A Design of Index Library using Management Information Modeling in Moving Picture Contents

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Abstract: - This is a system for extracting a specific portion of content. When a desired portion is extracted so that contents service can be provided a plurality of users extract a beginning time and an ending time of a specific frame in case of moving picture content and carry out a temporal indexing operation. When searching for the specific portion after extracting a beginning point and an ending point of the specific portion in case of still picture content and carrying out a spatial indexing operation, the plurality of users retrieve and display the specific portion from an indexed database. Therefore, the plurality of users can carry out the indexing operation for one file to organize a search database without correcting an original file and can extract the specific portion of content. Moreover, because the specific portion of content can be extracted and the extracted specific portion can be displayed and edited, all file formats can be controlled irrespective of a file format.

Key-Words: - Contents management, index library, moving picture contents, still picture contents, semantic unit, temporal controller, spatial controller.

1 Introduction

The content provided through current communication mostly includes moving picture content and still picture content. The moving picture content or still picture content is sent from the beginning to the end in a unit of a file. In order for an intermediate portion of the moving picture content to be viewed, a search bar is shifted to a corresponding portion in a player. In order to review a corresponding portion, a user must search for the corresponding portion while shifting the search bar. A key frame scheme is used for selecting or extracting a key image and viewing a desired portion using the selected or extracted key image. However, there is a problem in that the key frame scheme is not correct. In case of the still picture contents, the user shifts the search bar to a corresponding portion to view an intermediate potation of a still picture file, but cannot correctly search for the intermediate portion.

A method for extracting only user-desired information based on a user's information request to display the extracted information is disclosed in "method for organizing database on information modeling and retrieving information from organized database" filed with the Korean Intellectual Property

Office (KIPO) [3]. When the user makes a request for various information units such as historical information, industrial information, document materials, learning material, video information, etc., a user terminal is connected to a database containing various information units. The analysis and modeling operations for semantic elements such as temporal data, spatial data, temporal-spatial data, situation name, keyword, etc., inputted by the user, are carried out. A relative situation, module, action, etc. are retrieved from a database organized through the analysis and modeling operations. In the above patent, there is disclosed a method for organizing the database to retrieve information from the organized database so that user-desired information is extracted and the probability of retrieving the user-desired information is enhanced [2].

Accordingly in order that the above method can be effectively implemented, a need exists for a system that can carry out analysis and modeling operations for semantic elements inputted by a plurality of users without correcting a moving picture file and a still picture file in temporal and spatial domains and

can extract specific portions of the moving picture file and the still picture file [5].

2 Analysis of Extracting System

2.1 Semantic unit

The analyzing step of forming expressive properties by defining each of the temporal information data, spatial information data, object information data and thing information data as a formula in view of the name of at least one unit cell, looking up the data names of the expressive properties, and defining a path to each expressive property's data name used for determining a value of the expressive property.
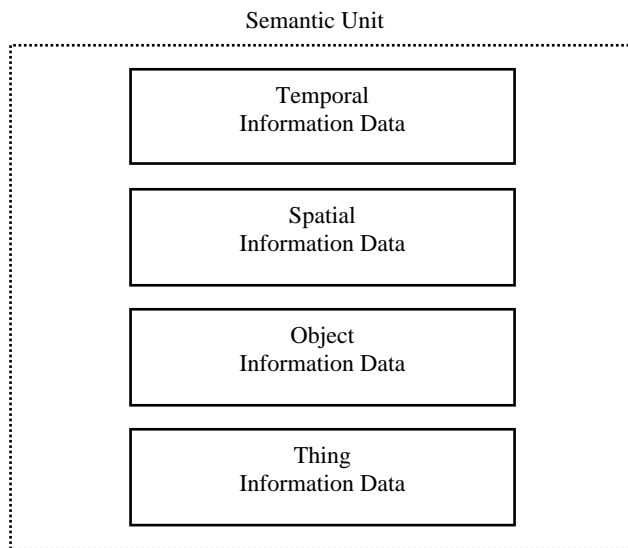
Semantic Unit

Fig. 1. The basic data of semantic unit

The step of looking up the data names of the expressive properties includes a step of performing extensive lookup with respect to the temporal information data, spatial information data, object information data and thing information data. The extensive lookup step is a procedure of forming a data feature list for analysis of information. In the extensive lookup step, the temporal information data, spatial information data, object information data and thing information data name of the expressive properties are looked up to form at least one feature list. Meanwhile, the analyzing step for information requested further includes a step of forming a common feature list, which can be commonly applied to data generated from the unit cells, and a separate feature list for leading input data to the

corresponding unit cells. The analyzing step further includes a feature identification of identifies each unit cell as unique one discriminated from the others in terms of the temporal information data, spatial information data, object information data and thing information data.

In the database establishment includes a step of forming a group in which the unit cells corresponding to the temporal information data, spatial information data, object information data and thing information data are assembled in a set having a common feature. Here has many sets having a common feature and has at least one member property.

2.2 Structure of extracting system

The hierarchical structure of the group formed in the database establishment step is shown in Fig. 2. The group includes actions through modules and situations. Each action is a minimum semantic unit including temporal information data, spatial information data, object information data and thing information data. Each module includes a first action and at least one other action related to at least one of the temporal information data, spatial information data, object information data and thing information data of the first action.
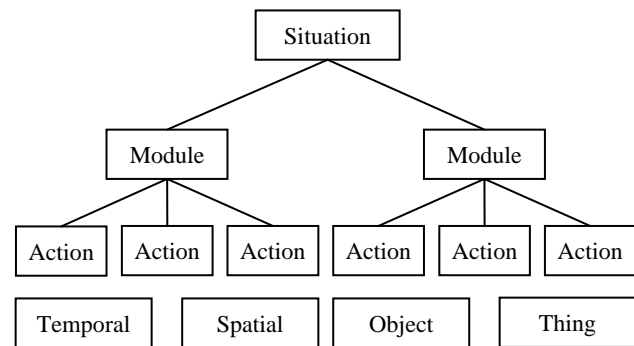

Fig. 2. A block diagram of the hierarchical structure

Each situation includes a module and at least one other module related to at least one of the temporal information data, spatial information data, object information data and thing information data of the former module. Each of the action, module and situation includes independent information content. The procedure includes a property formation step of defining a formula in view of at least one group composed of a plurality of unit cells corresponding to the temporal information data, spatial information data, spatial information data, object information data and thing information data which are included

in the group, a step of looking up the group name of a property in a plurality of group, and a step of defining a path to the property's group name used for determining a value of the property. Relationships among a unit cell, an action including the unit cell, another action, a first module including an action, another module, still another module including the first module, and a preceding module can be understood based on the name and the path. The step includes extensive look-up with respect to the plurality of groups. In the extensive look-up, the group name having a given property is looked up to form at least one list.

An information modeling method includes analyzing data input by a user, establishing a database and extracting information requested using the established database. In the data analyzing step, various kinds of data is analyzed into temporal information data including temporal information, spatial information data including spatial information indicating locations, object information data including object information which is an object of the function of data other than the temporal information data and the spatial information data and which interacts with the other data, and thing information data including the remaining thing information other than the temporal information, the spatial information and the object information.
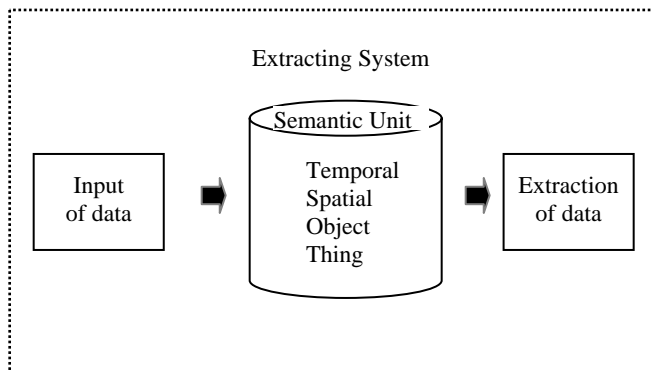

Fig. 3. A extracting system of information modeling

3 Design of Index Library System

This is an object of the study to provide a system for extracting a specific portion of content that can allow a plurality of users to extract a beginning time and an ending time of a specific frame in case of moving picture content and carry out a temporal

indexing operation when a desired specific portion is extracted so that a content service can be provided.

3.1 Index library

An index library is a method to retrieve and display the specific portion from an indexed database when searching for the specific portion after extracting a beginning point and an ending point of the specific portion in the case of still picture content and carrying out a spatial indexing operation. An objects can be accomplished by the provision of a system for extraction a specific portion of content, comprising. A content management database for registering at least one content file to be served and storing address and price information of the content file to be served; a temporal controller for designating a beginning time and an ending time in each time interval of a moving picture stored in the content management database, extracting the time interval and reproducing and terminating the moving picture according to the beginning time and the ending time in the extracted time interval. A spatial controller for designating a starting point and an ending point in each space interval of the file stored in the content management database, extracting the space interval and displaying a portion of the file according to the beginning point and the ending point of the extracted space interval. A content search database for storing not only search indexes and description materials but also integrated information of the search indexes and description materials so that the time interval extracted through the temporal controller can be retrieved according to streaming of moving picture content and the space interval extracted through the spatial controller can be retrieved according to a display portion of still picture content.

Preferably, the moving picture content is based on various file formats such as windows media, real time, quick time, MPEG (moving picture experts group), etc. Preferably, the still picture content is based on various file formats such as text, graphic, image, HTML (hypertext markup language), XML (extensible markup language), etc. The temporal controller extracts a specific time interval based on a beginning time and an ending time corresponding to a specific portion in case of the moving picture content, or the spatial controller extracts a specific space interval based on a beginning point and an ending point corresponding to a specific portion in case of the still picture content. The plurality of

users carry out an indexing operation for one content without correcting the file and store a result of the indexing operation for one content without correcting the file and store a result of the indexing operation in the content search database, such that a specific portion of content can be searched for and only the specific portion can be served.

Now, preferred embodiments of the present research will be described in detail with reference to the annexed drawings. The preferred embodiments are not intended to limit the research scope. The above and other objects, features and other advantages of the present research will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings. Fig. 4 is a block diagram illustration a system for extraction a specific portion of content in accordance with the present research.
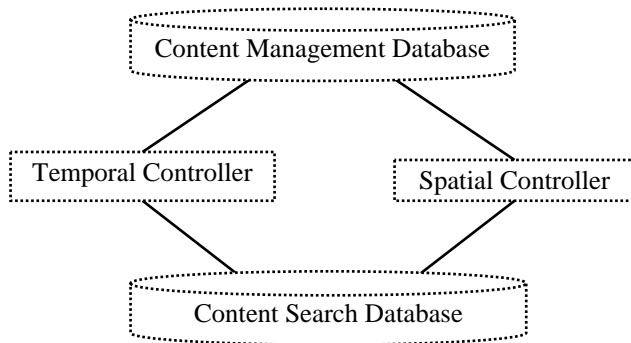

Fig. 4. A block diagram illustrating system for extracting specific portion of contents

As shown in Fig. 4, a content management database registers at least on content file to be served and stores address and price information of the content file to be served. A temporal controller designates a beginning time and an ending time in each time interval of a moving picture stored in the content management database, extracts the time interval, and reproduces and terminates the moving picture according to the beginning time and the ending time of the extracted time interval. A spatial controller designates a starting point and an ending point in each space interval of the file stored in the content management database, extracts the space interval, and displays a portion of the file according to the beginning point and the ending point of the extracted space interval. A content search database stores not only search indexes and description materials but also integrated information of the search indexes and

description materials so that the time interval extracted through the temporal controller can be retrieved according to streaming of moving picture content and the space interval extracted through the spatial controller can be retrieved according to a display portion of still picture content. The user allows the spatial controller to extract the predetermined space interval based on the beginning and ending points corresponding to a specific portion of a document while viewing a still picture on the internet in a state where an original picture file is not corrected, such that the plurality of users can carry out an indexing operation for one file.

3.2 Still picture contents
That is, when users A and B select a desired portion within a file while viewing the original still picture file as shown in Fig. 5, the beginning and ending points of a corresponding space interval are extracted. The content search database stores not only the beginning and ending points of the predetermined space interval but also information necessary for the search operation user by user.
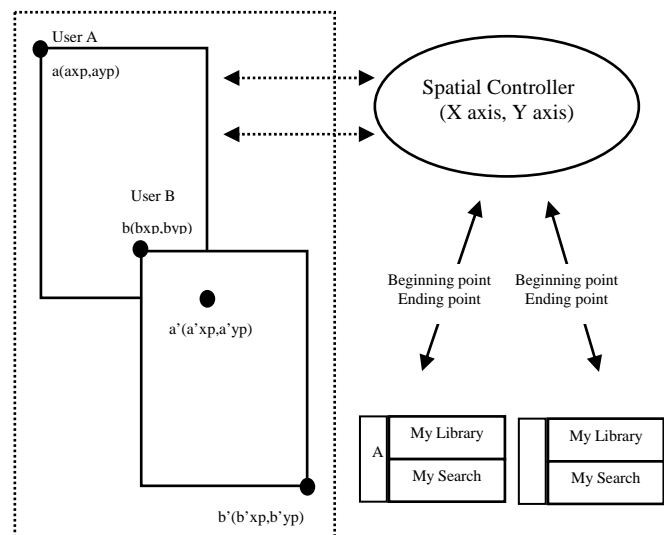

Fig. 5. A process of extracting specific space in still picture contents

The spatial controller extracts a beginning point a(axp, ayp) and an ending point a'(a'xp a'yp) from the predetermined space interval selected by the user a with respect to the still picture file stored in the content management database. The spatial controller stores, in the content search database, information

necessary far searching for the beginning and ending points of the predetermined space interval user by user together with a result of the extracting. Moreover, the spatial controller extracts a beginning points b(bxp, byp) and an ending point b'(b'xp, b'yp) from the predetermined space interval selected by the user b with respect to the still picture file stored in the content management database. The spatial controller stores, in the content search database, information necessary for searching for the beginning and ending points of the predetermined space interval user by user together with a result of the extracting. Because the beginning and ending points are extracted and then the predetermined space interval is extracted, all file formats can be controlled irrespective of a file format of still picture content. That is, only the beginning and ending points in a corresponding file are extracted, the predetermined space interval is extracted and information indicating a result of the extracting is stored in the database, irrespective of various file formats such as text, graphic, image, HTML, XML, etc. The spatial controller begins to display content of the beginning and ending points according to spatial information, such that only the content of the predetermined space interval can be edited at searched points.

A predetermined time interval of the moving picture content based on various file formats such as windows media, real time, quick time, MPEG, etc. stored in the content management database can be served. A predetermined space interval of the still picture content based on various file formats such as text, graphic, image, HTML, XML, etc. stored in the content management database can be served. Different portions of the same content can be stored according to a plurality of different user. In this case, the content of the predetermined time interval and content of the predetermined space interval are extracted and the extracted contents are stored in the content search database.

Where the predetermined time interval of moving picture content stored in the content management database is extracted, the temporal controller extracts the beginning time of the predetermined time interval when the user selects the beginning portion of the predetermined time interval while viewing a moving picture file. Subsequently, when the user selects the ending portion of the predetermined time interval, the temporal controller

extracts the ending time of the predetermined time interval. Subsequently, when the user inputs a search word, a keyword, a title, related information, etc., various information units necessary for a search operation as well as the beginning and ending times of the predetermined time interval are indexed and a result of the indexing is stored in the content search database.

3.3 Moving picture contents

The user allows the temporal controller to extract the predetermined time interval based on the beginning and ending times corresponding to a frame while viewing a moving picture on the internet in a state where an original moving picture file is not corrected, such that a plurality of users can carry out an indexing operation for one file. When users 1 and n select a desired portion on a time line while viewing the original moving picture file as shown in Fig. 6, respectively the beginning and ending times of a corresponding portion are extracted. The content search database stores not only the beginning and ending times of the predetermined time interval but also information necessary for a search operation user by user. Because the beginning and ending times are extracted and then the predetermined time interval is extracted, all file formats can be controlled irrespective of a file format of a moving picture. That is, the beginning and ending times are extracted, the predetermined time interval is extracted and information indicating a result of the extracting is stored in the database, irrespective of various file formats such as windows media, real time, quick time, MPEG, etc. The temporal controller begins to reproduce content of the selected time interval at the beginning time and terminates a playback operation at the ending time according to temporal information, such that only the content of the predetermined interval can be reproduced.
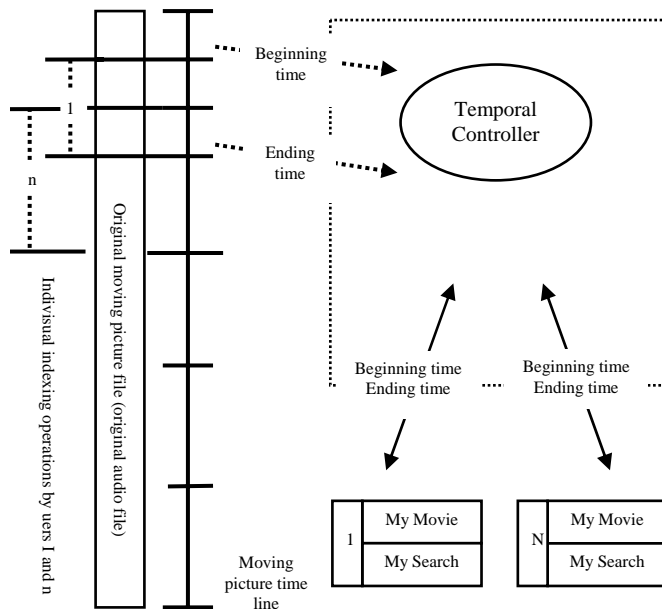
Fig. 6. A process of extracting specific portion in moving picture contents

Where content based on the same format a sat the time of selling the content is served using a system for extracting a specific portion of content, an indexing operation for a specific portion of a content stream or document is carried out and hence a desired portion can be retrieved from the total content. A corresponding portion is extracted and the extracted portion is served through the wired/wireless internet. When the corresponding portion is extracted, a search word is added to the indexing operation, such that moving picture content or still picture content can be correctly searched for. Only a part of a content file rather than a total of the content file is extracted and the extracted part of the content file can be cost-effectively served through the wired/ wireless internet, such that content transaction and service can be promoted on line.

4 System Extracting Method

A situation may be an independent single unit and may depend on preceding and succeeding situation. The situation is divided from the other situations based on time and space, and related situations are in a hierarchical flow. Similarly, either of a module and an action may be an independent single unit and may depend on preceding and succeeding modules actions. Either of a module and an action divided

from the other ones in a temporal and spatial domain. The modules and actions have hierarchical flows.

{(**God** created **heavens** and the **earth**.) (Now the **earth** was formless and empty), (darkness was over the surface of the deep), and (the Spirit of **God** was hovering over the water)}

For example, this is excerpted from Genesis of the Bible. Entire Genesis is considered as a situation, and paragraphs are considered as modules. A module is represented by { }, an action is represented by ( ), an object and a thing are represented by ___. Here, a main module is that 'God' created the 'heaven' and the 'earth'. A relationship between an essential object and an essential thing expresses an action. An action is a minimum semantic unit including at least one among the temporal information data, spatial information data, object information data and thing information data. Fig. 7 is a flowchart of a search method using a database established through information modeling according to the present research. The search method includes receiving a user's request for information through an interface such as a computer terminal, analyzing the received request for information, searching a database established according to the above modeling method, extracting data, and displaying the data.

Once a plurality of pieces of information expressing the user's request is input the information is analyzed into at least one of temporal information data, spatial information data, object information data and thing information data according to the above information modeling method, and a group including an action, a situation and module is constituted based on the analyzed data. The database includes at least one situation which includes a module and at least one other module related to at least on among the temporal information data, spatial information data, object information data and thing information data contained in the former module.

A module includes a first action at least one other action related to at least one among the temporal information data, spatial information data, object information data and thing information data of the first action. An action, a minimum semantic unit, includes the temporal information data containing temporal information, spatial information data containing spatial information indicating locations, object information data containing object information

which is an object of the function of data other than the temporal information data and spatial information data and which interacts with the other data, and thing information data including the remaining thing information other than temporal information, the spatial information and the object information. Any of the situation, module and action contains independent information content.
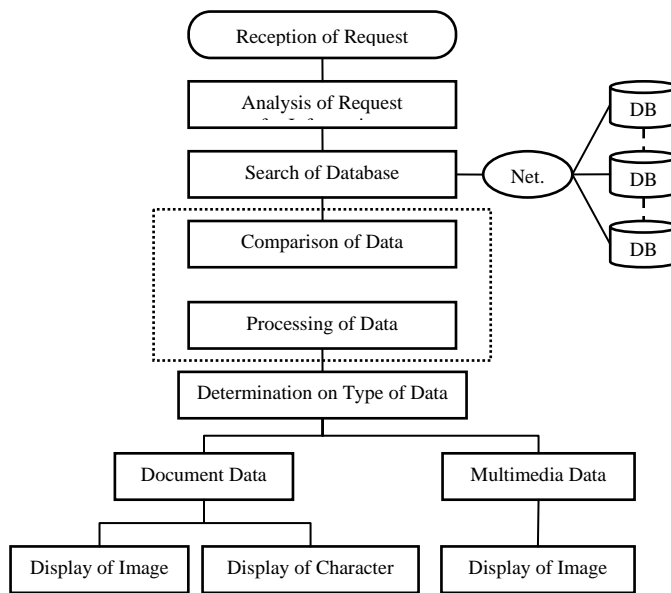

Fig. 7. A flowchart of data search method

Next, a data comparator performs an appropriate operation on the derived data and the plurality of pieces of information of the user's request, and the data containing the user's request is arranged and processed. In performing the operation on the derived data, data corresponding to the extracted user's request and a situation, module and action which can be contained in the data are extensively extracted in terms of temporal element, spatial element, object element and thing element. In addition, the data corresponding to the extracted user's request and a temporal element, spatial element, object element and thing element which can be contained in the data are extensively extracted in terms of situation, module and action. The operated, arranged and processed data is stored in memory units which memorize the features of information acquired from each of the action, module and situation.

In order to display the data, the type of the data is determined. If the data corresponding to the user's

request is document data including a character, a symbol or an image, the data resulting from the operation is transmitted to a document data processor and displayed in the form of an image or a character. If the data multimedia data including a moving image, the data resulting from the operation is transmitted to a multimedia data processor and displayed in the form of a moving image. Here, document data and multimedia data are simultaneously displayed using document data recording the features of the multimedia data or the order therein.

This research can be applied to a variety of fields. For example, in the case where a user wants to find a situation related to application for a driver's license, if the user enters the name of a related situation, the flow of situations of the application for a driver's license preceding and succeeding the entered situation is displayed, and the names of objects are listed as the names of related situation in order of time and space. When a situation in a particular space is intended to be found, a system is designed to ask a use a particular time. If the user does not answer, the system shows situations taken place in the particular region at the time corresponding to a default value in order of time. In addition, a situation is found using a module name or an object name, the flow of the situation contained in the situation is found, and the flow of an action contained in a particular module is found. For example, by clicking a situation related to traffic accidents, sentences and words about every module and action related to the traffic accidents can be derived. When a user wants to know a relationship between two objects, situations simultaneously appearing with the two objects and the roles played by the two objects in these situations are displayed. Particularly, in the case of a database including a moving image such as a film or a video, each event in the moving image is defined as a situation, each cut of motion occurring in the situation is defined as an action, and a set of actions is defined as a module so that a user can extract and view necessary part only in the moving image. Besides, this research can be applied to a variety of fields of industry such as English education, internet search, newspaper search and case search.

5 Industrial Applicability

As apparent from the above description, this research provides a system for extracting a specific portion of content that allow a plurality of users to extract a beginning time and an ending time of a specific frame in case of moving picture content and carry out a temporal indexing operation when a desired specific portion is extracted so that a content service can be provided, and to retrieve and display the specific portion from an indexed database when searching for the specific portion after extracting a beginning point and an ending point of the specific portion in case of still picture content and carrying out a spatial indexing operation, such that the plurality of users can carry out the indexing operation for one file to organize a search database without correcting an original file and can extract the specific portion of content.

Moreover, because beginning and ending times can be extracted in case of moving picture content so that a predetermined time interval is extracted and content of the extracted time interval is displayed and edited or beginning and ending points can be extracted in case of still picture content so that a predetermined space interval is extracted and content of the extracted space interval is displayed and edited, all file formats can be controlled irrespective of the file format.

An information modeling method and a database search system according to the present study have the following advantages. First, when a user requests information such as historical materials, industrial information, document, educational information or video information, the information is analyzed into temporal element, spatial element, temporal and spatial element, keyword, situation name, action and so on which are the elements of the user's request. Then, a database established according to information modeling according to the present study is searched for situations, modules and actions related to the user's request so that information desired by the user can be extracted. Accordingly, probability of searching for desired information only increases. Second, since a database system can process a user's request for information and can be extended simply by adding data, update and modification of the system is not necessary. Accordingly cost for the update and modification of the system can be saved, and the inconvenience of using the system can be reduced.

Besides, information modeling and search method using the information modeling according to the present research have the following technological effects and expected effects. First, multimedia contents in various fields such as linguistic, cultural, video and historical educations can be produced. Accordingly, methods of designing multimedia contents will be concretized and varied so that multimedia technology will be actively developed to support them. As a result, employment of personnel will increases in relation to production of linguistic, cultural and historical scenarios and video. Moreover, this research will accelerate the development of multimedia technology and the growth of ultrahigh-speed network business.

Second, by using contents produced according to the present research in the field of education, effects such as interactive multimedia education between users and providers, preparation of a learning environment suitable for a user's characteristics, and encouraging a user to learn can be expected. These contents produced according to the present research can be utilized more intensively to cultivate excellent personnel suitable for the globalization and information-oriented age. Third, this research prepares a foundation capable of providing multimedia educational contents suitable for commercialization of IMT so that effects such as expansion of network facilities necessary for transmitting a large amount of data, development of hardware industry, changes in competitive relations between basic network providers, and real time situation study for wireless terminal users can be obtained.

A system for extracting a specific portion of content, comprising: a content management database for registering at least one content file to be served and for storing address and price information of the content file to be served; a temporal controller for designating a beginning time and an ending time in each time interval of a moving picture stored in the content management database, extracting the time interval and reproducing and terminating the moving picture according to the beginning time and the ending time of the extracted time interval; a spatial controller for designating a starting point and ending point in each space interval of the file stored in the content management database, extracting the space interval and displaying a portion of the file according to the beginning point and the ending point of the extracted space interval; and a content search database

for storing not only search indexes and description materials but also integrated information of the search indexes and description materials so that the time interval extracted through the temporal controller can be retrieved according to the streaming of moving picture content and the space interval extracted through the spatial controller can be retrieved according to a display portion of the still picture content.

The system wherein the moving picture content is based on various file formats such as windows media, real time, quick time, MPEG, etc. The system wherein the still picture content is based on various file formats such as text, graphic, image, HTML, XML, etc. The data search method, wherein the display step comprises the step of transmitting the data extracted from the database to document data process if data corresponding to the information requested by the user is document data including a character, a symbol or an image. And, the data search method, wherein the display step comprises the step of transmitting the data extracted from the database to multimedia data process if data corresponding to the information requested by the user is multimedia data including a moving image. The information modeling method, wherein the group comprises an action a minimum semantic unit, including at least one unit cell corresponding to the temporal information data, the spatial information data, the object information data or the thing information data, a module including the action.

6 Conclusion

This research relates to a system for extracting a specific portion of content, and more particularly to a system for extracting a specific portion of content that will allow a plurality of users to extract the beginning time and ending time of a specific frame, in the case of moving picture content and carry out a temporal indexing operation when a desired specific portion is extracted so that a content service can be provided, and to retrieve and display the specific portion from an indexed database when searching for the specific portion after extracting beginning point and an ending point of the specific portion and carry out a spatial indexing operation, such that the plurality of users can carry out the indexing operation for one file to organize a search database without correcting the

original file and can extract the specific portion of content.

A content management database for registering at least one content file to be served and for storing address and price information of the content file to be served; a temporal controller for designating a beginning time and an ending time in each time interval of a moving picture stored in the content management database, extracting the time interval and reproducing and terminating the moving picture according to the beginning time and the ending time of the extracted time interval. A spatial controller for designating a starting point and an ending point in each space interval of the file stored in the content management database, extracting the space interval and displaying a portion of the file according to the beginning point and the ending point of the extracted space interval. A content search database for storing not only search indexes and description materials but also integrated information of the search indexes and description materials so that the time interval extracted through the temporal controller can be retrieved according to the streaming of moving picture content and the space interval extracted through the spatial controller can be retrieved according to a display portion of the still picture content. The moving picture content of this system is based on various file formats such as windows media, real time, quick time, MPEG, etc. Also, the still picture content is based on various file formats such as text, graphic, image, HTML, XML, etc.

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