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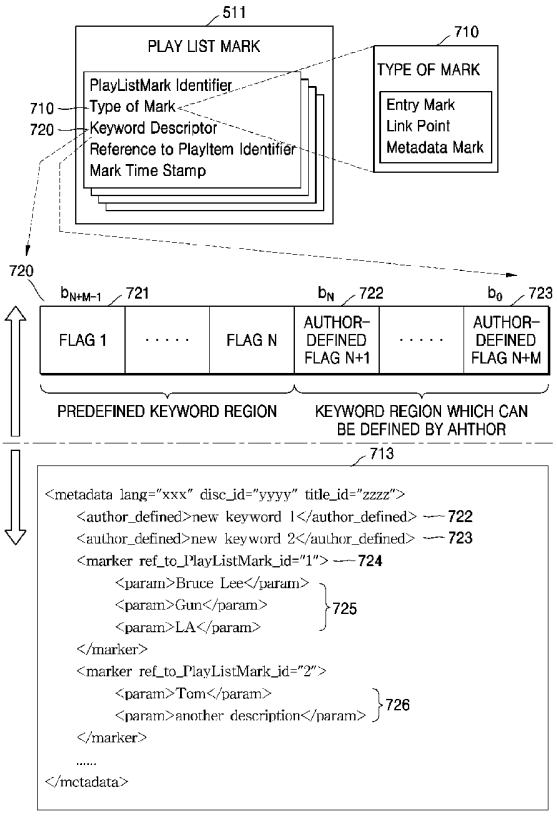
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(54) Title: STORAGE MEDIUM INCLUDING METADATA AND RE¬ PRODUCTION APPARATUS AND METHOD THEREFOR



(57) Abstract: A storage medium including metadata, which provide an extended search function using a variety of search keywords on audio- visual data, and a reproduction apparatus and a reproduction method of reproducing the storage medium. The storage medium includes: audio- visual data; and metadata to provide an extended search function on the audio-visual data, wherein the metadata include a predefined search keyword and a search keyword which may be additionally defined by an author. Accordingly, by using a variety of search keywords additionally defined by an author as well as predefined search keywords, providing an extended search function is possible. In addition, by recording only portions of the metadata relative directly to supporting multiple languages in an additional text-based file, providing an extended search function using a plurality of languages is also possible.

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Description

STORAGE MEDIUM INCLUDING METADATA AND REPRODUCTION APPARATUS AND METHOD THEREFOR

Technical Field

[1] An aspect of the present invention relates to reproduction of audio-visual (AV) data recorded in a storage medium, and, more particularly to a storage medium including metadata, which provide an extended search function using a variety of search keywords on audio-visual data, and an apparatus and method of reproducing the storage medium.

Background Art

[2] Storage media such as DVDs may store audio-visual data including video data, audio data, and/or subtitles, all of which are compressed and encoded in accordance with standards such as Motion Picture Experts Group (MPEG). Such storage media may further store additional information such as encoding attributes of the audio-visual data or reproduction procedures of the audio-visual data. Accordingly, motion pictures that are recorded in the storage media are reproduced sequentially in accordance with the reproduction information. In some cases, the audio-visual data may be reproduced through a jump in a unit of chapters.

Disclosure of Invention

Technical Problem

[3] However, the conventional storage may not be reproduced through a jump to a desired scene in accordance with a user's search conditions. That is, there does not exist an apparatus or a method of reproducing audio-visual data in accordance with the user's desired search conditions such as scene, characters, locations, background music, properties, etc.

[4] Since the audio-visual data are compressed, encoded, and multiplexed in accordance with the MPEG2 standard, conventional DVDs have problems in storing metadata that provides search functions on audio-visual data. Also there is little possibility to edit or reuse audio-visual data or metadata once the storage medium has been produced.

Technical Solution

[5] The present invention provides a storage medium including metadata, which provide an extended search function using a variety of search keywords on audio-visual data, and an apparatus for and a method of reproducing the storage medium.

[6] Specifically, the metadata according to aspects of the present invention provide the search keywords which may be additionally defined by an author, in addition to the

predefined search keywords.

Advantageous Effects

[7] Accordingly, the conventional problem may be solved that the audio-visual data or the metadata in a storage medium once produced could not be edited or reused, so that iproviding an extended search function using a variety of keywords defined by an author at the time of reproduction is possibble.

[8] Furthermore, by recording only portions of the metadata directly relative to the support for multiple languages in an additional text-based file, providing an extended search function using a plurality of languages is possible.

[9] Further, providing an extended search function of searching out and displaying the information on contents in a unit of disks or in a unit of titles is also possible.

Description of Drawings

[10] These and/or other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

[11] FIGS. 1A and 1B show embodiments of metadata according to the present invention;

[12] FIG. 2 shows an embodiment of metadata to which an author may add a search keyword according to the present invention;

[13] FIG. 3 shows an embodiment in which the structure of metadata shown in FIG. 2 is embodied in a text type;

[14] FIG. 4 shows another embodiment of metadata to which an author may add a search keyword according to the present invention;

[15] FIG. 5 is a diagram illustrating a structure of audio-visual data including metadata according to an embodiment of the present invention;

[16] FIG. 6 is a diagram illustrating a structure of a play list mark in the audio-visual data including the metadata according to an embodiment of the present invention;

[17] FIG. 7 is a diagram illustrating a structure of the metadata supporting multiple languages according to an embodiment of the present invention;

[18] FIG. 8 is a block diagram illustrating a structure of a reproduction apparatus according to an embodiment of the present invention;

[19] FIG. 9 is a flowchart illustrating a reproduction method using the extended search function according to an embodiment of the present invention;

[20] FIG. 10 is a diagram illustrating a structure of metadata on an entire disk according to another embodiment of the present invention;

[21] FIG. 11 is a diagram illustrating an example employing the metadata on an entire disk according to another embodiment of the present invention;

[22] FIGS. 12A and 12B are diagrams illustrating a structure and an example of author-defined metadata included in the metadata on the entire disk according to another embodiment of the present invention;

[23] FIGS. 13A and 13B are diagrams of nesting structure and an example of the author-defined metadata;

[24] FIG. 14 shows an example of a reproduction apparatus providing disk information or title information using the extended search function according to another embodiment of the present invention; and

[25] FIG. 15 is a flowchart illustrating a method of providing the disk information or the title information using the extended search function according to another embodiment of the present invention.

[26] FIG. 16 is a block diagram of a recording and/or reproducing apparatus according to an embodiment of the present invention.

Best Mode

[27] An aspect of the present invention provides a storage medium including metadata, which provide an extended search function using a variety of search keywords on audio-visual data, and an apparatus for and a method of reproducing the storage medium.

[28] According to an aspect of the present invention, there is provided a storage medium including: audio-visual data; and metadata to provide an extended search function on the audio-visual data, wherein the metadata include a predefined search keyword and a search keyword which may be additionally defined by an author. The metadata may be embodied in a binary type, and the metadata may include additional text fields to additionally define the author-defined search keyword and a keyword value of the author-defined search keyword. The metadata may be embodied in a text-based markup language type, and the metadata may include additional elements or attributes for additionally defining the author-defined search keyword and a keyword value of the author-defined search keyword. Parameters irrelative to supporting multiple languages in the metadata may be included in a binary type in the audio-visual data, and parameters relative to supporting multiple languages may be embodied in an additional text-based file.

[29] According to another aspect of the present invention, there is provided a reproduction apparatus comprising: a search unit to search a storage medium for a position of audio-visual data satisfying a predetermined search condition with reference to metadata, the storage medium including the audio-visual data and the metadata providing an extended search function on the audio-visual data; and a reproduction unit to reproduce the audio-visual data from the searched-out position, wherein the metadata includes a predetermined search keyword and a search keyword

which may be additionally defined by an author. The search unit may select the metadata corresponding to language information supporting subtitle, audio, and/or menu stored in a system parameter.

[30] According to another aspect of the present invention, there is provided a reproduction method comprising: searching a storage medium for a position of audio-visual data satisfying a predetermined search condition with reference to metadata, the storage medium including the audio-visual data and the metadata providing an extended search function on the audio-visual data; and reproducing the audio-visual data from the searched-out position, wherein the metadata includes a predetermined search keyword and a search keyword which may be additionally defined by an author.

[31] According to another aspect of the present invention, there is provided a storage medium including: audio-visual data; and metadata to provide an extended search function on the audio-visual data, wherein the metadata include a predefined search keyword and a search keyword which may be additionally defined by an author, and the metadata are included in information on an entire disk and/or title information.

[32] According to another aspect of the present invention, there is provided a reproduction apparatus comprising: a search unit to search a storage medium for information on an entire disk and/or title information satisfying a predetermined search condition with reference to metadata, the storage medium including the audio-visual data and the metadata providing an extended search function on the audio-visual data; and a display unit to display the information on the entire disk and/or title information, wherein the metadata includes a predetermined search keyword and a search keyword which may be additionally defined by an author.

[33] According to another aspect of the present invention, there is provided a reproduction method comprising: searching a storage medium for information on an entire disk and/or title information satisfying a predetermined search condition with reference to metadata, the storage medium including the audio-visual data and the metadata providing an extended search function on the audio-visual data; and displaying the information on the entire disk and/or title information, wherein the metadata includes a predetermined search keyword and a search keyword which may be additionally defined by an author.

[34] Additional and/or other aspects and advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

Mode for Invention

[35] Reference will now be made in detail to the present embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to the like elements throughout. The embodiments are

described below in order to explain the present invention by referring to the figures.

[36] FIGS. 1A and 1B show embodiments of metadata according to the present invention. FIG. 1A shows text-based metadata and FIG. 1B shows binary-based metadata. Referring to FIG. 1A, text-based metadata 101 described in a markup language, etc., are divided in scene units 102 or chapters. The scene elements include specific elements 103 indicating characters, properties, locations, background music, etc., and the specific elements 103 may be used as search keywords for an extended search of audio-visual data.

[37] On the other hand, referring to FIG. 1B, in binary-based metadata 1 used in a programming language such as C, C++, etc., binary codes shown in FIG. 1B may be included in a play list as a play sequence to reproduce a movie or in an audio-visual data stream. At this time, elements of the metadata which may be used as search keywords are preliminarily defined in a metadata type (metadata_type) 111. For example, characters are defined as a type value of '0', properties are defined as a type value of '1', locations are defined as a type value of '2', and background music is defined as a type value of '3' in advance.

[38] Accordingly, the type values corresponding to desired search keywords among the predefined metadata type values are allocated to the search points 111 in the audio-visual data stream. Then, keyword values corresponding to the search keywords are allocated to respective description fields 112. For example, when a user intends to search out only those scenes in which the character 'Neo' appears in the movie 'The Matrix', '0' indicating a character in the metadata type 111 is allocated to the search points in which 'Neo' appears in the audio-visual data stream, and 'Neo' is specified as a description field 112 indicating the keyword value. As a result, a user may search out and reproduce only the scenes in which 'Neo' appears from the audio-visual data stream.

[39] That is, while storage media such as conventional DVDs support only reproduction based on scenes, chapters, or time, the metadata embodied as shown in FIG. 1A or 1B may provide an extended search function.

[40] However, in FIG. 1A or 1B, there is a problem in that a new search keyword may not be added because the search keywords are defined in advance in the audio-visual data stream. A structure of metadata to which an author may additionally define a search keyword will be described as metadata for the extended search.

[41] FIG. 2 shows an embodiment of metadata to which an author may add a search keyword according to the present invention. Referring to FIG. 2, a tree structure of a markup document 2 in which metadata is embodied is shown. Scene elements 202 are included as specific elements of the metadata elements 201, and keyword elements 203 are included as specific elements of the scene elements. Each keyword element 203 has

a search keyword, which an author has an opportunity to additionally define, as a content of the corresponding element. A description element 204 having a keyword value corresponding to the author-defined search keyword as content thereof is included as a specific element of each keyword element 203. On the other hand, the keyword element 203 or the description element 204 may be embodied as an attribute instead of the specific element of the scene element 202.

[42] More specifically, an example of a markup document in which the metadata shown in FIG. 2 are described in a markup language will be presented. FIG. 3 shows an example in which the metadata structure shown in FIG. 2 is embodied in a text type.

[43] Referring to FIG. 3, the markup document 2 in which the metadata according to the present invention is described includes a metadata element <metadata> 301, a scene element <scene> 302, keyword elements <keyword> 303, and a description element < description> 304. The metadata element <metadata> 301 includes link information on a play sequence <link href='xxxx play sequence'/>. The metadata element includes the scene element <scene> 302 as a specific element. The scene element <scene> 302 includes the keyword elements <keyword> 303 having a variety of author-defined search keywords as contents and the description elements <description> 304 having keyword values corresponding to the search keywords as specific elements. For example, in order to use a character as a new search keyword at scene ID '001', 'Character' may be defined as a content of element <keyword> and 'Bruce Lee' may be defined as a content of element <description>, which is a keyword value corresponding to the search keyword 'Character'. Otherwise, locations and properties may be also defined as a new search keyword.

[44] That is, in the metadata according to the present embodiment, the search keywords are not defined in advance as shown in FIGS. 1A and 1B, but the search keywords as contents of the keyword elements may be additionally defined by an author. Accordingly, the author may newly define and use a variety of search keywords without restriction and without conventional terms used at the time of producing a title.

[45] On the other hand, FIG. 4 shows another embodiment of metadata in which an author may add search keywords according to the present invention. Referring to FIG. 4, an example of binary-based metadata is illustrated. The metadata according to the present embodiment includes two text-type fields such that an author may newly define and use not only a description field 404 indicating a keyword value but also a keyword field 403 to indicate a search keyword, similarly to the text-based metadata shown in FIG. 3. While only the predefined search keywords in the metadata type field are used in FIG. 1B, a variety of search keywords may be added by an author using the keyword field 403 in the present embodiment.

[46] Next, relations between the metadata in which the author may add a new search

keyword and the audio-visual data providing high-quality video will be described. FIG. 5 is a diagram to illustrate a structure of the audio-visual data including the metadata according to an embodiment of the present invention. Referring to FIG. 5, a clip, which acts as a recording unit of the audio-visual data, and a play list, which acts as a unit of reproduction, are shown. Specifically, the above-mentioned play sequence is embodied as the play list.

[47] The clip as a recording unit of the audio-visual data includes a clip A/V stream 540 in which a video data stream, an audio data stream, and other data streams compressed and encoded are recorded and clip information 530 in which information on encoding attributes for the clip A/V stream 540 is recorded. The clip A/V stream 540 multiplexes the video data stream, the audio data stream, and other data streams, compresses and encodes the multiplexed data streams, and records the compressed and encoded data streams. Each packet is identified by a Packet Identification (PID) as a packet identifier.

[48] On the other hand, the play list 510 to indicate a play sequence which specifies a reproduction order of the audio-visual data as a unit of reproduction includes play items 120a to 120c. That is, the play list 510 includes a plurality of play items (in this case, play items 120a to 120c).

[49] Specifically, the play list 510 further includes a play list mark 511 to indicate specific positions of the above-mentioned clip. The play list mark includes the metadata 512 to provide an extended search function according to an embodiment of the present invention. An example in which the metadata 512 is included and recorded in the play list mark 511 of the play list 510 is shown in FIG. 5. While it is understood that the metadata 512 may be defined separately from the play list mark 511 of the play list 510, or may be recorded in a binary type or a text type in a space independent of the play list 510, for the convenience of explanation, the example where the metadata are included in the play list mark of the play list is described based on FIG. 5.

[50] The play items 120a to 120c include information such as 'name' and 'IN_time' and 'OUT_time' of the clip information 530 file to be reproduced, so as to specify a clip or clips to be reproduced and a reproducing position or positions in the corresponding clip.

[51] Specifically, as shown in the figure, the play list mark 511, used to specify a specific position in the play list, has the following structure.

[52] FIG. 6 is a diagram illustrating the structure of the play list mark in the audio-visual data including the metadata according to an embodiment of the present invention. Referring to FIG. 6, the play list mark 511 includes an inherent identifier information (PlayListMark Identifier) field 610 to indicate the identifier of the play list mark, a mark type information (Type of Mark) field 620 to indicate the purpose of the

play list mark, a keyword (Keyword) field 630 and a description (Description) field 640 to be effective only when the mark type is a metadata mark, an inherent identifier information (Reference to Playitem Identifier) field 650 to indicate the identifier of the play item corresponding to the mark, and a mark time stamp (Mark Time Stamp) field 660 to indicate time information, including time points of the play item at which the play list mark is positioned. Any one of an entry mark (Entry Mark) 621, a link point (Link Point) 622, and the metadata mark (Metadata Mark) 623, according to an embodiment of the present invention, is allocated to the mark type field 620 to indicate the purpose of the play list markHere, the metadata mark 623 is allocated to the mark type field 620.

[53] As is described above, the metadata enables an author to newly define a search keyword using the keyword field 630 and to designate a keyword value corresponding to the search keyword using the description field 640. Accordingly, the author may newly add a variety of search keywords.

[54] On the other hand, since the play list mark 511 including the metadata is included in a binary type in the play list as shown in FIG. 5, the play list mark is included in 'In-Mux' type in the audio-visual data stream. Accordingly, binding the metadata to the audio-visual data stream is relatively easy and providing the extended search function using a variety of keywords that are defined by an author at the time of reproduction thereof is possible.

[55] However, it is understood that the play list mark 511 included in a binary type in the play list 510 may additionally provide support for multiple languages. That is, the reproduction apparatus to reproduce data recorded on the storage medium, according to the present invention, loads all the play lists on a memory, then extracts search keywords, which may be selected from the metadata information by a user by using an application having a programming function recorded in the storage medium or a specific module in the reproduction apparatus, and displays the extracted search keywords on a display unit. At this time, the search keywords are displayed in a specific language recorded in the keywords and descriptions when first preparing the metadata. That is, the play list mark 511 included in a binary type in the play list has a disadvantage of not supporting multiple languages.

[56] Here, preparing the play list in all languages to support a plurality of languages is not desirable. This is due to the fact that great resources included in the keyword and description fields so as to support such a plurality of languages require a greater memory.

[57] In order to solve such a problem, the structure of metadata to support the plurality of languages is now described as another embodiment of the present invention. FIG. 7 is a diagram illustrating a structure of the metadata to support multiple languages

according to an embodiment of the present invention.

[58] As is described above, general audio-visual data are multiplexed into a variety of applications such as graphic streams for subtitles or menus in a main audio-video data stream. This is due to the fact that binding and synchronizing the applications with the main audio-visual data stream is relatively easy.

[59] Therefore, in another embodiment of the present invention, only the keyword portions and the description portions of the metadata that are directly relative to the support for multiple languages are embodied in an additional text-based metadata type, and the identifier information or the time information of the metadata directly irrelative to the support for multiple languages are included in a binary type in the main audio-visual data stream.

[60] Accordingly, the reproduction apparatus may obtain the metadata, the time of application, and information on the predefined keywords using the play list included in the main audio-visual data stream. By defining only the author-defined keywords and the descriptions thereof in the text-based metadata file, reducing the size of the metadata file is possible. In addition, since the keywords and the descriptions thereof exist in a particular file other than the main audio-visual data stream, supporting multiple languages is also possible.

[61] Referring to FIG. 7, the metadata mark providing the extended search function is defined as a kind of mark type 710 in the play list mark 511. A keyword descriptor (Keyword Descriptor) field 720, being effective only when the mark type is a metadata mark, is also defined in the play list mark 511. The keyword descriptor field 720 has a predetermined number of bits. The keyword descriptor field 720 is divided into a flag region to indicate an existence of a specific keyword defined in advance and a flag region to indicate existence of a predetermined keyword which may be additionally defined by an author. For example, suppose that the keyword descriptor field 720 consists of N+M bits, where the N bits, corresponding to the former flag region 721, indicate the existence of N predefined search keywords and the M bits, corresponding to the latter flag region 722, indicate the existence of M author-defined search keywords. When a search keyword of the corresponding bit exists, a value '1b' is allocated. When a search keyword of the corresponding bit does not exist, a value '0b' is allocated.

[62] Referring to the bit structure of the keyword descriptor 720 shown in FIG. 7, for example, when 'character' indicating a character is allocated as a predefined search keyword to an author-defined Flag 1 721 of a bit, the value of '0b' set to the bit indicates that the corresponding search keyword is not effective. The value of '1b' set to the bit means that the search keyword corresponding to 'character' is effective. The same is true of an author-defined flag 722 of another bit. In this way, effectiveness of a

search keyword may be indicated using the keyword descriptor field 720.

[63] On the other hand, the text-based metadata file 713 exists separately from the above-mentioned play list mark 511 so as to support multiple languages. I t is desirable that the text-based metadata file 713 includes language information to indicate supported languages as attribute information ('lang' in the figure) so as to support multiple languages. Specifically, it is desirable that the same language code as is designated in a reproduction apparatus status register to store language information on any one of a subtitle, audio data, and a menu of the reproduction apparatus is used for the language information. Furthermore, since the text-based metadata file 713 is independent of the above-mentioned play list mark 511, it is desirable that the text-based metadata file 713 includes identifiers of the storage medium ('disc_id' in the figure) and/or title identifier information ('title_id' in the figure) for the binding to the main audio-visual data stream.

[64] The metadata file 713 shown at the lower end of FIG. 7 includes elements < author_defined> 722 and 723 for the search keywords which may be defined by the author. The search keywords, newly defined by the author, are used as contents of the elements. At this time, the first element 722 for the author-defined search keyword is a search keyword corresponding to the first bit having the value of '1b' in the author-defined flag of the above-mentioned keyword descriptor 721. For example, when the (N+1)-th bit of the keyword descriptor 720 is '1b', the element <author_defined> 722 which is first defined in the metadata file 713 indicates the corresponding search keyword. An element <marker> 724 having the keyword value corresponding to the search keyword as a content is also included. An element <param> 725 having the keyword values of a plurality of search keywords applied at the corresponding mark time point as a content may be further included as a specific element. Of course, the keyword values may be expressed in an attribute type, instead of the element <param>.

[65] Specifically, it is assumed that the keyword descriptor 720 included in the play list mark of FIG. 7 has 8 bits and the value thereof is '01001100'. The sixth, third, and second bits may have the value of '1b', the sixth bit may indicate 'character' as a predefined search keyword, and the elements <author_defined> of the third and second bits may indicate 'property' and 'location' in the additional metadata file 713, respectively. At this time, the keyword values corresponding to the search keywords are 'Bruce', 'Gun', and 'LA' as defined by the elements <param> 725.

[66] Of course, the elements <author_defined> may indicate ' □□ ' and ' □□□□ ', respectively, and the elements <param> 725 may indicate ' □□□ ', ' □ ', and ' □□□□□□ ', respectively, in Korean. Accordingly, providing the extended search function supporting multiple languages correspondingly to the language required by a user is possible.

[67] A reproduction apparatus and a reproduction method to reproduce the storage

medium including the above-mentioned metadata will now be described.

[68] FIG. 8 is a block diagram illustrating a reproduction apparatus according to the present invention. Referring to FIG. 8, the reproduction apparatus according to an embodiment of the present invention comprises a read unit 820, a search unit 840, and a reproduction unit 850. The read unit 820 reads out the audio-visual data and the metadata from the storage medium. Although not shown, the audio-visual data and the metadata read out by the read unit 820 may be temporarily stored in a buffer unit (not shown) in the read unit 820 and then transmitted to the reproduction unit 850.

[69] The search unit 840 searches the storage medium for the position of the audio-visual data satisfying a predetermined search condition externally input with reference to the metadata. Here, the storage medium includes a plurality of metadata used as a search reference of the audio-visual data.

[70] That is, the search unit 840 receives the metadata from the read unit 820, compares information on the search keywords included in the metadata with the predetermined search condition externally input, and then transmits position information of the audio-visual data included in a play list mark corresponding to the search condition or an additionally-defined mark to the reproduction unit 850. The reproduction unit 850 reproduces the corresponding part of the audio-visual data on the basis of the position information of the audio-visual data searched out by the search unit 840.

[71] The reproduction method of reproducing the storage medium including the metadata according to an embodiment of the present invention is described based on the structure described above. FIG. 9 is a flowchart illustrating the reproduction method using the extended search function according to an embodiment of the present invention. Referring to FIG. 9, in order to reproduce the storage medium including the metadata providing the extended search function, a predetermined search condition is first input (operation 920). Next, the audio-visual data and the metadata are read out from the storage medium and a position of the audio-visual data satisfying the predetermined search condition is searched out with reference to the metadata (operation 922). Then, the audio-visual data are reproduced from the searched-out position (operation 924).

[72] Specifically, in searching out the position of the audio-visual data with reference to the metadata, the input search condition and the search keyword information of the metadata are compared with each other to search out a play list mark corresponding to the search condition or an additionally-defined mark, and the corresponding position of the audio-visual data is searched out with reference to the position information included in the searched-out play list mark or the additionally-defined mark.

[73] Hitherto, the data structure, the reproduction apparatus, and the reproduction method to provide the extended search function on the audio-visual data included in

the respective titles of the storage medium by using the metadata have been described in detail. In addition, an extended structure of metadata and an embodying method thereof to provide the extended search function on an entire disk as well as the respective titles to enlarge the extended search function will be described.

[74] FIG. 10 is a block diagram illustrating a structure of metadata on the entire disk according to another embodiment of the present invention. Referring to FIG. 10, the metadata for an entire disk according to the present invention includes disk information 1010 used in common with information on the disk or all the titles of the disk and title information 1020 relative to the titles recorded on the disk. The title information 1020 and the disk information 1010 further include metadata 1012 and 1022 which may provide the extended search function and be defined by an author. Accordingly, as shown in FIGS. 1A and 9, providing extended metadata to provide the extended search function on contents stored in the titles or the disk, as well as the metadata to provide the extended search function on the audio-visual data itself, is possible.

[75] More specifically, the disk information 1010 may include metadata relative to production of the disk, metadata relative to resources of the disk, and metadata 1012 defined by the author of the disk. The metadata relative to the production of the disk may include disk name, content list, copyright, release information, etc. The metadata relative to resources of the disk may include thumbnail or URL addresses of relevant information.

[76] On the other hand, similarly to the disk information 1010, the title information 1020 may include metadata relative to production of contents, metadata relative to presentation of the contents, metadata relative to classification of the contents, metadata relative to resources of the contents, and metadata 1022 defined by the author of the contents. The metadata relative to production of the contents may include title name, title type, information on organizations involved in production and release of the title, etc. The metadata relative to presentation of the contents may include aspect ratio, subtitles, run time, information on support for audio, etc. The metadata relative to classification of the contents may include credit, promotion information, content type, review, etc. The credit is information on persons relative to production of the titles and may include information on actor, director, producer, music producer, scenario writer, etc. The promotion information is associated with genre, language, parental guide, etc. The metadata relative to resources of the contents may include synopsis, information on prize, and information on URL addresses of relevant data.

[77] FIG. 11 is a diagram illustrating an example where the metadata for an entire disk is applied according to another embodiment of the present invention. Referring to FIG. 11, the metadata 1000 for an entire disk are stored in a unit of disks or in a unit of volumes in a storage unit such as a hard disk of a reproduction apparatus, when the

disk is inserted into and loaded in the reproduction apparatus. Accordingly, even when the disk is removed from the reproduction apparatus, a specific disk or a specific title may be searched out using the metadata 1000 (also referred to as a disk library) stored in a unit of disks or in a unit of volumes in the storage unit. Specifically, the specific disk or the specific title may be searched out using the metadata 1012 and 1022 additionally defined by the author as well as disk information or title information defined in advance as shown in detail in FIG. 10. That is, while the extended search shown in FIGS. 1A to 9 is restricted to the audio-visual data of a title, the extended search shown in FIGS. 10 and 11 is enlarged to the entire disk. In addition, while it is an important purpose of the former to search out the position of the audio-visual data satisfying the search condition and to reproduce the audio-visual data from the searched-out position, it is an important purpose of the latter to display the contents satisfying the search condition in a type of disk information or title information. FIGS. 12A and 12B are diagrams illustrating a structure of author-defined metadata included in the metadata for the entire disk and an example thereof according to another embodiment of the present invention.

[78] Referring to FIG. 12A, when an author wants to additionally define metadata in addition to the descriptors of the metadata defined in advance, the author-defined metadata 'authordef' 1012A may be used. For example, when the author intends to add information on a supporting actress, the supporting actress is input to Element name of 'authordef', another 'authordef' is defined as a specific element of the 'authordef', and the name of the supporting actress is input to Element 'name' of the newly defined 'authordef'.

[79] An example in which the author-defined metadata are embodied in a markup document type is shown in FIG. 12B. Referring to FIG. 12B, the disk information element includes the author-defined element <authordef>, which includes Element < name> specifying the element name. The element <authordef> includes another element <authordef> as a specific element in which <name> may be defined. For example, in order to define the author-defined metadata for a supporting actress, 'supporting_actress' may be specified in the element <name> of the generic element < authordef>, and 'Actress1' may be specified in the element <name> of the specific element <authordef>.

[80] FIGS. 13A and 13B are diagrams illustrating a nesting structure of author-defined metadata and an example thereof. Referring to FIGS. 13A and 13B, an element 'supporting actress name' is defined as a specific element of an element 'supporting actress' and an element 'profile (cast works)' is defined as a specific element of the element 'supporting actress name'. In this way, providing hierarchical metadata using the author-defined elements <authordef> and <name> is possible. That is, by adding

the author-defined information using the metadata 'authordef', classifying and displaying more detailed information through the nesting of the element 'authordef' is possible.

[81] On the other hand, FIG. 14 shows an example of a reproduction apparatus providing disk information or title information using the extended search function according to another embodiment of the present invention. Referring to FIG. 14, the reproduction apparatus allows a search unit 1420 to search a metadata storage unit for metadata in accordance with an input search condition through a user interface unit 1430 and to output the results of the search through a display unit 1440. The multimedia data reproduction apparatus comprises the metadata storage unit 1410, the search unit 1420, the user interface unit 1430, and the display unit 1440. The metadata storage unit 1410 receives metadata from a storage medium such as a disk or a network and stores the received metadata. When a user inserts a storage medium into the multimedia data reproduction apparatus and the reproduction apparatus loads the storage medium once, the metadata relative to the storage medium are not deleted but remains in the metadata storage unit 1410, even when the storage medium is ejected. The user inputs search conditions for the metadata to the user interface unit 1430. That is, keywords for disk name, actor, actress, director, etc., are input using a remote controller or other devices. The search unit 1420 searches the metadata and outputs the metadata corresponding to the user's search condition to the display unit 1440.

[82] On the other hand, FIG. 15 is a flowchart illustrating a method of providing disk information or title information using the extended search function according to another embodiment of the present invention.

[83] Referring to FIG. 15, a predetermined search condition is input (operation 1510). Metadata are read out from a disk library stored in the metadata storage unit 1410 such as a hard disk and disk information or title information satisfying the search condition is searched out with reference to the read-out metadata (operation 1512). The searched-out disk information or title information is displayed on the display unit (operation 1514). As a result, the disk information or title information corresponding to the search condition may be provided to the user.

[84] FIG. 16 is a block diagram of a recording and/or reproducing apparatus according to an embodiment of the present invention. Referring to FIG. 16, the recording and/or reproducing apparatus for use with a user interface unit and a display unit to provide disk information and/or title information using an extended search function includes a recording/reading unit 1601, a controller 1602, and an optical disk 1610 onto which and from which data is recorded/reproduced by the recording/reading unit 1601 according to the control of the controller 1602. According to embodiments of the invention, the controller 1602 includes the metadata storage unit 1410 and the search

unit 1420, as shown in FIG. 14. As such, the controller 1602 is able to store metadata associated with the disk information and is further able to search in the stored metadata in accordance with an input search condition through the user interface unit 1430 of FIG. 14. Further, the controller 1602 outputs the results of the search through the display unit 1440 as set forth in relation to the discussion above and to FIG 14. It is understood, that the user interface includes but is not limited to keyboards, mousse, voice command receptors, or combinations thereof. Similarly, the display unit may be a monitor, a TV screen, or the like.

[85] As is described above, according to aspects of the present invention, there is provided a storage medium including metadata, which provide an extended search function using a variety of search keywords on audio-visual data, and reproduction apparatus and method of reproducing the storage medium.

[86] Specifically, the metadata according to aspects of the present invention provide the search keywords which may be additionally defined by an author, in addition to the predefined search keywords.

[87] Accordingly, the conventional problem may be solved that the audio-visual data or the metadata in a storage medium once produced could not be edited or reused, so that iproviding an extended search function using a variety of keywords defined by an author at the time of reproduction is possibble.

[88] Furthermore, by recording only portions of the metadata directly relative to the support for multiple languages in an additional text-based file, providing an extended search function using a plurality of languages is possible.

[89] Further, providing an extended search function of searching out and displaying the information on contents in a unit of disks or in a unit of titles is also possible.

[90] On the other hand, the extended search method according to aspects of the present invention may be embodied as computer programs. Codes and code segments constituting the programs may be easily construed by programmers skilled in the art. The programs may be stored in a computer readable recording medium and read by a computer, thereby embodying the extended search method. Examples of the computer readable recording medium include magnetic re cording media, optical recording media, and carrier waves. Of course, other types of computer readable recording media are possible.

[91] Although a few embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

Industrial Applicability

[92] The present invention applies to a storage medium including metadata, which

provide an extended search function using a variety of search keywords on audio-visual data, and to reproduction apparatus and method of reproducing the storage medium.

Claims

[1] What is claimed is:

1. A storage medium including:

audio-visual data; and

metadata providing an extended search function on the audio-visual data, wherein the metadata include a predefined search keyword and a search keyword which are to be additionally defined by an author.

[2] 2. The storage medium according to claim 1, wherein the metadata are embodied in a binary type and the metadata include additional text fields to additionally define the author-defined search keyword and a keyword value of the author-defined search keyword.

[3] 3. The storage medium according to claim 1, wherein the metadata are embodied in a text-based markup language type and the metadata include additional elements or attributes to additionally define the author-defined search keyword and a keyword value of the author-defined search keyword.

[4] 4. The storage medium according to claim 1, wherein parameters that are unrelated to supporting multiple languages in the metadata are included in a binary type in the audio-visual data and parameters relative to supporting multiple languages are embodied in an additional text-based file.

[5] 5. The storage medium according to claim 4, wherein the parameters that are unrelated to supporting multiple languages include a keyword descriptor defining effectiveness of a plurality of search keywords.

[6] 6. The storage medium according to claim 5, wherein the predefined search keyword is allocated to a predetermined bit of the keyword descriptor.

[7] 7. The storage medium according to claim 5, wherein the author-defined search keyword is allocated to a predetermined bit of the keyword descriptor.

[8] 8. The storage medium according to claim 4, wherein the additional text-based file includes information on supported languages in file names and/or attributes and/or elements.

[9] 9. The storage medium according to claim 4, wherein the additional text-based file include an identifier of the storage medium and/or title identifier information for the binding to the audio-visual data.

[10] 10. The storage medium according to claim 7, wherein the additional text-based file includes an element and/or an attribute indicating the author-defined search keyword among the search keywords specified by the keyword descriptors.

[11] 11. The storage medium according to claim 10, wherein the additional text-based file includes an element and/or an attribute indicating keyword values of the

search keywords specified by the keyword descriptors.

[12] 12. A reproduction apparatus comprising:
a search unit to search a storage medium for a position of audio-visual data satisfying a predetermined search condition with reference to metadata, the storage medium including the audio-visual data and the metadata providing an extended search function on the audio-visual data; and
a reproduction unit to reproduce the audio-visual data from the searched-out position,
wherein the metadata includes a predetermined search keyword and a search keyword which may be additionally defined by an author.

[13] 13. The reproduction apparatus according to claim 12, wherein the search unit selects the metadata corresponding to language information supporting subtitle, audio, or menu stored in a system parameter.

[14] 14. A reproduction method comprising:
searching a storage medium for a position of audio-visual data satisfying a predetermined search condition with reference to metadata, the storage medium including the audio-visual data and the metadata providing an extended search function on the audio-visual data; and
reproducing the audio-visual data from the searched-out position,
wherein the metadata includes a predetermined search keyword and a search keyword which are additionally definable by an author.

[15] 15. A storage medium including:
audio-visual data; and
metadata to provide an extended search function on the audio-visual data,
wherein the metadata include a predefined search keyword and a search keyword which may be additionally defined by an author and the metadata are included in information on an entire disk and/or tile information.

[16] 16. The storage medium according to claim 15, wherein the metadata are downloaded to a storage unit of a reproduction apparatus and are used to search the audio-visual data.

[17] 17. A reproduction apparatus comprising:
a search unit to search a storage medium for information on an entire disk and/or title information satisfying a predetermined search condition with reference to metadata, the storage medium including the audio-visual data and the metadata providing an extended search function on the audio-visual data; and
a display unit to display the information on the entire disk and/or title information,
wherein the metadata includes a predetermined search keyword and a search

keyword which are additionally definable by an author.

[18] 18. The reproduction apparatus according to claim 17, further comprising a metadata storage unit downloading and storing the metadata from the storage medium.

[19] 19. The reproduction apparatus according to claim 17, further comprising a user interface unit receiving a predetermined search condition.

[20] 20. A reproduction method comprising:
searching a storage medium for information on an entire disk and/or title information satisfying a predetermined search condition with reference to metadata, the storage medium including audio-visual data and metadata providing an extended search function on the audio-visual data; and
displaying the information on the entire disk and/or title information,
wherein the metadata includes a predetermined search keyword and a search keyword which are additionally definable by an author.

[21] 21. The reproduction method according to claim 20, further comprising downloading and storing the metadata from the storage medium before the searching the storage medium.

[22] 22. The reproduction method according to claim 20, further comprising receiving a predetermined search condition before the searching the storage medium.

[23] 23. A storage medium to be used with a reproducing apparatus and to store data including audio/visual (AV) data and metadata, the data comprising:
a plurality of scene elements of the AV data;
keyword elements as specific elements of the corresponding scene elements, each keyword element having a search keyword, which an author selectively defines, as a content of the corresponding scene element; and
a description element, having a keyword value corresponding to the author-defined search keyword as content thereof, as a specific element of each keyword element.

[24] 24. The storage medium according to claim 23, wherein the keyword elements and/or the description element are attributes of the corresponding scene element.

[25] 25. A markup document in which metadata of audio/visual (AV) data to be reproduced by a reproducing apparatus is described in a markup language, comprising:
a metadata element to include link information on a play sequence of the AV data;
a scene element, included in the metadata element, to act as a specific element of the metadata, the scene element including keyword elements and a description element.

[26] 26. The markup document according to claim 25, wherein the keyword elements comprise a variety of author-defined search keywords as contents thereof.

[27] 27. The markup document according to claim 26, wherein the description element comprises keyword values corresponding to the search keywords as specific elements thereof.

[28] 28. The markup document according to claim 27, wherein the search keywords are defined in advance and/or by an author.

[29] 29. The markup document according to claim 28, wherein the author may newly defines and uses a variety of search keywords without restriction and without conventional terms used at the time of producing a title.

[30] 30. A storage medium of a reproducing apparatus to store audio/visual (AV) data including metadata, the metadata comprising at least two text-type fields to allow an author to newly define and use a description field to indicate a keyword value and/or a keyword field to indicate a search keyword, wherein a variety of search keywords are addable by the author using the keyword field.

[31] 31. A structure of audio/visual (AV) data stream to be reproduced by a reproducing apparatus, the AV data stream including at least one AV data clip and metadata, comprising:
a play list to indicate a play sequence which specifies a reproduction order of the clip, the play list including:
a plurality of play items including information of the clip and a reproducing position in the clip ; and
a play list mark, including the metadata, to provide a search function to allow a search of the clip.

[32] 32. The structure according to claim 31, wherein the metadata is defined separately from the play list mark.

[33] 33. The structure according to claim 31, wherein the metadata is recorded in a binary type or a text type independent of the play list.

[34] 34. The structure according to claim 31, wherein the play list mark comprises:
an inherent identifier field to indicate an identifier of the play list mark;
a mark type field to indicate a purpose of the play list mark;
a keyword field and a description field to be effective only when the mark type is a metadata mark;
an inherent identifier field to indicate the identifier of the play item corresponding to the mark; and
a mark time stamp field to indicate time information, including time points of the play item the play list mark is positioned at.

[35] 35. The structure according to claim 34, wherein any one of an entry mark, a link

point, and a metadata mark is allocated to the mark type field to indicate a purpose of the play list mark.

[36] 36. The structure according to claim 35, wherein the metadata mark is allocated to the mark type field.

[37] 37. The structure according to claim 31, wherein the metadata enables an author to newly define a search keyword to search the clip, to designate a keyword value, and/or to add a variety of search keywords to search the clip.

[38] 38. The structure according to claim 34, wherein

keywords in the keyword field and descriptions in the description field that are directly relative to the support for multiple languages are embodied in additional text-based metadata, and

identifier information or the time information of the metadata that are unrelated to the support for multiple languages are included in a binary type in the main AV data stream.

[39] 39. The structure according to claim 38, wherein the text-based metadata exists separately from the play list mark.

[40] 40. The structure according to claim 31, wherein the metadata comprises disk information relative to titles recorded in a disk to provide an extended search function to allow searching on contents stored in the titles.

[41] 41. The structure according to claim 31, wherein the metadata comprises disk information relative to a production of a disk, to resources of the disk, data defined by an author of the disk.

[42] 42. The structure according to claim 40, wherein the disk information relative to the titles recorded in the disk comprises metadata relative to production of contents, metadata relative to presentation of the contents, metadata relative to classification of the contents, metadata relative to resources of the contents, and metadata defined by an author of the contents.

[43] 43. The structure according to claim 31, wherein the metadata is stored in a unit of disks and/or in a unit of volumes in a storage unit.

[44] 44. A method of operating a reproducing apparatus to reproduce audio/visual (AV) data recorded on a disk, the AV data including metadata, the method comprising:

inputting a search condition;

reading metadata from a disk library stored in a storage unit other than the disk;

searching out disk information and/or or title information satisfying the search condition with reference to the metadata; and

displaying the searched-out disk information and/or title information.

[45] 45. A reproducing apparatus to reproduce data recorded on a storage medium,

the data including audio/visual (AV) data and metadata, the apparatus comprising:

a read unit to read the AV data and the metadata from the storage medium;

a search unit to search the storage medium for a position of the AV data that satisfies an externally input predetermined search condition with reference to the metadata ; and

a reproduction unit to reproduce a corresponding part of the AV data based on the position of the AV data that satisfies an externally input predetermined search condition.

[46] 46. The apparatus according to claim 45, wherein the search unit receives the metadata from the read unit, compares information on search keywords included in the metadata with the search condition, and then transmits position information of the AV data and/or an additionally-defined play mark to the reproduction unit.

[47] 47. A method of operating a reproducing apparatus to reproduce audio/visual (AV) data recorded on a storage medium, the AV data including metadata, the method comprising:

inputting a predetermined search condition;

reading the AV data and the metadata from the storage medium;

searching out a position of the AV data satisfying the predetermined search condition with reference to the metadata; and

reproducing the AV data from the searched-out position.

[48] 48. The method according to claim 47, wherein the searching comprises comparing the search condition and the metadata with each other to search out a play list mark corresponding to the search condition.

[49] 49. A storage medium including:

audio-visual data; and

metadata to provide an extended search function on the audio-visual data, wherein

the metadata include a predefined search keyword and a search keyword which may be additionally defined by an author and the metadata are included in information on an entire disk and/or tile information, and

portions of the metadata that relate to support for multiple languages are recorded in a text based file so as to provide an extended search function using a plurality of languages.

[50] 50. A reproducing and/or recording apparatus for use with a user interface unit and a display unit to provide disk information and/or title information using an extended search function, the apparatus comprising:

a metadata storage unit to store metadata associated with the disk information;
a search unit to search the metadata storage unit for the stored metadata in accordance with an input search condition through the user interface unit and to output the results of the search through the display unit.

[51] 51. The apparatus according to claim 50, wherein the search condition comprises keywords for a disk name, an actor, an actress, a director, or combinations thereof.

[52] 52. The apparatus according to claim 50, wherein the metadata storage unit r eceives metadata from a storage medium.

[53] 53. The apparatus according to claim 52, wherein, if the storage medium is loaded into the apparatus, the metadata relative to the storage medium are not deleted but remains in the metadata storage unit, even when the storage medium is ejected.

[54] 54. A recording and/or reproducing apparatus for use with a user interface unit and a display unit to provide disk information and/or title information using an extended search function, the apparatus comprising:
an optical disk;
a recording/reading unit to record/read data onto/from the optical disk; and
a controller to control the recording/reading unit, the
controller including a searchable storage such that the controller is able to store metadata associated with information relating to the optical disk and such that the controller is able to
search the stored metadata in accordance with an input search condition that is inputted through the user interface unit, wherein the controller outputs results of the search to the display unit.

FIG. 1A

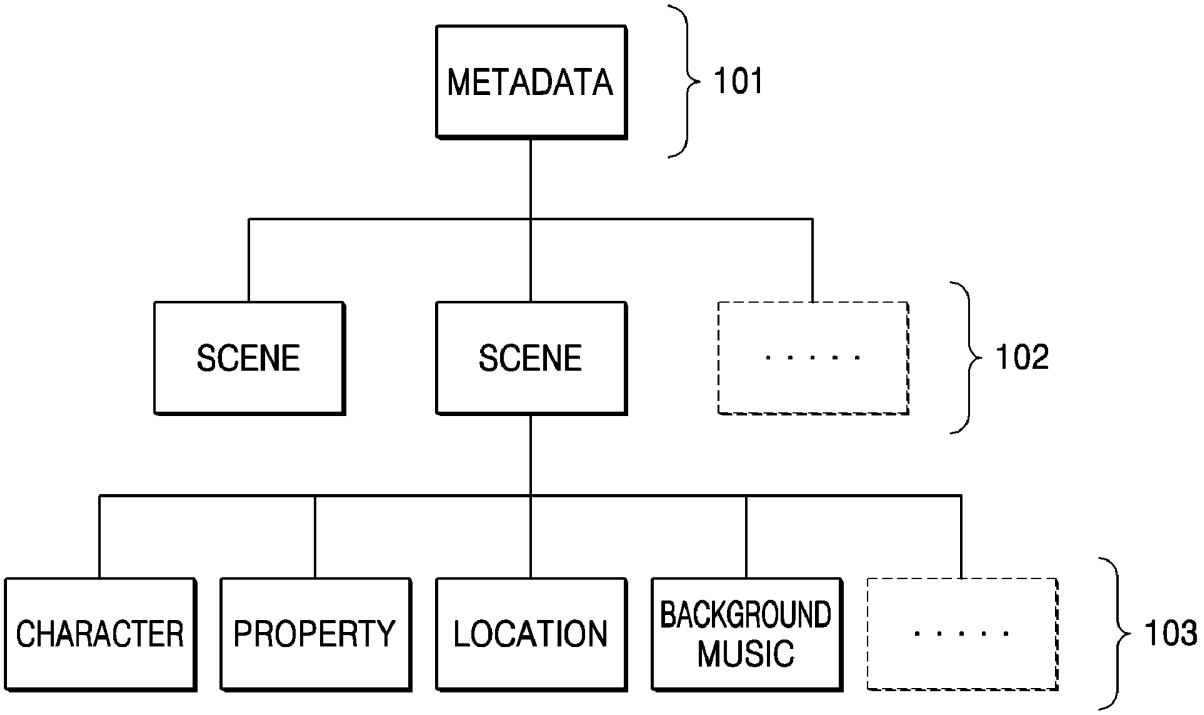

METADATA
101
SCENE
SCENE
. . . . .
102
CHARACTER
PROPERTY
LOCATION
BACKGROUND MUSIC
. . . . .
103

FIG. 1B

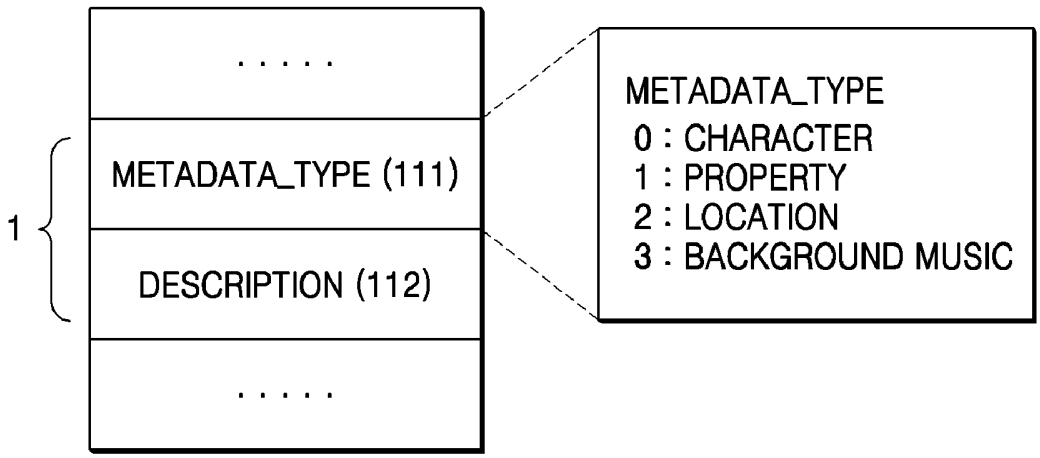

. . . . .
METADATA_TYPE (111)
DESCRIPTION (112)
. . . . .
1
METADATA_TYPE
0 : CHARACTER
1 : PROPERTY
2 : LOCATION
3 : BACKGROUND MUSIC

FIG. 2

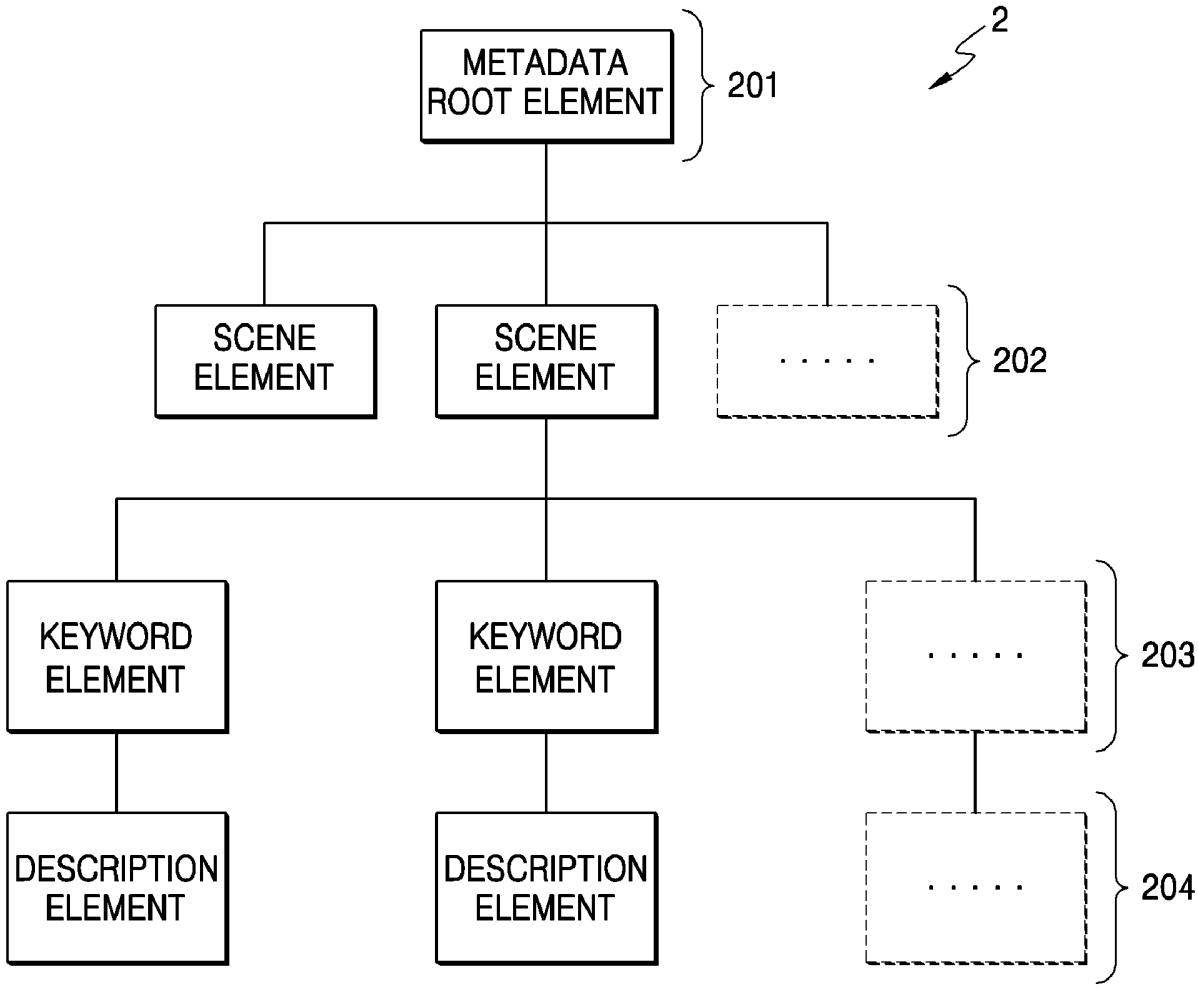

2
METADATA ROOT ELEMENT
201
SCENE ELEMENT
SCENE ELEMENT
. . . . .
202
KEYWORD ELEMENT
KEYWORD ELEMENT
. . . . .
203
DESCRIPTION ELEMENT
DESCRIPTION ELEMENT
. . . . .
204

FIG. 3

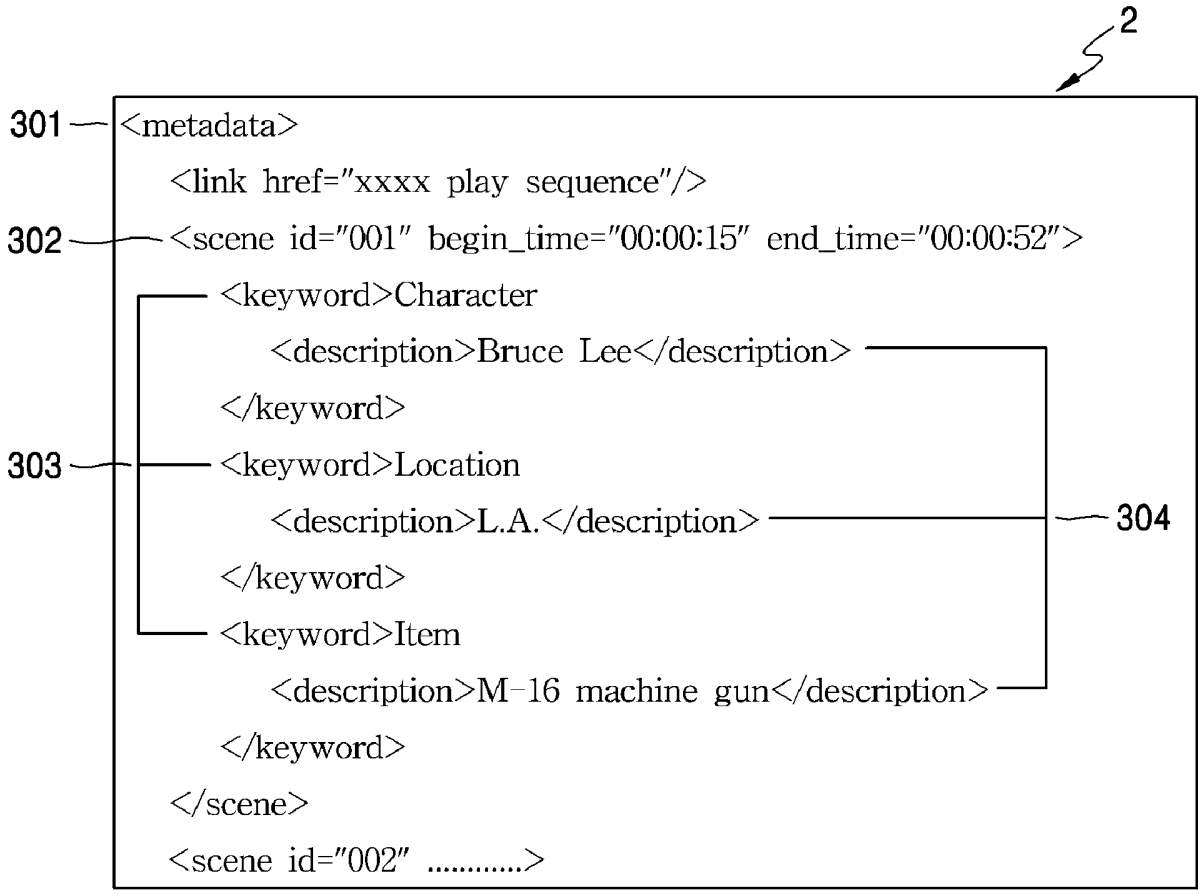

2
301
<metadata>
<link href="xxxx play sequence"/>
302
<scene id="001" begin_time="00:00:15" end_time="00:00:52">
<keyword>Character
<description>Bruce Lee</description>
</keyword>
303
<keyword>Location
<description>L.A.</description>
304
</keyword>
<keyword>Item
<description>M-16 machine gun</description>
</keyword>
</scene>
<scene id="002" .....>

FIG. 4

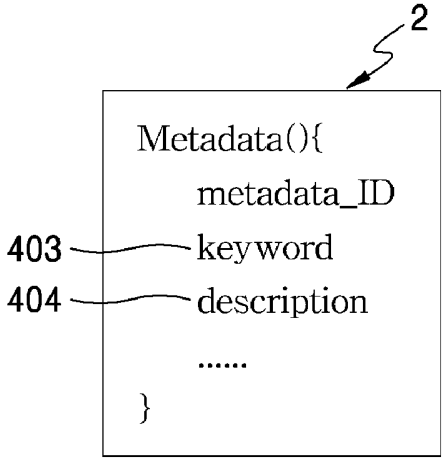

2
Metadata(){
metadata_ID
403
keyword
404
description
.....
}

FIG. 5

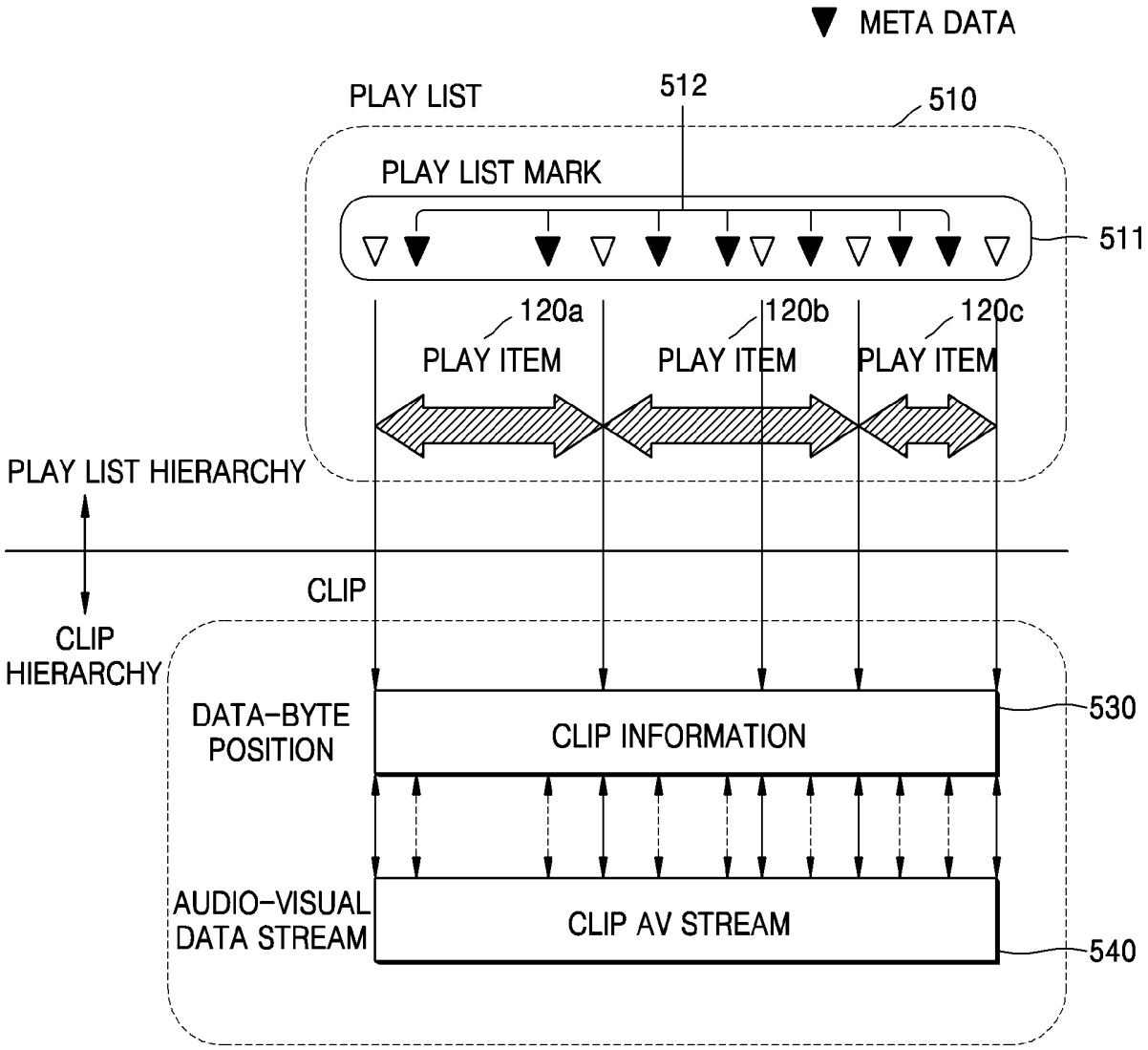

META DATA
PLAY LIST
512
510
PLAY LIST MARK
511
120a
120b
120c
PLAY ITEM
PLAY ITEM
PLAY ITEM
PLAY LIST HIERARCHY
CLIP
CLIP HIERARCHY
DATA-BYTE POSITION
CLIP INFORMATION
530
AUDIO-VISUAL DATA STREAM
CLIP AV STREAM
540

FIG. 6

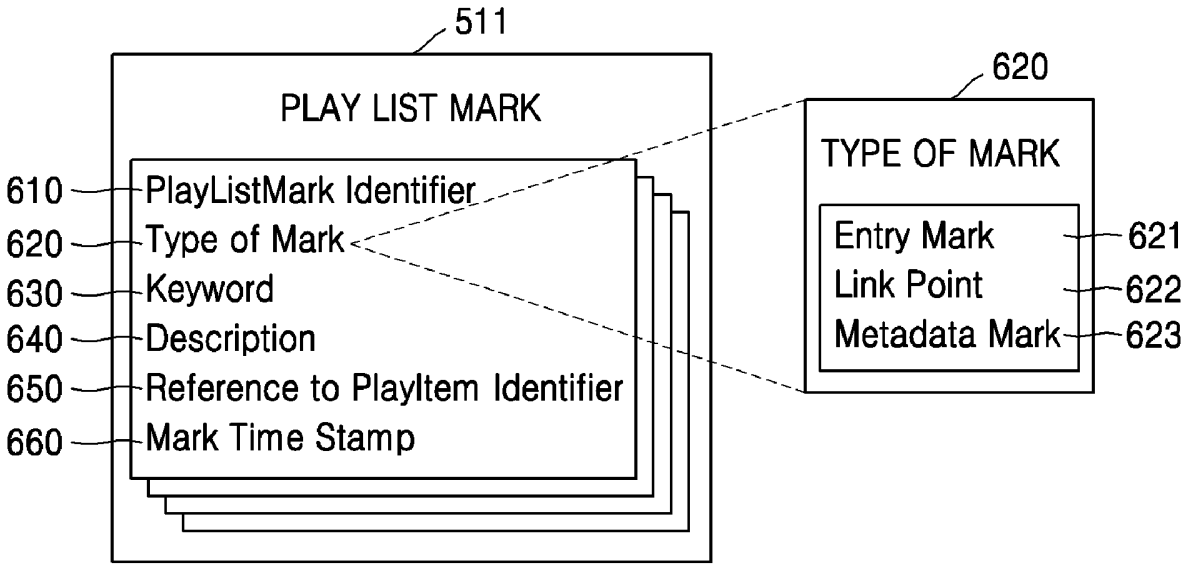

511
PLAY LIST MARK
610
PlayListMark Identifier
620
Type of Mark
630
Keyword
640
Description
650
Reference to PlayItem Identifier
660
Mark Time Stamp
620
TYPE OF MARK
Entry Mark
621
Link Point
622
Metadata Mark
623

FIG. 7

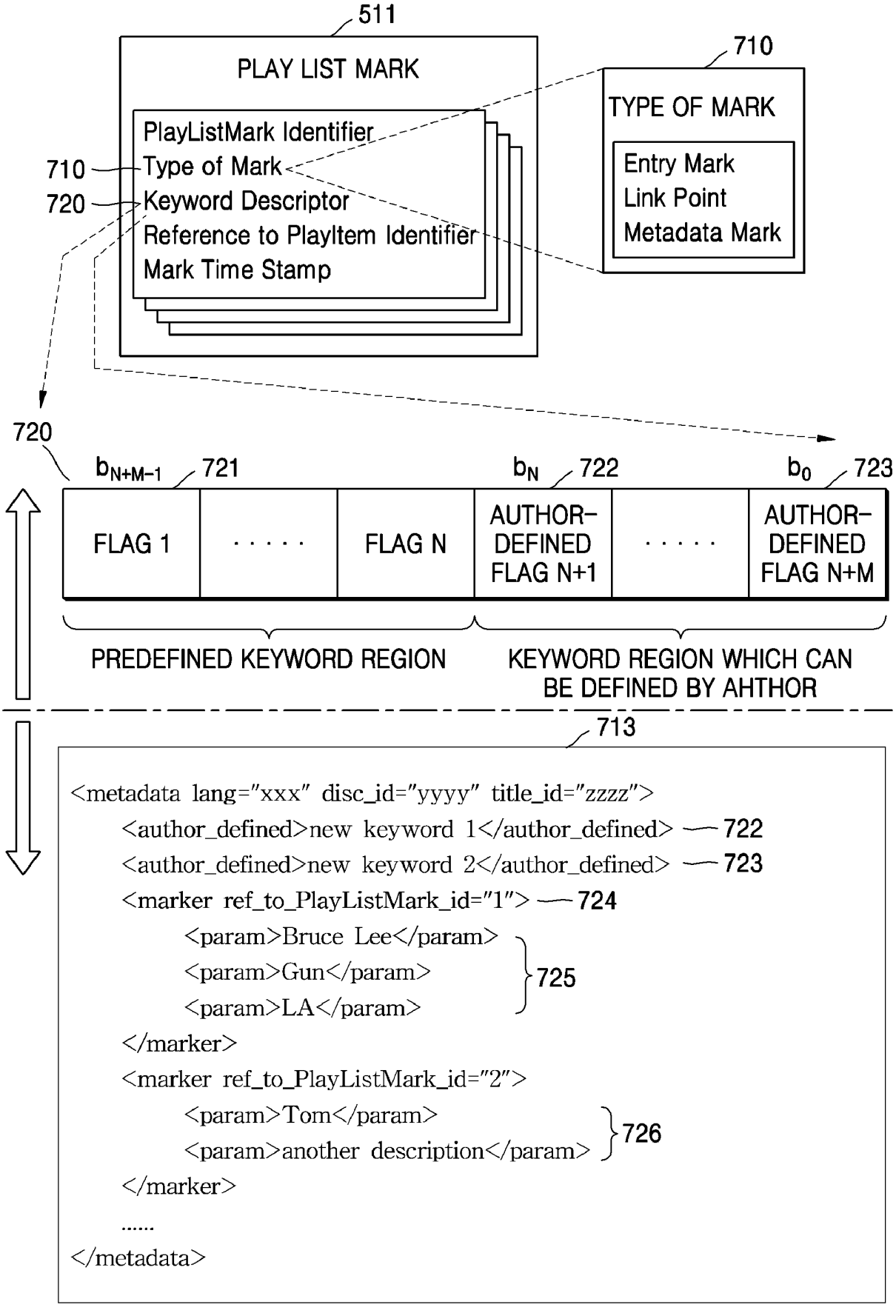

511
PLAY LIST MARK
PlayListMark Identifier
Type of Mark
Keyword Descriptor
Reference to PlayItem Identifier
Mark Time Stamp
710
720
710
TYPE OF MARK
Entry Mark
Link Point
Metadata Mark
720
b_{N+M-1}
721
b_N
722
b_0
723
FLAG 1
· · · · ·
FLAG N
AUTHOR-DEFINED FLAG N+1
· · · · ·
AUTHOR-DEFINED FLAG N+M
PREDEFINED KEYWORD REGION
KEYWORD REGION WHICH CAN BE DEFINED BY AHTHOR
713
<metadata lang="xxx" disc_id="yyyy" title_id="zzzz">
<author_defined>new keyword 1</author_defined> 722
<author_defined>new keyword 2</author_defined> 723
<marker ref_to_PlayListMark_id="1"> 724
<param>Bruce Lee</param>
<param>Gun</param>
<param>LA</param>
725
</marker>
<marker ref_to_PlayListMark_id="2">
<param>Tom</param>
<param>another description</param>
726
</marker>
.....
</metadata>

FIG. 8

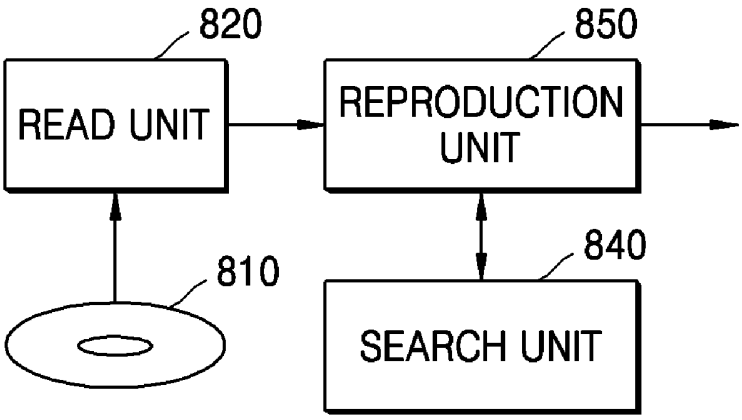

820
850
READ UNIT
REPRODUCTION UNIT
840
810
SEARCH UNIT

FIG. 9

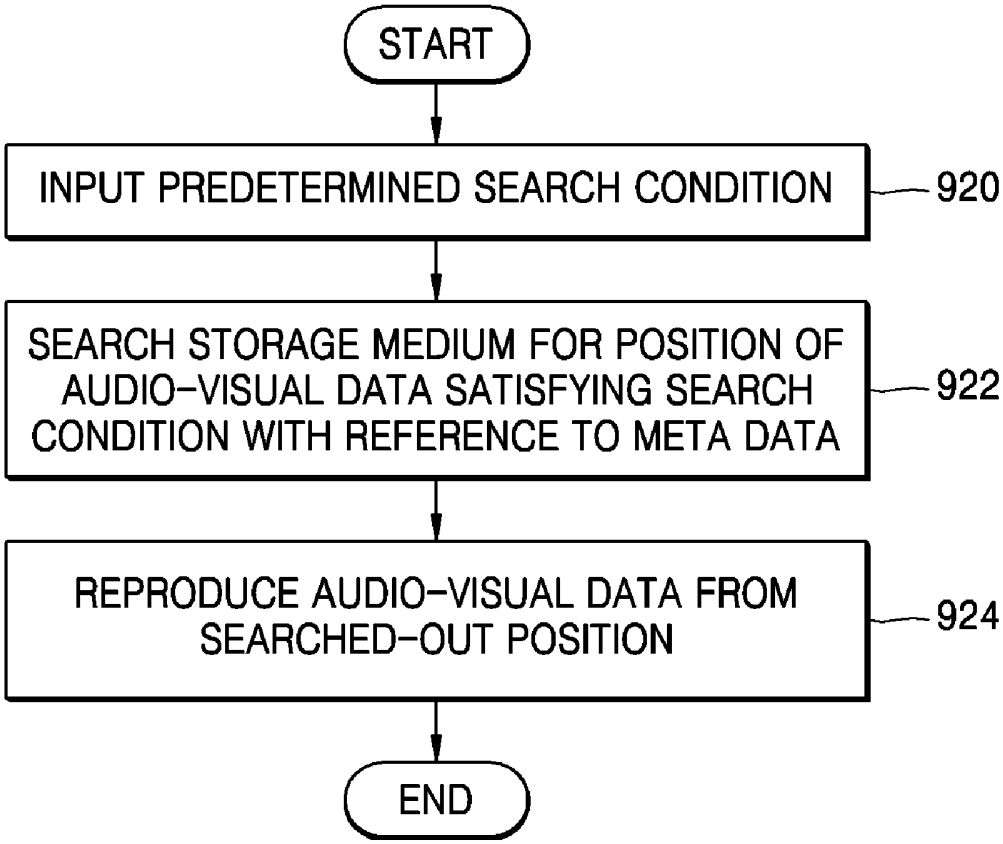

START
INPUT PREDETERMINED SEARCH CONDITION
920
SEARCH STORAGE MEDIUM FOR POSITION OF AUDIO-VISUAL DATA SATISFYING SEARCH CONDITION WITH REFERENCE TO META DATA
922
REPRODUCE AUDIO-VISUAL DATA FROM SEARCHED-OUT POSITION
924
END

FIG. 10

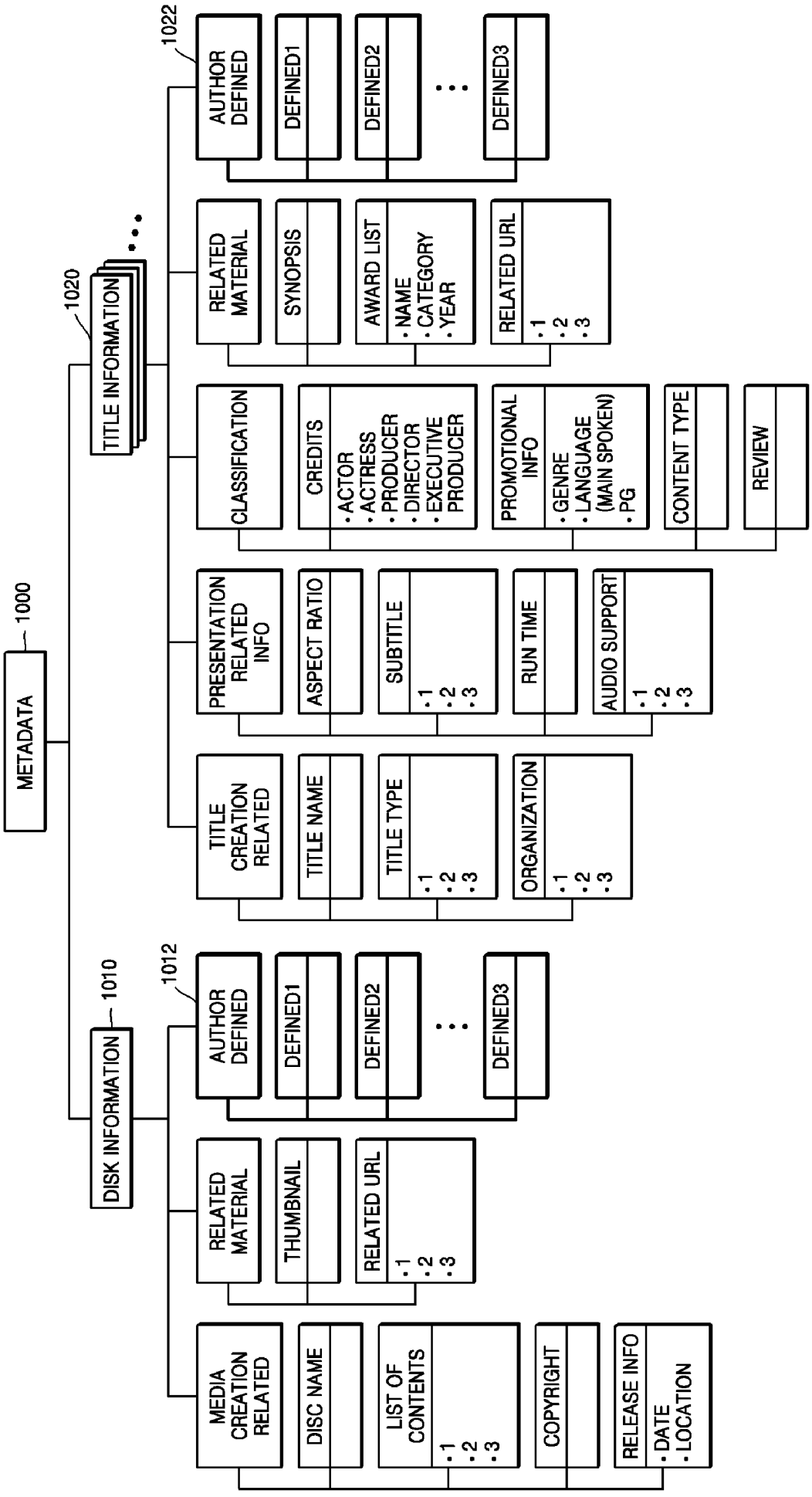

METADATA
1000
DISK INFORMATION
1010
MEDIA CREATION RELATED
DISC NAME
LIST OF CONTENTS
• 1
• 2
• 3
COPYRIGHT
RELEASE INFO
• DATE
• LOCATION
RELATED MATERIAL
THUMBNAIL
RELATED URL
• 1
• 2
• 3
1012
AUTHOR DEFINED
DEFINED1
DEFINED2
DEFINED3
TITLE INFORMATION
1020
TITLE CREATION RELATED
TITLE NAME
TITLE TYPE
• 1
• 2
• 3
ORGANIZATION
• 1
• 2
• 3
PRESENTATION RELATED INFO
ASPECT RATIO
SUBTITLE
• 1
• 2
• 3
RUN TIME
AUDIO SUPPORT
• 1
• 2
• 3
CLASSIFICATION
CREDITS
• ACTOR
• ACTRESS
• PRODUCER
• DIRECTOR
• EXECUTIVE PRODUCER
PROMOTIONAL INFO
• GENRE
• LANGUAGE (MAIN SPOKEN)
• PG
CONTENT TYPE
REVIEW
RELATED MATERIAL
SYNOPSIS
AWARD LIST
• NAME
• CATEGORY
• YEAR
RELATED URL
• 1
• 2
• 3
1022
AUTHOR DEFINED
DEFINED1
DEFINED2
DEFINED3

FIG. 11

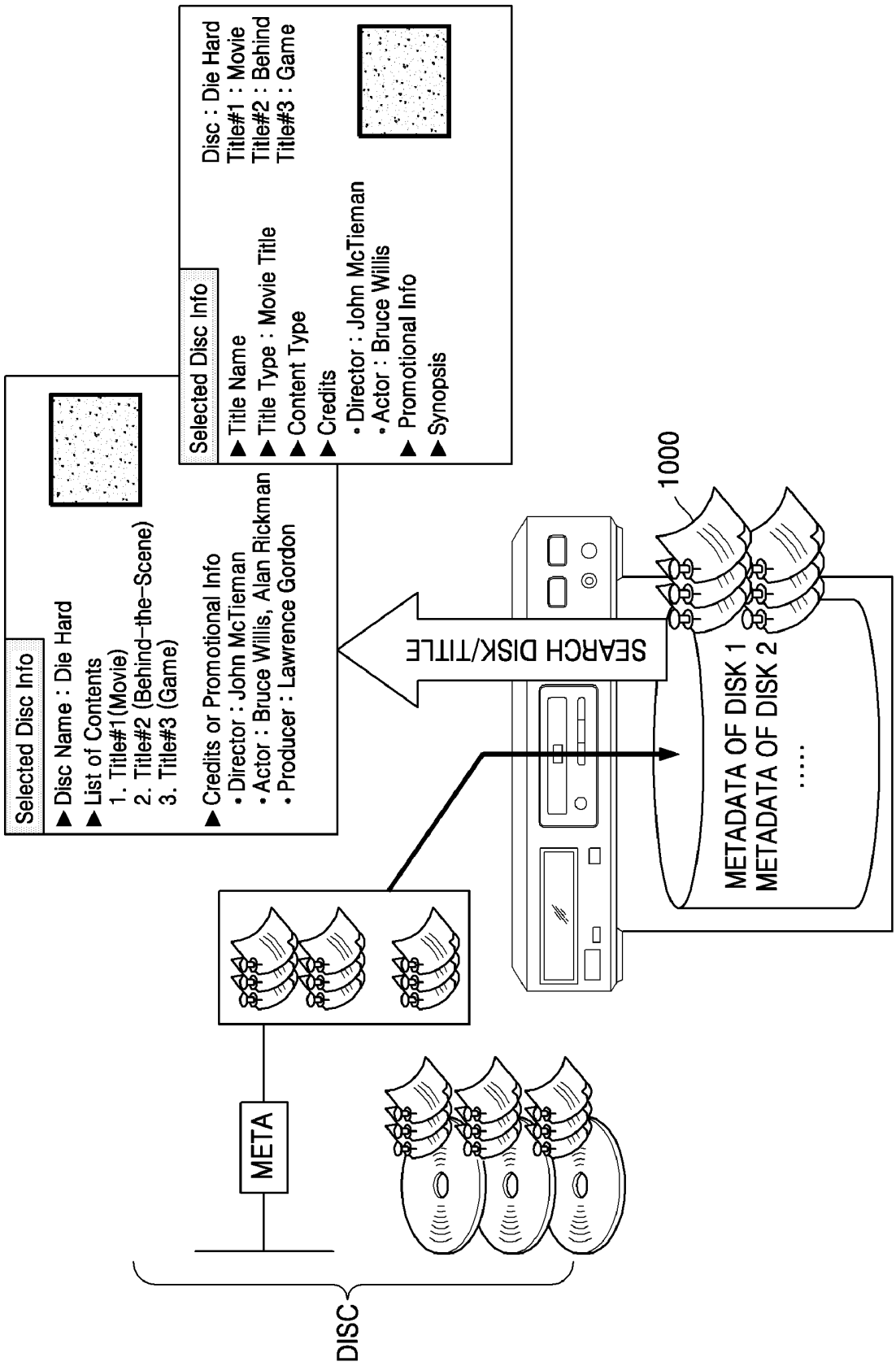

Selected Disc Info
▲Disc Name : Die Hard
▲List of Contents
1. Title#1(Movie)
2. Title#2 (Behind-the-Scene)
3. Title#3 (Game)
▲Credits or Promotional Info
• Director : John McTieman
• Actor : Bruce Willis, Alan Rickman
• Producer : Lawrence Gordon
Selected Disc Info
▲Title Name
▲Title Type : Movie Title
▲Content Type
▲Credits
• Director : John McTieman
• Actor : Bruce Willis
▲Promotional Info
▲Synopsis
Disc : Die Hard
Title#1 : Movie
Title#2 : Behind
Title#3 : Game
SEARCH DISK/TITLE
1000
METADATA OF DISK 1
METADATA OF DISK 2
.....
META
DISC

FIG. 12A

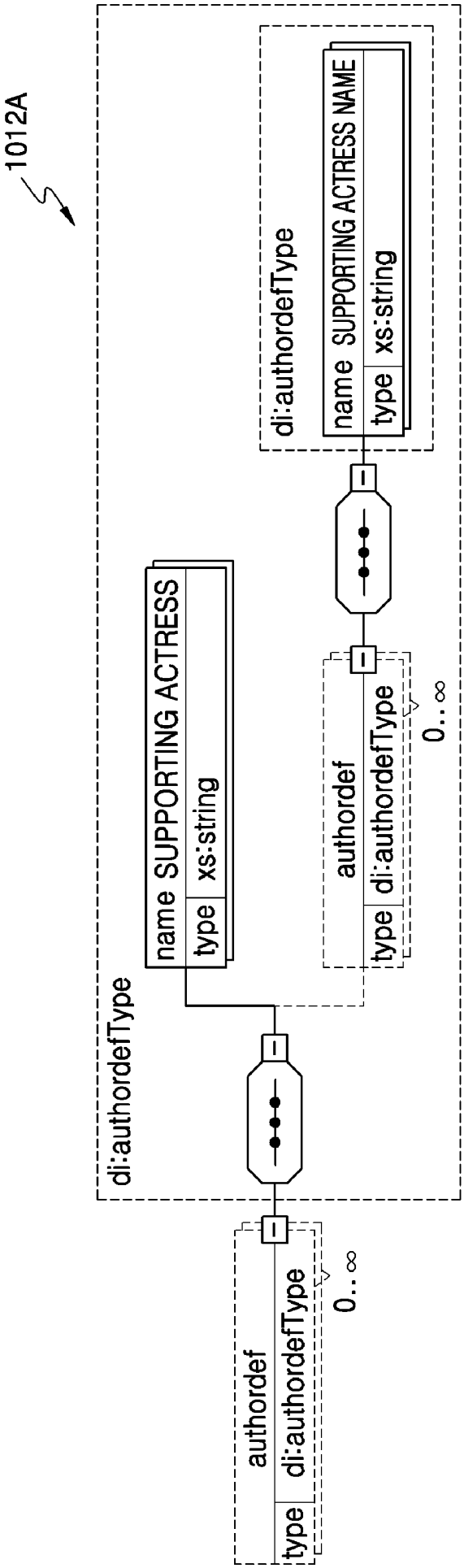

1012A
di:authordefType
name SUPPORTING ACTRESS
type xs:string
authordef
type di:authordefType
0..∞
di:authordefType
name SUPPORTING ACTRESS NAME
type xs:string
authordef
type di:authordefType
0..∞

FIG. 12B

1012A

```
<discinfo>
        <authordef>
            <name>supporting_actress</name>
            <authordef>
                <name>Actress1</name>
            </authordef>
        </authordef>
</discinfo>
```

FIG. 13A

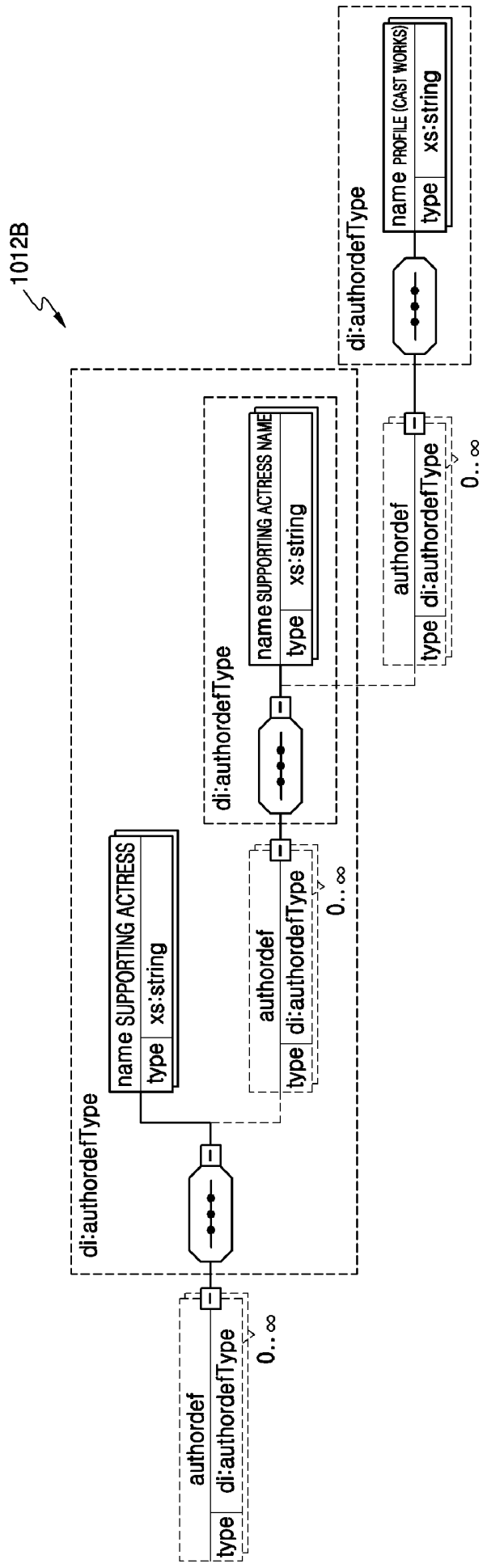

1012B
di:authordefType
name SUPPORTING ACTRESS
type xs:string
authordef
type di:authordefType
0..∞
di:authordefType
name SUPPORTING ACTRESS NAME
type xs:string
authordef
type di:authordefType
0..∞
di:authordefType
name PROFILE (CAST WORKS)
type xs:string
authordef
type di:authordefType
0..∞

FIG. 13B

1012B

```
<discinfo>
    <authordef>
        <name>supporting_actress</name>
        <authordef>
            <name>actress1</name>
            <authordef>
                <name>Profile</name>
                <authordef>
                    <name>Performed In: Movie1,
                Movie2, Act_A, Musical_A</name>
                </authordef>
            </authordef>
        </authordef>
    </authordef>
```

FIG. 14

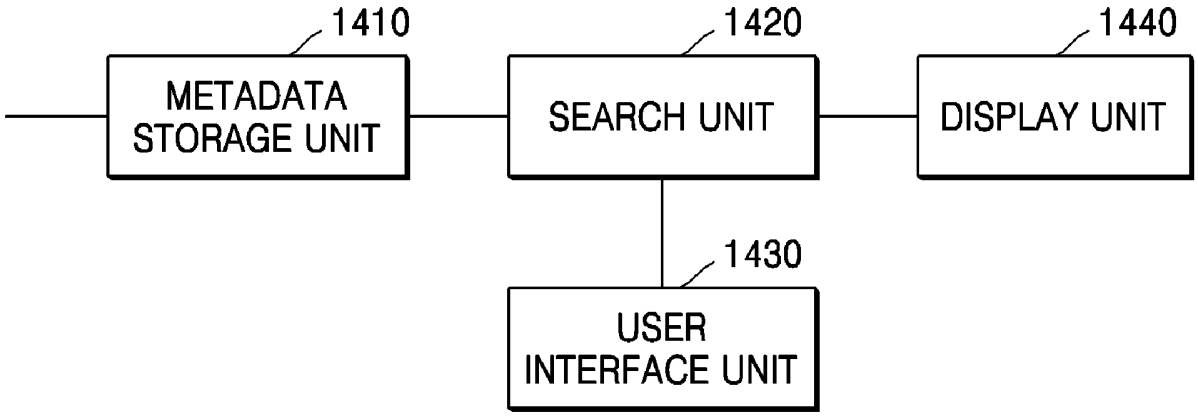

1410
METADATA STORAGE UNIT
1420
SEARCH UNIT
1440
DISPLAY UNIT
1430
USER INTERFACE UNIT

FIG. 15

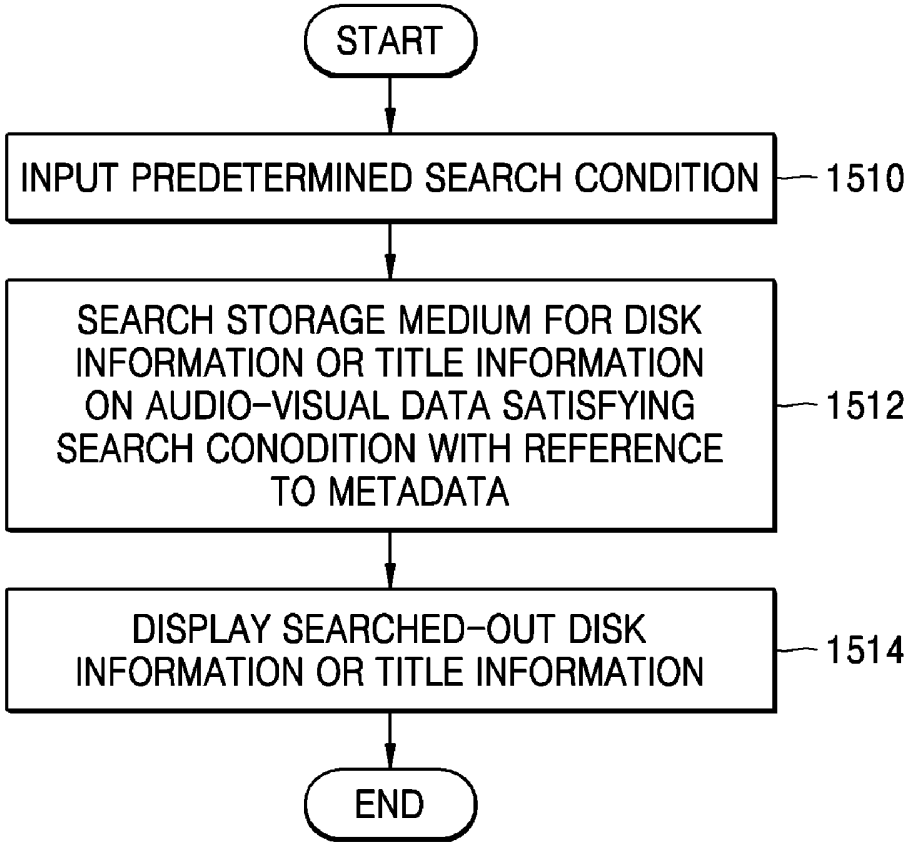
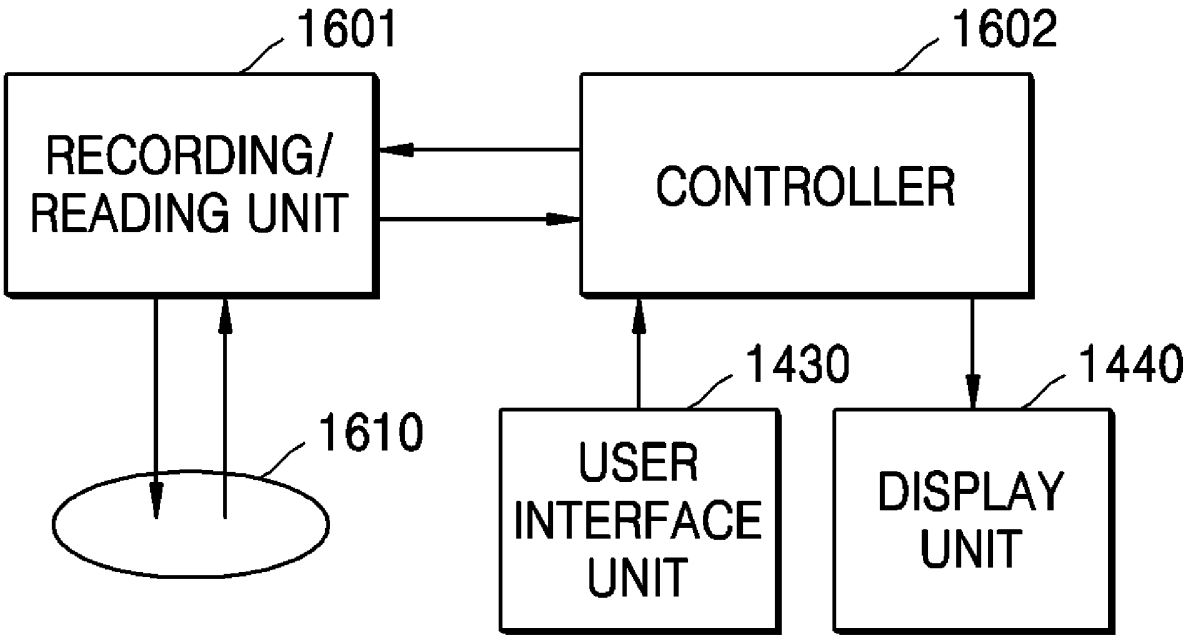

START
INPUT PREDETERMINED SEARCH CONDITION
1510
SEARCH STORAGE MEDIUM FOR DISK INFORMATION OR TITLE INFORMATION ON AUDIO-VISUAL DATA SATISFYING SEARCH CONODITION WITH REFERENCE TO METADATA
1512
DISPLAY SEARCHED-OUT DISK INFORMATION OR TITLE INFORMATION
1514
END

FIG. 16


1601
RECORDING/
READING UNIT
1602
CONTROLLER
1610
1430
USER
INTERFACE
UNIT
1440
DISPLAY
UNIT

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2005/002430

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 G11B 20/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G11B 20/10 G11B 20/12 G06F 17/30 G06F 3/00 G06F 7/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the intertnational search (name of data base and, where practicable, search terms used)

WPI, PAJ "meta-data, keyword, extended, search, additional, markup, binary, text-based, descriptor"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2001-216726 A (SONY UNITED KINGDOM LTD.) 10 August 2001 See the whole document	1, 12, 14-15, 17, 20, 23, 25, 30-31, 44-45, 47, 49-50, 54
A	JP 2003-122761 A (THOMSON LICENSING SA) 25 April 2003 See the whole document	1, 12, 14-15, 17, 20, 23, 25, 30-31, 44-45, 47, 49-50, 54
A	JP 2002-108892 A (CANON INC.) 12 April 2002 See the whole document	1, 12, 14-15, 17, 20, 23, 25, 30-31, 44-45, 47, 49-50, 54
A	JP 2001-184802 A (SONY UNITED KINGDOM LTD.) 04 July 2003 See the whole document	1, 12, 14-15, 17, 20, 23, 25, 30-31, 44-45, 47, 49-50, 54
P,Y	US 2004-0189694 A1 (James Brian Kurtz et al.) 30 September 2004 See the whole document	1, 12, 14-15, 17, 20, 23, 25, 30-31, 44-45, 47, 49-50, 54

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 OCTOBER 2005 (27.10.2005)	**27 OCTOBER 2005 (27.10.2005)**

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