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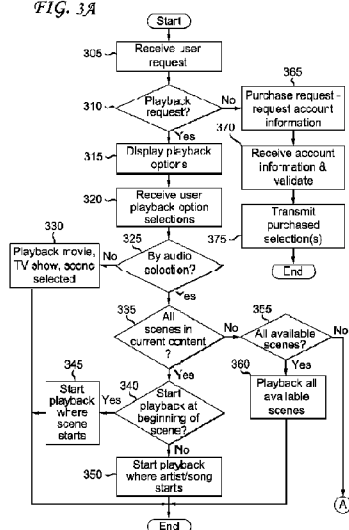
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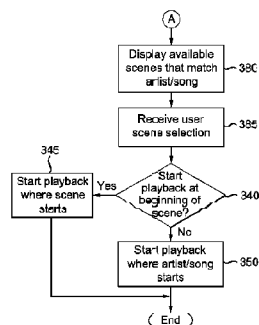
(54) Title: VIDEO SEGMENTATION BY AUDIO SELECTION

FIG. 3A



(57) Abstract: A method and apparatus are described including receiving a user request, determining if the user request is a playback request, displaying to a user, playback options, if the user request is the playback request, receiving the playback options selected by the user, determining if the playback options selected by the user are by audio selection and forwarding scenes that match the audio selection of the user for playback.

FIG. 3B





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TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM,
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EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,
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VIDEO SEGMENTATION BY AUDIO SELECTION

FIELD OF THE INVENTION

5 The present invention relates to video content playback, and, in particular to the video content playback based upon audio selections.

BACKGROUND OF THE INVENTION

10 Conventionally, video content has been broken (segmented) into scenes either due to editing decisions or how a script is written. Such scenes are typically used for trick play functions (jump to the next scene) or chapters that are accessed on a DVD/Blu-Ray disc.

SUMMARY OF THE INVENTION

15 The present invention segments video content based upon the audio (music) associations of the video instead of as in the prior art based on scenes associated with the video. The present invention provides a framework for breaking up a video for a media asset such as a television show or movie or other content (including multimedia content) into segments that correlate to the audio/music selections instead of scenes as
20 in the prior art.

 A method and apparatus are described including receiving a user request, determining if the user request is a playback request, displaying to a user, playback options, if the user request is the playback request, receiving the playback options selected by the user, determining if the playback options selected by the user are by
25 audio selection and forwarding scenes that match the audio selection of the user for playback.

BRIEF DESCRIPTION OF THE DRAWINGS

30 The present invention is best understood from the following detailed description when read in conjunction with the accompanying drawings. The drawings include the following figures briefly described below:

 Fig. 1 is a flowchart of an exemplary method for segmenting a video into different segments that correlate to the audio associated with such a video.

Fig. 2 presents the results of the application of the described method of the present invention.

Figs. 3A and 3B together form a flowchart of an exemplary embodiment of the method of the present invention.

5 Fig. 4 is a block diagram of an exemplary embodiment in accordance with the principles of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention provides a mechanism for breaking up (segmenting) a
10 video (such as a movie or a television show or any other form of content) into audio selections, which can be music selections such as songs or background music. The video segment can then be mapped to such audio segments (called M) instead of using the typically scenes for which a video is segmented. Video scenes are typically the way a video is constructed either due to editing decisions, how a script is written,
15 commercial break requirements, and the like.

Fig. 1 is a flowchart of an exemplary method for segmenting a video into different segments that correlate to the audio associated with such a video. The invention begins with a video asset that is composed of a number of scenes. Each scene can then be associated with a number (0 to X) of music selections which can be
20 songs associated with different music artists. At 105, a media asset containing audio and video is ingested into a server or other type of storage device. At 110, a time reference is assigned to the audio and the video of the media asset. Preferably, such a time reference can be timestamps although other mechanisms can be used for this step. At 115, an audio recognition mechanism is applied to recognize the different
25 audio segments in the media asset. Such audio recognition techniques can be the use of a program such as Shazam, which identifies songs/music selections based on audio fingerprint of the audio selection or AudioID developed by Fraunhofer institute, volume changes in the audio such as periods of silence that exceed a threshold time value and the like. Other audio recognition mechanisms can be used and/or combined
30 with Shazam and/or AudioID. At 120, the video is segmented by way of the audio selections that were identified in the previous step. That is, instead of having the video scenes control how a video is organized, it will be the audio selections which are used to segment a video. Hence, the beginning and the end of an audio selection will have

a video segment corresponding in kind. The time basis for the audio and the video segment would then match up using the time reference (e.g., time stamps). In an alternative embodiment, if the audio segment is identified using an audio recognition technique, the audio segment can be referred by a song title, artist, copyright, and the like if such information can be determined by the characteristics of the audio segment, whereby such information can be assigned as metadata to such audio selections.

Fig. 2 presents the results of the application of the described method of the present invention where a video that is 30 minutes in length is divided according to Music Selections M1, M2, M3, M4, M5, and M6. In addition, Fig. 2 displays the corresponding scenes S1, S2, S3, and S4.

Table 1 presents an example of audio selections and the related metadata of such selections. Using the information listed below, a user can specify that a video be played back where the audio segments that correspond to a certain artist (M83, Prince) are used to select the corresponding video segments that are played back (M1, for example for M83 and M2 and M3 for Prince). A user can also be provided with an option to buy the corresponding audio segments in a form such as an MP3 from a service such as M-Go, Amazon, and the like if a video is presented with a corresponding list of audio selections as presented in Table 1. Other examples are possible in accordance with the described principles.

Scene	Audio Selection	Title	Artist	Time
1 st Scene	M1	Overture	M83	5:00
1 st Scene	M2	Purple Rain	Prince	12:00
2 nd Scene	M3	Dolphin	Prince	4:00
3 rd Scene	M3	Dolphin	Prince	
3 rd Scene	M4	Hang Tough	New Kids on the Block	4:00
4 th Scene	M5	Blackbird	Beatles	5:00
4 th Scene	M6	Finale	M83	5:00

A first aspect of the invention lets a user playback all of the scenes that match a particular artist or song title. Hence, if Prince is selected as the relevant artist in the present example both the 1st scene and the 2nd scene will be played back (from the beginning of such scenes or where such songs begin in accordance with a user preference). In addition, the playback of such scenes can be done in sequential order or in a randomized order.

A second aspect of the invention will let a user playback “all” of the scenes that pertain to a particular artist or song title where all of such scenes are available to a user. Such scenes can be from different movies, television shows, and the like. One feature of this aspect of the present invention is that the scenes that are played back can have the SAME song performed by a different artist. Hence, a cover version of “BLACKBIRD” could be played back with a corresponding scene instead of having the “4th scene” where the Beatles performed the version of “BLACKBIRD”. This is a substitute song feature.

A third aspect will let a user buy MP3 versions of songs from a service provider such as AMAZON, M-GO, and the like. With this embodiment, alternative versions of songs can be offered as well as “Blackbird” from the Beatles and respective cover versions of the song.

The invention could be performed by a content server or content distribution system. In an alternative embodiment, the segmented content could be stored on a user’s device including but not limited to televisions, set top boxes, computers, laptops, dual mode smart phones, iPods, iPads, iPhones, and tablets. As processing power increases and processing devices get smaller (and less costly) much of the above described segmentation could be performed by an end user’s device. The third aspect of the present invention involving purchasing certain audio would be coordinated with the user’s content provider in terms of billing (accounting). Other secondary aspects of the third aspect of the present invention could include offering user’s “deals” if they purchased, for example, “Blackbird” by all artists that recorded that song or perhaps if the user purchased an entire Beatles album on which the song “Blackbird” was included or if they purchased other movies or movie segments that included the song “Blackbird”.

Figs. 3A and 3B together form a flowchart of an exemplary embodiment of the method of the present invention. At 305, a user request is received. At 310, a test is

performed to determine if the user request is a playback request. A playback request may be by movie, TV show, other content, by scene, or by audio selection. If the user request is a playback request, then at 315, the playback options are displayed to the user. At 320, the user's playback options are received. At 325, a test is performed to
5 determine if the playback option selected is by audio selection (rather than by scene as in the prior art). If the playback option selected is not by audio selection then the movie, TV show or scene selected by the user is forwarded to the user for playback at 330. If the playback option selected is by audio selection then at 335, a test is performed to determine if all scenes in the current content that match the user's audio
10 selection are to be played back. If all scenes in the current content that match the user's audio selection are to be played back then a test is performed at 340 to determine if the playback is to start at the beginning of each scene of the current content that matches the user's audio selection. If the playback is to start at the beginning of each scene of the current content that matches the user's audio selection
15 then forward the scenes (in the order that the scenes occur or shuffled (in some random order)) to the user for playback at 345. If the playback is not to start at the beginning of each scene of the current content that matches the user's audio selection then at 350 forward the scenes (in the order that the scenes occur or shuffled (in some random order)) starting at the point where the audio selection begins to the user for
20 playback. If all scenes in the current content that match the user's audio selection are not to be played back then at 355 a test is performed to determine if all available scenes that match the user's audio selection are to be played back. If all available scenes that match the user's audio selection are to be played back then at 360, forward all available scenes that match the user's audio selection to the user for playback. It
25 should be understood that the user may playback the received content immediately or store the received content for playback at a later time more convenient for the user.

If all available scenes that match the user's audio selection are not to be played back then at 380, the available scenes that match the user's audio selection are displayed. At 385, the user's scene selections from the available scenes are received.
30 Steps/operations 340, 345 and 345 will not be described again since they are the same as described above.

If the user request was not a playback request, then it is assumed to be a purchase request for audio selections and at 365 a request for audio selections and account information to make the purchase is displayed. At 370, the user's account

information is received and validated. At 375, the audio selections purchased by the user are transmitted to the user.

Fig. 4 is a block diagram of an exemplary embodiment in accordance with the principles of the present invention. The present invention is practiced at a content provider's equipment/system. The user interface module 405 is in bi-directional communication with the user. User interface module 405 is also in bi-directional communication with a user request module 410, which parses the user's request to determine if the user's request is a purchase request or a playback request. If the user's request is a purchase request then the user request module 410, which is in bi-directional communication with the purchase request module 415, forwards the user's purchase request to the purchases request module 415. The purchase request module 415 is in bi-directional communication with the account information module 420. The account information module request and receives the user's account information via the user requests module 410 and the user interface module 405 and validates the user's account information. Once the user's account information is validated the account information module 420 returns confirmation to the purchase request module 415. The purchase request module 415 then requests and retrieves the user's audio selection information via the user request module 410 and the user interface module 405. The user's audio selection information is forwarded to the retrieve audio selection module 425 with which the purchase request module is in bi-directional communication. The retrieve audio selection module 425 retrieves the user's audio selection from the content storage and retrieval module 445 with which the retrieve audio selection module 425 is in bi-directional communication.

If the user request is determined by the user request module 410 to be a playback request then the user request module forwards the request to playback module 430 with which the user request module is in bi-directional communication. The \playback module 430 determines if the playback is by scene (or entire content) or by audio selection. If the playback is by scene (or entire content) then the playback request module 430 forwards the user's selection to the retrieve content by scene or entire content module 440 with which the playback request module 430 is in bi-directional communication. The retrieve content by scene or entire content module 440 retrieves the user's content selection from the content storage and retrieval module 445 with which the retrieve content by scene or entire content module 440 is in bi-directional communication.

If the user's request is determined by the playback request module 430 to be a request to playback by audio selection then the playback request module 430 forwards the user's selection to the retrieve content by audio selection to the retrieve content by audio selection module 435 with which the playback request module 430 is in bi-directional communication. The user's selection information includes whether to playback scenes starting at the beginning of each scene or starting at the point that the audio selection begins. The user's selection information also includes whether the user wants to playback scenes that match the user's audio selection in the current content or all available content. The retrieve content by audio selection module 435 retrieves the user's content selection that match the user's audio selection from the content storage and retrieval module 445 with which the retrieve content by audio selection module 435 is in bi-directional communication. All content retrieved from the content storage and retrieval module is transmitted (forwarded) to the user on the reverse path from which the request was received via the bi-directional communication paths.

The means for receiving a user request is the user interface module. The means for determining if said user request is a playback request is the user request module. The means for displaying to a user, playback options, if said user request is said playback request is the user interface module. The means for receiving said playback options selected by said user is the user interface module. The means for determining if said playback options selected by said user are by audio selection is the playback request module. The means for forwarding scenes that match said audio selection of said user for playback is via retrieve content by audio selection module (having retrieved the selected content from the content storage and retrieval module). The retrieve content by audio selection module forwards the retrieved content back to the playback request module which forwards the retrieved content to the user request module which forwards the retrieved content to the user interface module, which forwards the retrieved content to the user for playback.

The means for determining if said user has selected playing back of all scenes in content currently being viewed by said user is the playback request module. The means for determining if said user has selected playing back content starting at a beginning of each scene or said user has selected playing back content where said audio selection selected by said user commences is the playback request module.

The means for forwarding content selected by said user for playback, if said playback options selected by said user are not by audio selection is via retrieve content by scene or entire content module (having retrieved the selected content from the content storage and retrieval module). The retrieve content by scene or entire
5 content module forwards the retrieved content back to the playback request module which forwards the retrieved content to the user request module which forwards the retrieved content to the user interface module, which forwards the retrieved content to the user for playback.

The means for determining if said user has selected playing back all scenes in
10 all available content, if said user has not selected playing back scenes that match the user's audio selection from said current content is the playback request module. The means for displaying a list of all scenes of all available content that match said audio selection of said user is the user interface module. The means for receiving said user's scene selection from said list of all scenes of all available content that match said
15 audio selection of said user is the user interface module. The means for determining if said user has selected playing back content starting at a beginning of each scene or said user has selected playing back content where said audio selection selected by said user commences is the playback request module.

The means for receiving said audio selections for purchase and account
20 information from said user is the user interface module. The means for validating said user's account information is the account information module. The means for transmitting said purchased selections to said user is via the retrieve audio selection module (having retrieved the selected content from the content storage and retrieval module). The retrieve audio selection module forwards the retrieved content back to
25 the purchase request module which forwards the retrieved content to the user request module which forwards the retrieved content to the user interface module, which forwards the retrieved content to the user for playback.

It is to be understood that the present invention may be implemented in various forms of hardware, software, firmware, special purpose processors, or a
30 combination thereof. Special purpose processors may include application specific integrated circuits (ASICs), reduced instruction set computers (RISCs) and/or field programmable gate arrays (FPGAs). Preferably, the present invention is implemented as a combination of hardware and software. Moreover, the software is preferably

implemented as an application program tangibly embodied on a program storage device. The application program may be uploaded to, and executed by, a machine comprising any suitable architecture. Preferably, the machine is implemented on a computer platform having hardware such as one or more central processing units
5 (CPU), a random access memory (RAM), and input/output (I/O) interface(s). The computer platform also includes an operating system and microinstruction code. The various processes and functions described herein may either be part of the microinstruction code or part of the application program (or a combination thereof), which is executed via the operating system. In addition, various other peripheral
10 devices may be connected to the computer platform such as an additional data storage device and a printing device.

It is to be further understood that, because some of the constituent system components and method steps depicted in the accompanying figures are preferably implemented in software, the actual connections between the system components (or
15 the process steps) may differ depending upon the manner in which the present invention is programmed. Given the teachings herein, one of ordinary skill in the related art will be able to contemplate these and similar implementations or configurations of the present invention.

CLAIMS:

1. A method, said method comprising:

receiving a user request;

determining if said user request is a playback request;

- 5 displaying to a user, playback options, if said user request is said playback request;

receiving said playback options selected by said user;

determining if said playback options selected by said user are by audio selection; and

- 10 forwarding scenes that match said audio selection of said user for playback.

2. The method according to claim 1, further comprising:

determining if said user has selected playing back of all scenes in content currently being viewed by said user; and

- 15 determining if said user has selected playing back content starting at a beginning of each scene or said user has selected playing back content where said audio selection selected by said user commences.

3. The method according to claim 1, further comprising forwarding content selected by said user for playback, if said playback options selected by said user are not by audio selection.

20

4. The method according to claim 2, further comprising determining if said user has selected playing back all scenes in all available content, if said user has not selected playing back scenes that match the user's audio selection from said current content.

- 25 5. The method according to claim 4, further comprising:

displaying a list of all scenes of all available content that match said audio selection of said user;

receiving said user's scene selection from said list of all scenes of all available content that match said audio selection of said user; and

determining if said user has selected playing back content starting at a beginning of each scene or said user has selected playing back content where said audio selection selected by said user commences.

6. The method according to claim 1, further comprising:

receiving said audio selections for purchase and account information from said user;

validating said user's account information; and

transmitting said purchased selections to said user.

7. A system, comprising:

means for receiving a user request;

means for determining if said user request is a playback request;

means for displaying to a user, playback options, if said user request is said playback request;

means for receiving said playback options selected by said user;

means for determining if said playback options selected by said user are by audio selection; and

means for forwarding scenes that match said audio selection of said user for playback.

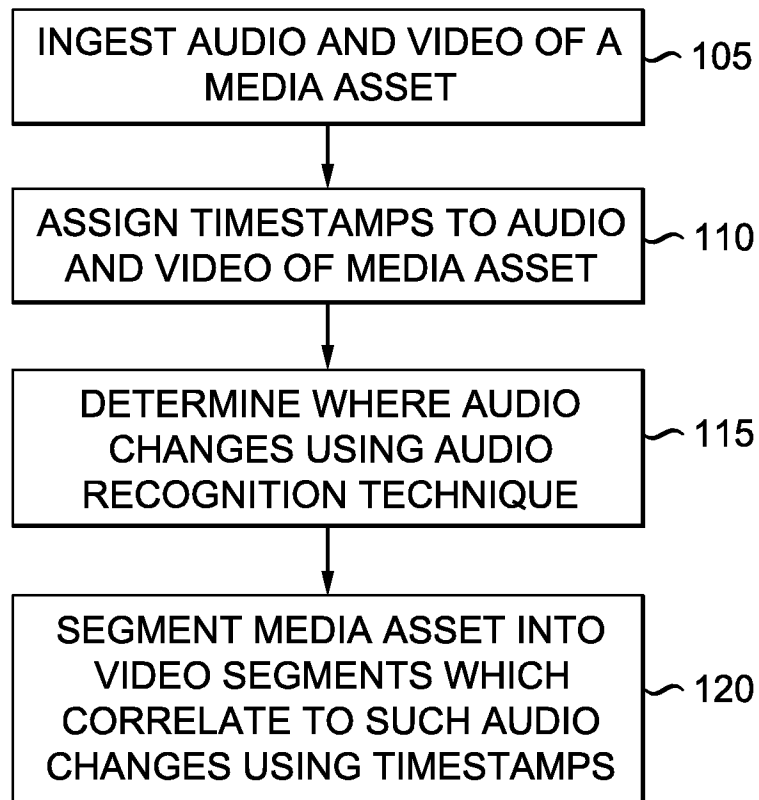
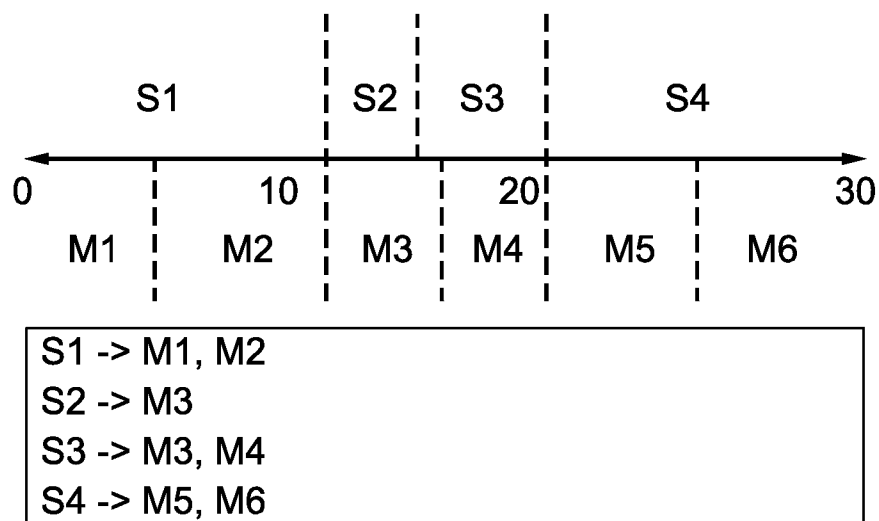
8. The system according to claim 7, further comprising:

means for determining if said user has selected playing back of all scenes in content currently being viewed by said user; and

means for determining if said user has selected playing back content starting at a beginning of each scene or said user has selected playing back content where said audio selection selected by said user commences.

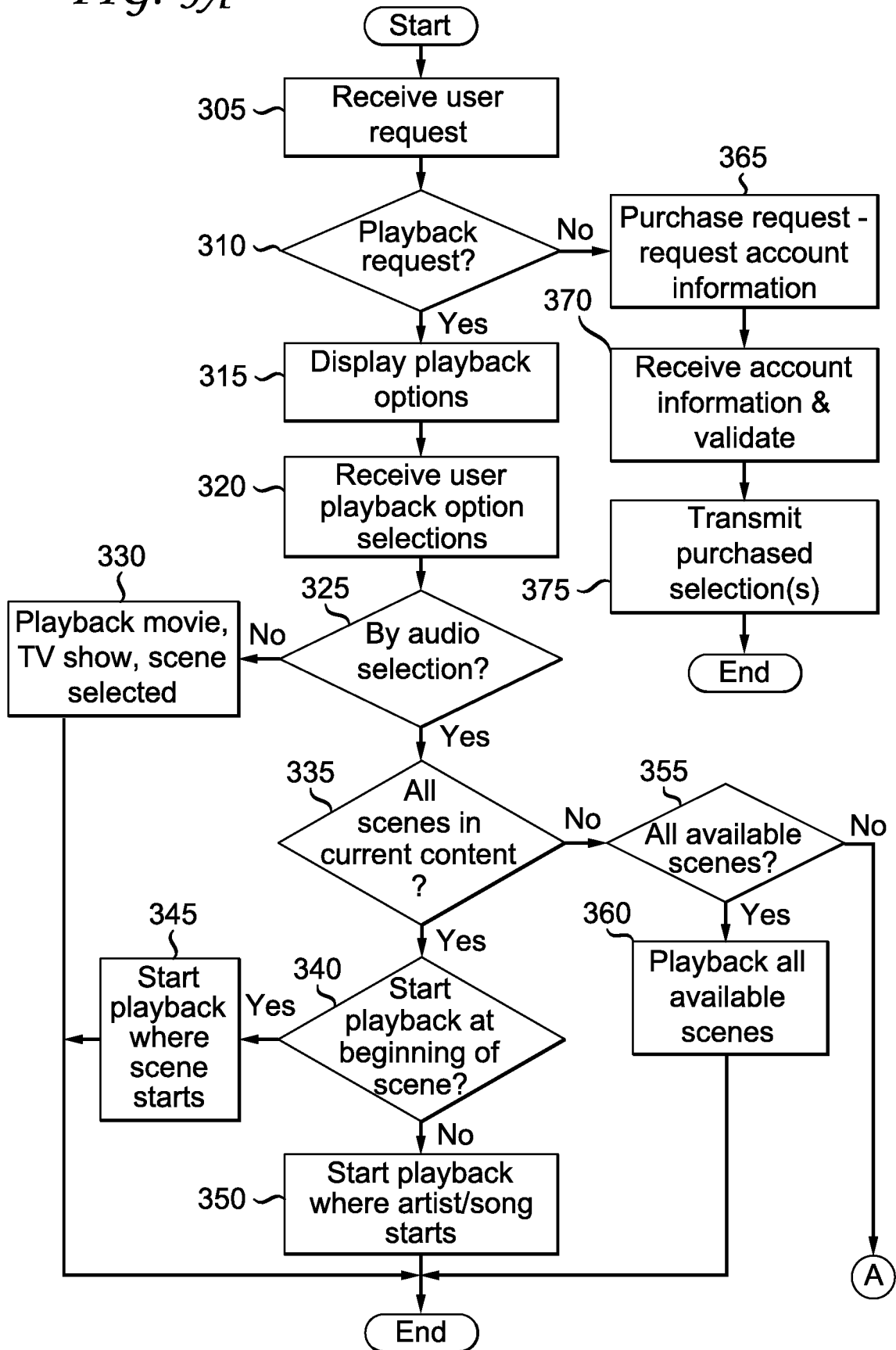
9. The system according to claim 7, further comprising means for forwarding content selected by said user for playback, if said playback options selected by said user are not by audio selection.
10. The system according to claim 8, further comprising means for determining if
5 said user has selected playing back all scenes in all available content, if said user has not selected playing back scenes that match the user's audio selection from said current content.
11. The system according to claim 10, further comprising:
- 10 means for displaying a list of all scenes of all available content that match said audio selection of said user;
- means for receiving said user's scene selection from said list of all scenes of all available content that match said audio selection of said user; and
- 15 means for determining if said user has selected playing back content starting at a beginning of each scene or said user has selected playing back content where said audio selection selected by said user commences.
12. The system according to claim 7, further comprising:
- means for receiving said audio selections for purchase and account information from said user;
- means for validating said user's account information; and
- 20 means for transmitting said purchased selections to said user.

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*FIG. 1**FIG. 2*

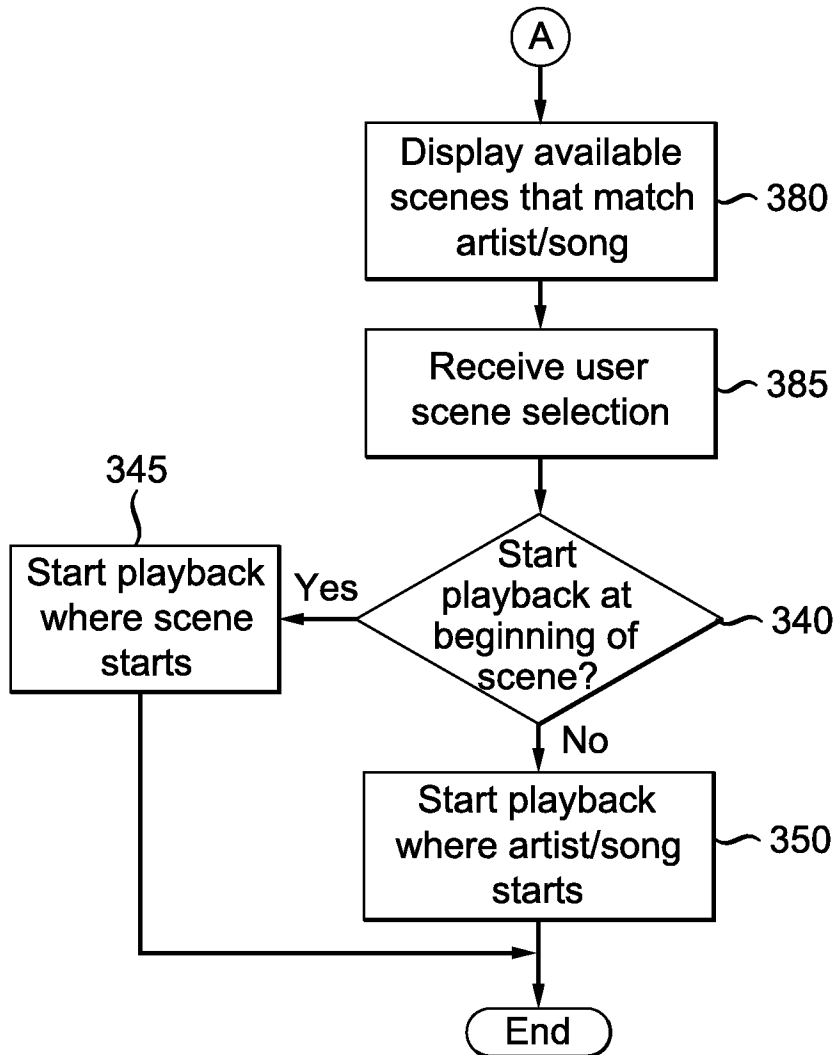
2/4

FIG. 3A



3/4

FIG. 3B



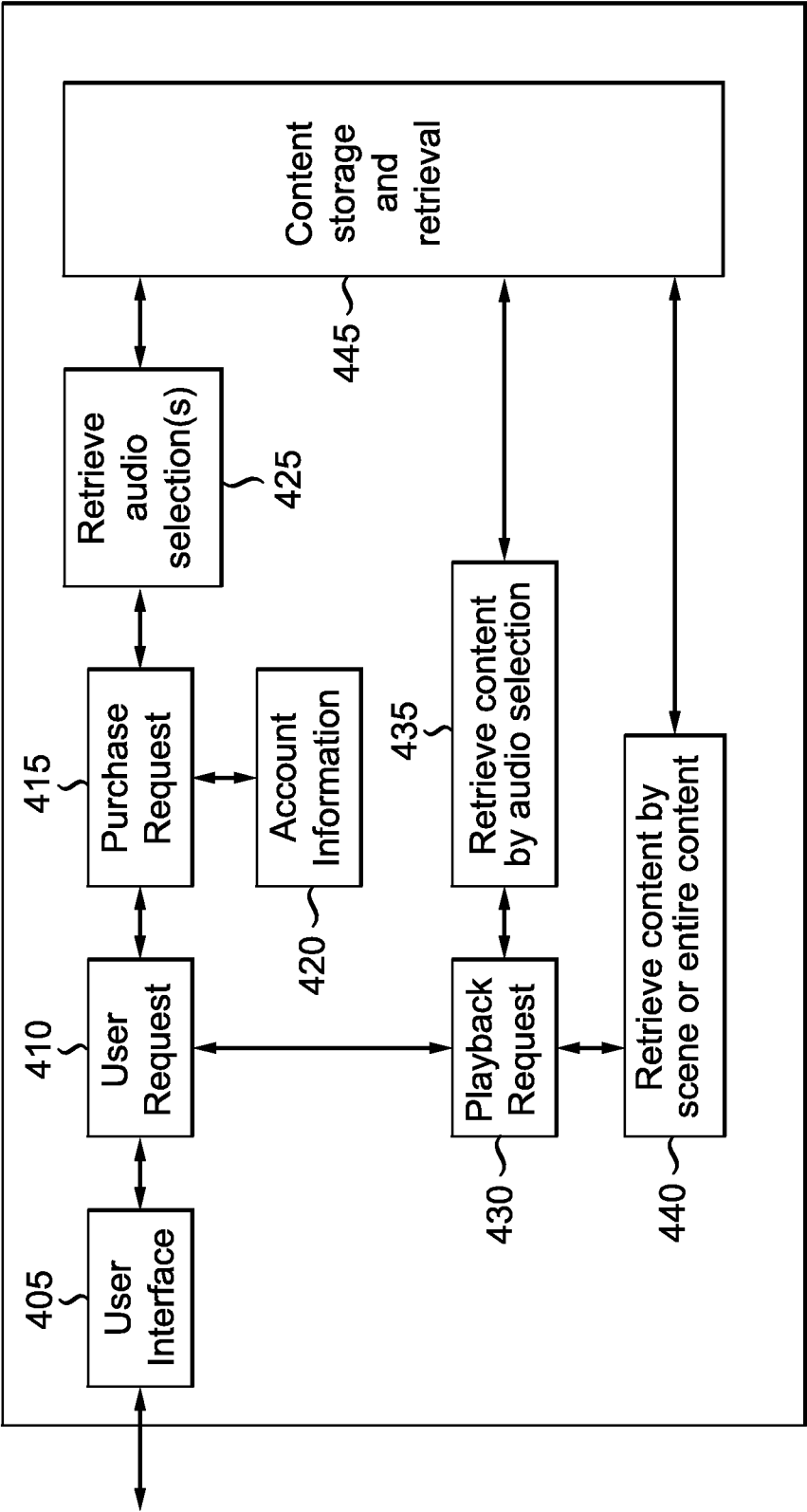


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No

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A. CLASSIFICATION OF SUBJECT MATTER
 INV. G11B27/34 G11B27/28 H04N21/81 G06F17/30
 ADD.

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 G06F H04N

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 608 206 A2 (SAMSUNG ELECTRONICS CO LTD [KR]) 26 June 2013 (2013-06-26) paragraphs [0001] - [0020], [0024] - [0041]; figures 1-4,5 -----	1-12
A	US 2008/304807 A1 (JOHNSON GARY [US] ET AL) 11 December 2008 (2008-12-11) paragraphs [0010] - [0012], [0035], [0036], [0050] - [0058]; figures 6,8,9 -----	1-12
A	EP 1 708 101 A1 (MITSUBISHI ELECTRIC CORP [JP]) 4 October 2006 (2006-10-04) search on importance; paragraph [0078] paragraphs [0044] - [0057], [0060] - [0067]; figures 10,5,6,8,9,19,20 ----- -/-	1-12



Further documents are listed in the continuation of Box C.



See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"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

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21/03/2014

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Bruma, Cezar

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2013/059343

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP H10 111872 A (NIPPON TELEGRAPH & TELEPHONE) 28 April 1998 (1998-04-28) abstract	1-12
Y	----- SARACENO C ET AL: "Identification of story units in audio-visual sequences by joint audio and video processing", IMAGE PROCESSING, 1998. ICIP 98. PROCEEDINGS. 1998 INTERNATIONAL CONFERENCE ON CHICAGO, IL, USA 4-7 OCT. 1998, LOS ALAMITOS, CA, USA, IEEE COMPUT. SOC, US, vol. 1, 4 October 1998 (1998-10-04), pages 363-367, XP010308744, DOI: 10.1109/ICIP.1998.723500 ISBN: 978-0-8186-8821-8 page 363 - page 364 page 365, column 2 - page 366, column 1 -----	1-12
A	SMITH M A ET AL: "VIDEO SKIMMING AND CHARACTERIZATION THROUGH THE COMBINATION OF IMAGE AND LANGUAGE UNDERSTANDING TECHNIQUES", PROCEEDINGS OF THE 1997 IEEE COMPUTER SOCIETY CONFERENCE ON COMPUTER VISION AND PATTERN RECOGNITION. SAN JUAN, PUERTO RICO, JUNE 17 - 19, 1997; [PROCEEDINGS OF THE IEEE COMPUTER SOCIETY CONFERENCE ON COMPUTER VISION AND PATTERN RECOGNITION], LOS ALAM, vol. CONF. 16, 17 June 1997 (1997-06-17), pages 775-781, XP000776576, ISBN: 978-0-7803-4236-1 the whole document ----- -/--	1-12

INTERNATIONAL SEARCH REPORT

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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