). Time element unit is considered in the format of [day/month/year]. Regarding to the proposed model, transaction time represents the transaction date when multimedia data is recorded into a database. The transaction date is recorded during insertion and updating process. Valid time represents the valid period for the multimedia objects stored in the database. This valid period is changed when the object stored in a database is modified or edited. In the model, valid time involves a time interval, and can be categorized into two (2) different attributes known as valid-from and valid-until, vt = [vt-from, vt-until]. The valid time will be combined with a set of temporal operators which can be denoted as, OP = $\{op_1, op_2, \ldots, op_n\}$. The proposed model considered only five (5) temporal operators; equal, before, after, meets and met_by. Figure 1 shows the conceptual of temporal elements embedded in multimedia data management.

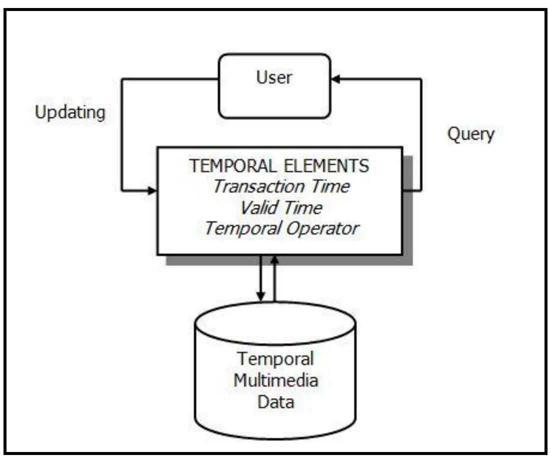

Figure 1. The Conceptual of TempMD

Let I the time interval, then Table 3 and Figure 2 illustrate the definition of each temporal operator used in the model. The state of temporal operators based on a defined time interval τ_i can be best described as in Figure 2. The figure depicts the general definition of a temporal operator used based on a period of time (time interval, I). Equal, after and meet_by operators are used together with the start date. On the other hand, equal, before and meets operator are used together with the end date.

Table 3. The Definition of Temporal Operators based on Time Interval

The operators	Definition
Equal	$\tau = \{(\tau = \tau_i) \in I\}$
Before	$\tau = \{(\tau < \tau_i) \in I\}$
After	$\tau = \{(\tau > \tau_i) \in I\}$
Meets	$\tau = \{(\tau \leq \tau_i) \in I\}$
Met_by	$\tau = \{(\tau \geq \tau_i) \in I\}$

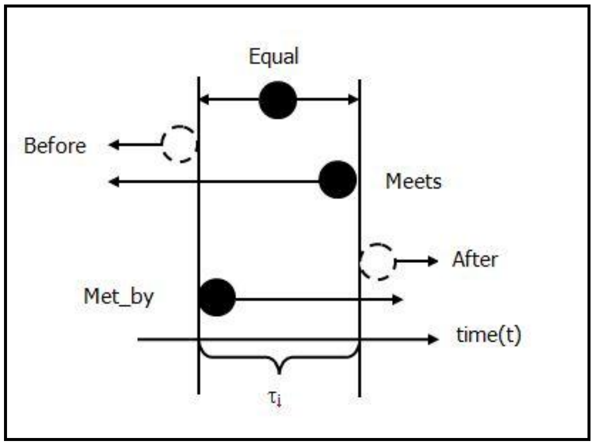

Figure 2. The State of Temporal Operators based on a Time Interval

If we have a multimedia database that contains a set of multimedia data signed as, $M = \{m_1, m_2, \ldots m_n\}$ then the complete model for temporal based multimedia database is:

$$TEMPORAL(m_i \in M) \subseteq (tt \cap OP \cap vt). \quad \textbf{(1)}$$

where *tt* is transaction time, *OP* is temporal operator and *vt* is valid time. Thus, if the multimedia database that has a set of features attributes A_i then a complete scheme for a temporal based in multimedia data management can be signed as:

$$R = (A_1, A_2, \ldots, A_n, tt, op1, vt\text{-}from, op2, vt\text{-}until) \quad \textbf{(2)}$$

where $op1, op2 \in OP$.

Consider that a snapshot of temporal based multimedia record in a database as in Table 4. The table captured the transaction time and valid time of the objects recorded based on relation, $R = (A_1, A_2, \ldots, A_n, tt, op1, vt\text{-}from, op2, vt\text{-}until)$. To complete this relation, some formal definitions need to be established and could be viewed as: Each multimedia data that gone through a set of modification process, $U = \{u_1, u_2, \ldots, u_n\}$ will have a set of version which can be noted as:

$M = \{m_1, m_2, \ldots, m_n\}$ then **(3)**

$$\forall m_i \in M \Leftrightarrow \exists (u_i \in U) \quad \textbf{(4)}$$

$$\forall m_i \in M \Rightarrow \exists (vt\text{-}from \in I \cup vt\text{-}until \in I) \quad \textbf{(5)}$$

where *vt-from* < *vt-until*, meaning that each multimedia data stored in the temporal database would have a valid time (which is classified as a time interval).

And,

$$\forall u_i \in U \Rightarrow \exists (tt \in P) \quad \textbf{(6)}$$

meaning that each update process of multimedia data in a database would have a transaction time (which is classified as a time point).

Table 4. Temporal based Multimedia Data Table

Data-ID	Operations	Transaction time	Operator 1	Valid time-from	Operator 2	Valid time-until
Video-01	INSERT	12/01/2012	Met_by	11/01/2011	Meets	28/02/2012
Video-01	UPDATE	28/02/2012	After	28/02/2012	Before	03/03/2012
Video-01	UPDATE	02/03/2012	Met_by	03/03/2012	Before	03/09/2012
Video-01	UPDATE	04/09/2012	Met_by	04/09/2012	Meets	06/12/2012
Image-04	INSERT	15/02/2012	After	15/02/2012	Meets	19/02/2012
Image-04	UPDATE	20/02/2012	After	20/02/2012	Before	27/02/2012
Image-04	UPDATE	28/02/2012	Met_by	28/02/2012	Before	31/07/2012
Video-03	INSERT	20/02/2012	Met_by	22/02/2012	Meets	03/03/2012
Video-03	UPDATE	03/03/2012	After	03/03/2012	Before	31/08/2012
Video-03	UPDATE	01/09/2012	After	02/09/2012	Meets	25/12/2012
Audio-09	INSERT	24/05/2012	After	24/05/2012	Before	28/11/2012
Audio-09	UPDATE	27/11/2012	After	28/11/2012	Before	31/12/2012

As illustrated in Table 4, consider the description or evolution of a multimedia data which Data-ID is *Video*-01. *Video-01* has four (4) transactions that are on date 12/01/2012, 28/02/2012, 02/03/2012 and 04/09/2012. The first transaction date represents for the operation of data INSERT and others represents for the operations of data UPDATE. In the first transaction, we can said that *Video-01* has a period of valid time as "Met_by 11/01/2012 to Meets 28/02/2012". The Valid time-until for *Video-01* in the first transaction have been changed since the UPDATE operation is executed to the multimedia data on 28/02/2012. The original granularity value for valid time-until is changed to 03/03/2012. Comprehensively, the valid time for Video-01 in the second transaction is "After 28/02/2012 to Before 03/03/2012". The modification to *Video-01* has been executed on 02/03/2012 (the 3rd transaction) where the valid time is changed to "Met_by 03/03/2012 to Before 03/09/2012". Again, on 04/09/2012 (4th transaction) the valid time period for video-01 is changed as "Met_by 04/09/2012 to Meets 06/12/2012" when video-01 is modified. Based to the proposed model, all the temporal attribute value except transaction date will be updated depend on user requirement. In the proposed model, transaction date is set to the current date (server date) that is referring to the updating process of the record.

3.2. Querying of Temporal Multimedia Database

Based on this proposed TempMD model, the following four (4) conventions can be used to retrieve for any records in the database.

Table 5. Examples of Queries

Condition	Relational Algebra	SQL statement
Attribute name only $\Rightarrow$ current time	π data_id,max(transactionTime) as transaction time,operator1,max(valid_from)as valid_from,operator2,max(valid_until)as valid_until (σ column name$^{\text{(table name)}}$)	SELECT data_id,max(transactionTime)as transaction time,operator1,max(valid_form) as valid_from,operator2,max(valid_until)as valid_until FROM table name WHERE column name
Attribute name followed by ALL $\Rightarrow$ all history	σ column name$^{\text{(table name)}}$	SELECT * FROM table name WHERE column name
Attribute name followed by an interval $\Rightarrow$ specific time period	σ column name $^{\text{(table name)}}$ $\wedge$ valid_from>= 28/02/2012 $\wedge$ valid_until < 30/11/2012	SELECT * FROM table name WHERE colum name ANDvalid_from>=28/02/2012 AND valid_until < 30/11/2012
Attribute name followed by RESTRICT $\Rightarrow$ specific time period designated	σ column name $^{\text{(table name)}}$ $\wedge$ valid_from>12/01/2012 $\wedge$ valid_until <=01/12/2012 $\wedge$ operator1='after'	SELECT * FROM table name WHERE colum name AND valid_from> 12/01/2012 AND valid_until <=01/12/2012 AND operator1='after'

4. Development of TempMD Model under Web Services Platform

Many organizations used World Wide Web as a medium for collaboration and connected with multiple environment of hardware and software platform. The differences between system architecture, operating system and database create a problem in data sharing or data exchange. Through web services platform this problem can be solved [25]. Web service is a Service-Oriented Architecture (SOA) where the designing principles in SOA are interoperability and reusability [26]. Major application of web services is to integrate different applications, different languages and different platforms to talk to each others [20, 25, 26].

The platform elements for web services are WSDL, SOAP and UDDI. WSDL is a W3C standard based on XML language. It is used by a service provider to describe the functions provides by web services and how other programs can access the functions. SOAP is defined as message exchange protocol and also in XML based structure. XML is a markup language that makes data portable, by proving a standard way of data-exchange [25]. UDDI is normally used as a directory for storing web services information.

The implementation of the TempMD model under web services can ensure a compatible information exchange, integration framework and management optimization for the current multimedia resource management system. Apart from that TempMD has been designed under web services environment to avoid limited access to the multimedia resources, limited communication between applications and provide a user friendly interface in a distributed computing. In order to implement the proposed model, we are considered to employ XML-based web services with the Java 2 platform, Enterprise Edition (J2EE). This model supports three (3) main modules: insertion of new multimedia data, information updating of multimedia data and querying process. Those modules are registered in the service server. The overview of TempMD under web services platform is depicted in Figure 3 and the users are used different applications that are developed with different programming languages such as PHP, Java, ASP or Visual Basic.

Those users can independently access or using service offered by TempMD engine in order to insert, update and query multimedia data. TempMD becomes as a service provider to allow request and response process. The database consists of temporal multimedia data, which has been stored in multiple environments of a database server such as MySql, Oracle and Informix. Meanwhile, the database server is linked to the variety platform of an operating system like Windows, Linux and Mac-OS. As an example, Table 6 shows general step of two (2) registered applications the proposed model.

Table 6. General Steps for Updating Data and Querying Applications

Application 1: Updating valid time of the multimedia data	Application 2: Querying valid time of the multimedia data
• User send all particular data to application in TempMD engine • Activate SOAP-aware servlet and establish connection with the related platforms under http server configuration • Send and store the data in temporal multimedia data	• User send all particular data to application in TempMD engine with the specified query convention • Activate SOAP-aware servlet and establish connection under http server configuration • TempMD engine will search and identify the location of the requested data • If the requested data is found, then the related information will be sent to the users

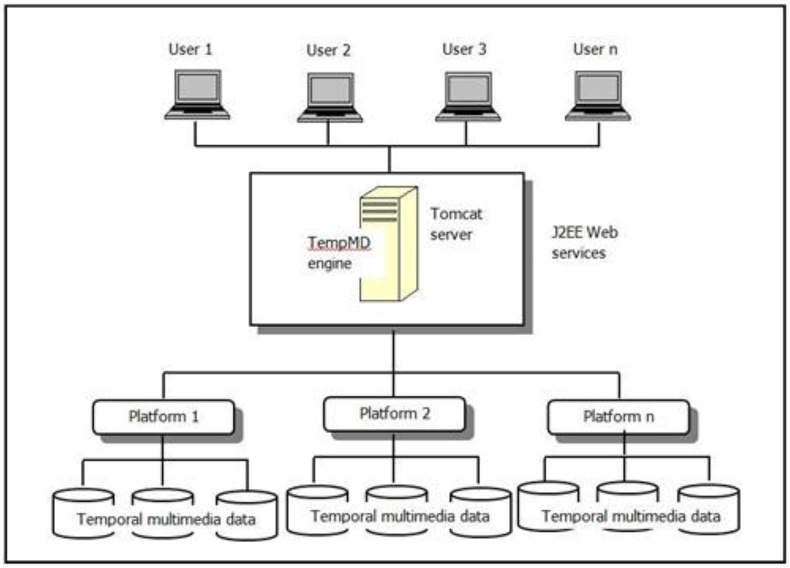

Figure 3. Architecture of TempMD under J2EE Web Services Platform

All the communication between multiple users, TempMD, multiple platforms and database servers are based on SOAP communication protocol. Figure 4 and Figure 5 show the interface for inserting and updating temporal multimedia data respectively.

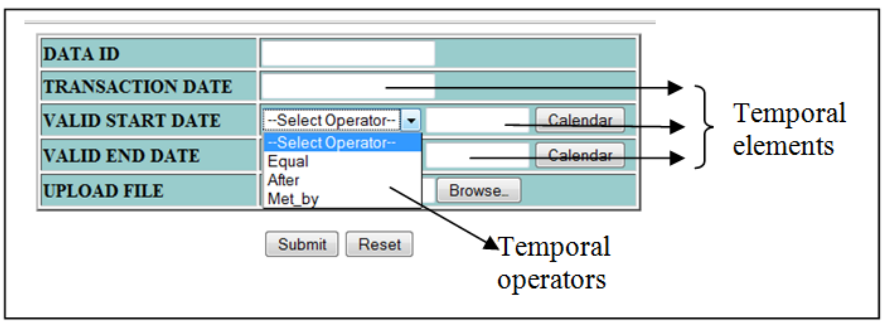

Figure 4. The Interface for Inserting Multimedia Object

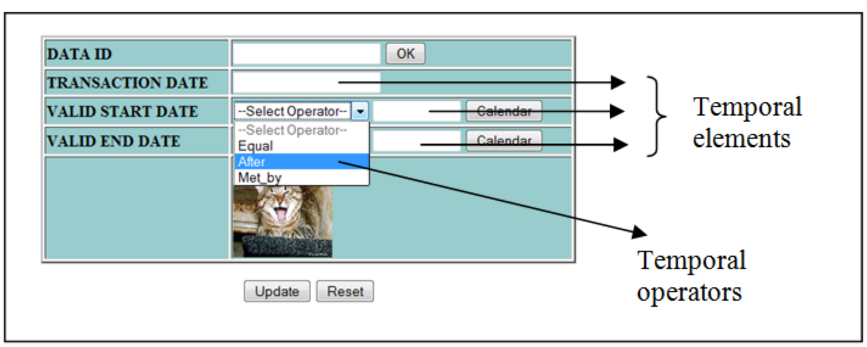

Figure 5. The Interface for Updating Multimedia Object

5. Conclusions

The explosion of multimedia information in diverse kind of data needs efficient operation process in database management such as query retrieval management, classification management, multimedia data processing management and data security management. However, the time stamping based multimedia data manager tool has not been broadly emphasized. This paper addresses the issue of providing data management support for multimedia data using temporal elements. The integration of temporal elements is believed can improve the multimedia data management process. The proposed model provides a new discovery for archiving multimedia data in the more systematic way based on time-information data. The concept of temporal data management must be introduced into multimedia data management to ensure that event and transaction of multimedia information record can be managed accurately. Furthermore, temporal elements such as valid time and transaction time are integrated into multimedia database application to allow an efficient process in monitoring historical data; past, present and future. The proposed model has been modeled under web services platform, where J2EE is employed to develop the application. The proposed model creates a collaborative environment and supports independencies of communication between multi-platform environments.

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References

[1] A. R. M. Nordin, M. Farham, S. Suhailan, M. D. Sufian and Y. M. Kamir, "Applying Time Granularity in Multimedia Data Management", Proceeding of the International Conference on Computational Intelligence and Vehicular System, **(2010)** November 22-23; Cheju, Korea.
[2] B. Claudio, J. Sushil and W. Xiaoyang Sean, "Time Granularities in Databases, Data Mining and Temporal Reasoning", Springer-Verlag Berlin Heidelberg **(2000)**.
[3] D. Curtis E, E. William S, L. Hong and S. Richard, "Efficiently Supporting Temporal Granularities", IEEE Trans. On Knowledge and Data Engineering, vol. 12, no. 4, **(2000)**.
[4] G. Dengfeng, J. Christian, S. Richard, S. Micheal, "Join Operations in Temporal Databases", In The Very Large Database Journal, vol. 14, **(2005)**.
[5] J. Christian and S. Richard, "Temporal Data Management", IEEE Transaction on Knowledge and Data Engineering, vol. 11, no. 1, **(2009)**.
[6] T. Kristian, J. Christian and S. Richard, "Effective Timestamping in Database", The VLDB Journal, vol. 8, **(1999).**
[7] Ö. Gultekin and S. Richard, "Temporal and Real-Time Databases: A Survey", IEEE Trans on Knowledge and Data Engineering, vol. 7, **(1995)**.
[8] A. Canan Eren, "A Comparison of Attribute and Tuple Time Stamped Bitemporal Relational Data Models", Proceedings of the International Conference on Applied Computer Science, **(2010)** October 4-6: Iwate, Japan.
[9] D. Nasrat, "A Multimedia Temporal Database Model", Lebanese American University, **(2006)**.
[10] H. Sami and Al-R. Nashwan, "Memory Storage Issue of Temporal Database Applications on Relational Database Management Systems", Journal of Computer Science, vol. 6, no. 3, **(2010)**.
[11] K. Brian and M. Jixin, "A Temporal Database Model Supporting Relative and Absolute Time", The Computer Journal, vol. 37, no. 7, **(1994)**.
[12] M. Nadeem, B. Aqil and A. Kamran, "A Logical Temporal Relational Data Model", International Journal of Computer Science, vol. 1, no. 7, **(2010)**.
[13] P. Jaymin, "Temporal Database System", Individual Project, University of London, **(2003)**.
[14] A. R. M. Nordin and S. Suhailan, "Managing Software Change Request Process: Temporal Data Approach", International Journal of Computer Science Security, vol. 3, no. 3, **(2009)**.

[15] C. Qimai, L. Hai, T. Yong, C. Zicong and P. Lining, "Designing TDBEngine for Processing Temporal Educational Information", Proceeding of the Information Technologies and Applications in Education, **(2007)** November 23-25: Kunming, China.
[16] E. Nina, H. N. Patricia, M. M. Mirella and D. Giovani, "A Temporal Database Management System Implemented on Top of a Conventional Database", Proceeding of the International Conference of The Chilean, **(2000)** November 16-18: Santiago.
[17] J. Sanjeevkumar and K. Praveenkumar, "Multimedia Data Mining in Digital Libraries: Standards and Features", Proceeding of the Recent Advances in Information Science and Technology, **(2007)** July 12-13: Tamil Nadu.
[18] G. Jim, S. Brent, Y. Raj and K. Kevin, "Content-based Multimedia Data Management and Efficient Remote Access", Extrait de la Reveu Informatique et Statistique dens les Sciences Humaines, vol. 1, no. 4, **(1997)**.
[19] K. Harald and D. Mario, "Multimedia Database System: Where are we now?", Special session talk, The IASTED DBA Conference, **(2005)** February 14-16: Innsbruck, Austria.
[20] H. Xu, H. Qin and M. Li, "Nutrition Catering System of Hospitals Based on Web Services Integrating Wireless and Wired Network", International Conference on Multimedia Information Networking and Security, **(2009)** 18-20 November: Hubei, China.
[21] C. Ogescu, C. Plaisanu and D. Bistriceanu, "Web Based Platform for Management of Heterogeneous Medical Data, Automation", Quality and Testing Robotics, IEEE, **(2008)** May 22-25: Cluj-Napoca.
[22] S. C. Stoica, "A Multimedia Database Server Funtionality", Second International Conference on Advances in Multimedia, IEEE, **(2010)** June 13-19: Athens.
[23] M. M. Shahiduzzaman, N. Mahmuda and U. R. A. Ashfaque, "Portable and Secure Multimedia Data Transfer in Mobile Phone Using Record Management Store (RMS)", 3rd IEEE International Conference On ICCSIT, **(2010)** July 9-11: Chengdu, China.
[24] M. Farham, A. R. M. Nordin and A. M. Lazim, "The Development of Temporal-Based Multimedia Data Management Application Using Web Service", Proceeding of the 11th International Conference on Intelligent Systems Design and Applications, **(2011)** November 22-24: Cordoba, Spain.
[25] M. Y. Kamir and S. Suhailan, "A Web Service Platform for Support Multiple Programming Language to Access Biomedical", World Academy of Science, Engineering and Technology **(2010)** Apr 28-30: Rome, Italy.
[26] D. Shenghui, X. Hongzhen and Z. Huaqin, "Research on Multimedia Resource Management System Based on Web Services", International Conference on Industrial and Information Systems, **(2009)** April 24-25: Haikou, China.

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