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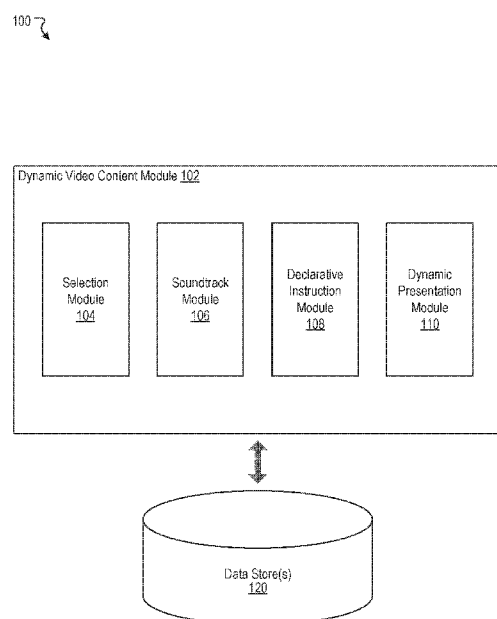


FIGURE 1

(57) Abstract: Systems, methods, and non-transitory computer-readable media can acquire a first selection to identify a subset of media content items out of a set of media content items. A second selection to identify a mood out of a set of moods can be acquired. A soundtrack can be identified based on at least one of first selection or the second selection. The soundtrack can be associated with data utilized to determine when each media content item in the subset is to be presented during a playback of the soundtrack. A set of declarative instructions utilized to determine how each media content item in the subset is to be presented during the playback of the soundtrack can be provided. The subset can be dynamically presented based on the set of declarative instructions. The subset can be presented during the playback of the soundtrack and can be presented to represent video content.

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## **SYSTEMS AND METHODS FOR DYNAMICALLY PROVIDING VIDEO CONTENT BASED ON DECLARATIVE INSTRUCTIONS**

### **FIELD OF THE INVENTION**

**[0001]** The present technology relates to the field of media processing. More particularly, the present technology relates to techniques for dynamically providing video content based on declarative instructions.

### **BACKGROUND**

**[0002]** Today, people often utilize computing devices (or systems) for a wide variety of purposes. Users can use their computing devices to, for example, interact with one another, access content, share content, and create content. In some cases, users can use their computing devices to create and provide content items, such as images, audio, text, status updates, comments, and/or posts. The content items can, for instance, be presented and stored by social networking systems (i.e., social networking services, social media systems, social media services). In some cases, users can utilize computing devices to access or interact with multimedia or media content, such as video content made available via the social networking systems.

**[0003]** Under conventional approaches specifically arising in the realm of computer technology, the video content must be rendered, by one or more computing devices (or systems), at some time prior to a user watching or viewing the video content. In one example, the user can further interact with the video content by modifying or editing the video content. In some cases, under conventional approaches, the user can edit or otherwise modify the video content, but the edited or modified video content must be rendered again before it can be watched, viewed, or accessed, which can be inconvenient or inefficient. These and other concerns can create challenges for or reduce the overall user experience associated with accessing or otherwise interacting with media content such as videos.

**SUMMARY**

**[0004]** Various embodiments of the present disclosure can include systems, methods, and non-transitory computer readable media configured to acquire a first selection to identify a subset of media content items out of a set of media content items. A second selection to identify a mood out of a set of moods can be acquired. A soundtrack can be identified based on at least one of first selection or the second selection. The soundtrack can be associated with data that is utilized to determine when each media content item in the subset of media content items is to be presented during a playback of the soundtrack. A set of declarative instructions utilized to determine how each media content item in the subset is to be presented during the playback of the soundtrack can be provided. The subset of media content items can be dynamically presented based on the set of declarative instructions. The subset of media content items can be presented during the playback of the soundtrack and can be presented to represent video content.

**[0005]** In an embodiment, a modification to the first selection can be received such that a modified subset of media content items is identified. A modified soundtrack can be identified based on the modified subset of media content items. A modified set of declarative instructions utilized to determine how each media content item in the modified subset is to be presented during a playback of the modified soundtrack can be provided. The modified subset of media content items can be dynamically presented based on the modified set of declarative instructions. The modified subset of media content items can be presented during the playback of the modified soundtrack and can be presented to represent video content.

**[0006]** In an embodiment, a modification to the second selection can be received such that a modified mood is identified. A modified soundtrack can be identified based on the modified mood. A modified set of declarative instructions utilized to determine how each media content item in the subset is to be presented during a playback of the modified soundtrack can be provided. The subset of media content items can be dynamically presented based on the modified set of declarative instructions. The subset of media content items can be presented during the playback of the modified soundtrack and can be presented to represent video content.

**[0007]** In an embodiment, the soundtrack can be associated with data that is utilized to determine when each media content item in the subset of media content items is to be presented during the playback of the soundtrack.

**[0008]** In an embodiment, identifying the soundtrack can include identifying a particular version of the soundtrack based on a quantity of media content items in the subset of media content items, and wherein the particular version of the soundtrack has a particular playback length that is compatible with the quantity of media content items in the subset of media content items.

**[0009]** In an embodiment, the set of declarative instructions can be utilized to determine how to transition from a particular media content item in the subset to a next media content item in the subset when the subset is being presented.

**[0010]** In an embodiment, the set of declarative instructions can specify, for each media content item in the subset of media content items, at least one of: 1) a respective starting state, 2) a respective ending state, 3) a respective movement operation from the respective starting state to the respective ending state, 4) a respective zoom operation from the respective starting state to the respective ending state, or 5) a respective duration of time in which the respective starting state transitions to the respective ending state.

**[0011]** In an embodiment, one or more declarative instructions in the set of declarative instructions can be dynamically executed in order to dynamically present the subset of media content items.

**[0012]** In an embodiment, the subset of media content items can be presented to represent video content without generating a video file.

**[0013]** In an embodiment, a command to post, as video content, the subset of media content items presented based on the set of declarative instructions can be acquired. A video file can be generated based on the set of declarative instructions.

**[0014]** It should be appreciated that many other features, applications, embodiments, and/or variations of the disclosed technology will be apparent from the accompanying drawings and from the following detailed description. Additional and/or alternative implementations of the structures, systems, non-transitory computer readable media, and methods described herein can be employed without departing from the principles of the disclosed technology.

**BRIEF DESCRIPTION OF THE DRAWINGS**

**[0015]**      **FIGURE 1** illustrates an example system including an example dynamic video content module configured to facilitate dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure.

**[0016]**      **FIGURE 2A** illustrates an example declarative instruction module configured to facilitate dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure.

**[0017]**      **FIGURE 2B** illustrates an example dynamic presentation module configured to facilitate dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure.

**[0018]**      **FIGURE 3A** illustrates an example scenario associated with dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure.

**[0019]**      **FIGURE 3B** illustrates an example scenario associated with dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure.

**[0020]**      **FIGURE 4** illustrates an example method associated with dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure.

**[0021]**      **FIGURE 5A** illustrates an example method associated with dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure.

**[0022]**      **FIGURE 5B** illustrates an example method associated with dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure.

**[0023]**      **FIGURE 6** illustrates a network diagram of an example system including an example social networking system that can be utilized in various scenarios, according to an embodiment of the present disclosure.

**[0024]**      **FIGURE 7** illustrates an example of a computer system or computing device that can be utilized in various scenarios, according to an embodiment of the present disclosure.

**[0025]** The figures depict various embodiments of the disclosed technology for purposes of illustration only, wherein the figures use like reference numerals to identify like elements. One skilled in the art will readily recognize from the following discussion that alternative embodiments of the structures and methods illustrated in the figures can be employed without departing from the principles of the disclosed technology described herein.

**DETAILED DESCRIPTION****DYNAMICALLY PROVIDING VIDEO CONTENT BASED ON DECLARATIVE INSTRUCTIONS**

**[0026]** People use computing systems (or devices) for various purposes. Users can utilize their computing systems to establish connections, engage in communications, interact with one another, and/or interact with various types of content. In some cases, computing devices can include or correspond to cameras capable of capturing or recording media content, such as images or videos (e.g., sets of video image frames or still frames). In some instances, users can utilize their computing devices to access a social networking (or social media) system or service to post, edit, share, and/or otherwise engage with (e.g., comment, like, etc.) media content such as images and videos. In one example, users can combine or aggregate media content items to create a video, such as a film or movie file.

**[0027]** In some cases, conventional approaches specifically arising in the realm of computer technology for creating videos can combine or stitch together various media content items and then render or otherwise process the media content items to produce, at a later time, a video (e.g., a video file). Often times users who are attempting to create videos may desire to modify the media content items used for creating the videos. However, in accordance with such conventional approaches specifically arising in the realm of computer technology, subsequent to modifying the media content items used for creating the videos, there must be another rendering or processing procedure to produce the new videos that incorporate the modifications. Accordingly, such conventional approaches specifically arising in the realm of computer technology for video creation can be inefficient or inconvenient.

**[0028]** Due to these or other concerns, conventional approaches specifically arising in the realm of computer technology can be disadvantageous or problematic. Therefore, an improved approach rooted in computer technology that overcomes the foregoing and other disadvantages associated with conventional approaches can be beneficial. Based on computer technology, the disclosed technology can dynamically provide video content based on declarative instructions. Various embodiments of the present disclosure can include systems, methods, and non-transitory computer readable media configured to acquire a first selection to identify a subset of media content items out of a set of media content items. A second selection to identify a

mood out of a set of moods can be acquired. A soundtrack can be identified based on at least one of first selection or the second selection. The soundtrack can be associated with data that is utilized to determine when each media content item in the subset of media content items is to be presented during a playback of the soundtrack. A set of declarative instructions utilized to determine how each media content item in the subset is to be presented during the playback of the soundtrack can be provided. The subset of media content items can be dynamically presented based on the set of declarative instructions. The subset of media content items can be presented during the playback of the soundtrack and can be presented to represent video content. It is contemplated that there can be many variations and/or other possibilities associated with the disclosed technology.

**[0029]** **FIGURE 1** illustrates an example system 100 including an example dynamic video content module 102 configured to facilitate dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure. As shown in the example of **FIGURE 1**, the dynamic video content module 102 can include a selection module 104, a soundtrack module 106, a declarative instruction module 108, and a dynamic presentation module 110. In some instances, the example system 100 can include at least one data store 120. The components (e.g., modules, elements, etc.) shown in this figure and all figures herein are exemplary only, and other implementations may include additional, fewer, integrated, or different components. Some components may not be shown so as not to obscure relevant details.

**[0030]** In some embodiments, the dynamic video content module 102 can be implemented, in part or in whole, as software, hardware, or any combination thereof. In general, a module as discussed herein can be associated with software, hardware, or any combination thereof. In some implementations, one or more functions, tasks, and/or operations of modules can be carried out or performed by software routines, software processes, hardware, and/or any combination thereof. In some cases, the dynamic video content module 102 can be implemented, in part or in whole, as software running on one or more computing devices or systems, such as on a user or client computing device. For example, the dynamic video content module 102 or at least a portion thereof can be implemented as or within an application (e.g., app), a program, an applet, or an operating system, etc., running on a user computing device

or a client computing system, such as the user device 610 of **FIGURE 6**. In another example, the dynamic video content module 102 or at least a portion thereof can be implemented using one or more computing devices or systems that include one or more servers, such as network servers or cloud servers. In some instances, the dynamic video content module 102 can, in part or in whole, be implemented within or configured to operate in conjunction with a social networking system (or service), such as the social networking system 630 of **FIGURE 6**. It should be appreciated that there can be many variations or other possibilities.

**[0031]** The selection module 104 can be configured to facilitate acquiring a first selection to identify a subset of media content items out of a set of media content items. In some embodiments, the selection module 104 can receive, retrieve, detect, or otherwise acquire the selection to identify the subset of media content items out of the set of media content items. In one example, a user's computing device (or system) can include a media content library, such as a local camera roll, which stores the set of media content items (e.g., images, videos, etc.). In this example, the user can select or identify the subset of media content items, such as by tapping on, clicking on, or otherwise interacting with one or more media content items to be included in the subset. The selection module 104 can then acquire the user's selection that identifies the subset of media content items. In some implementations, the selection module 104 can automatically (e.g., without manual/user effort) select or identify the subset of media content items. For instance, the selection module 104 can utilize one or more image processing techniques (e.g., image classification, object/face detection, object/face recognition, etc.) to determine which media content items out of the set are interesting or relevant, such as those images or video frames that depict faces. In this instance, a selection of such interesting or relevant media content items can be performed and/or acquired by the selection module 104.

**[0032]** In some implementations, the selection module 104 can acquire metadata associated with the subset of media content items, such as resolution data, dimension data, time data, location data, focal point data, quantity data, etc. For example, such metadata can be utilized subsequently to determine how the selected subset of media content items is to be dynamically presented to represent or appear as video content. It should be appreciated that all examples herein are provided for

illustrative purposes and that many variations associated with the disclosed technology are possible.

**[0033]** Moreover, the selection module 104 can also be configured to facilitate acquiring a second selection to identify a mood out of a set of moods. In some embodiments, the set of moods can be specified, predefined, and/or preset, etc. Examples of the moods in the set can include, but are not limited to, a happy mood, an optimistic/hopeful mood, an adventurous/exciting mood, a sad mood, and/or a nostalgic mood, etc. In some cases, the selection module 104 can acquire the selection to identify the mood based on user input. For instance, the user can tap on, click on, or otherwise interact with a particular mood out of the set of moods in order to select or identify the particular mood. In some embodiments, the selection module 104 can automatically (e.g., without manual/user effort) perform or acquire the selection of the mood, such as based on a default configuration, a system setting, or a defined preference. In one example, the selection module 104 can utilize one or more image processing techniques to determine whether one or more faces depicted in the subset of media content items are indicative of a happy mood (e.g., the faces are smiling), a sad mood (e.g., the faces are frowning), or other sentiments. In this example, based on how the faces are depicted in the subset, the selection module 104 can perform and/or acquire the selection of the mood out of the set of moods. Again, many variations are possible.

**[0034]** In addition, the soundtrack module 106 can be configured to facilitate identifying a soundtrack based on at least one of the first selection (to identify the subset of media content items) or the second selection (to identify the mood). In some implementations, a plurality of soundtracks (including various playback length soundtrack versions) can be stored locally. Based on the second selection of the mood, the soundtrack module 106 can, for example, identify a particular soundtrack out of the plurality. In some cases, the particular soundtrack that is selected or identified can have been specified or predefined to be associated with, to be compatible with, and/or to represent the selected mood.

**[0035]** Further, in some cases, identifying the soundtrack can include identifying a particular version of the soundtrack based on a quantity of media content items in the subset of media content items. The particular version of the soundtrack can have a particular playback length that is specified or predefined to be associated with, to

be compatible with, and/or to fit the quantity of media content items in the subset. For instance, when more media content items are selected to be included in the subset, the particular version of the soundtrack that is identified or selected can have a longer playback length than when less media content items are selected to be included in the subset.

**[0036]** Moreover, in some embodiments, the soundtrack can be associated with data that is utilized to determine when each media content item in the subset of media content items is to be presented during the playback of the soundtrack. For instance, a beat detection process can have been applied to the soundtrack to identify one or more beats in the soundtrack. In some cases, the one or more beats can be prioritized in a particular order (e.g., more important or interesting beats can be prioritized over less important interesting beats). This information about beats can be stored as or can be included in the data (e.g., metadata) associated with the soundtrack. Based on the information about beats or other similar information (e.g., specified/predefined cut points in the soundtrack), it can be determined when each media content item in the subset of media content items is to be presented during the playback of the soundtrack. In some cases, manual effort or manual curation can facilitate at least a portion of the above process.

**[0037]** Furthermore, the declarative instruction module 108 can be configured to facilitate providing a set of declarative instructions utilized to determine how each media content item in the subset is to be presented during a playback of the soundtrack. More details regarding the declarative instruction module 108 will be provided below with reference to **FIGURE 2A**.

**[0038]** Moreover, the dynamic presentation module 110 can be configured to facilitate dynamically presenting the subset of media content items based on the set of declarative instructions. The subset of media content items can be presented during the playback of the soundtrack and can be presented to represent video content. The dynamic presentation module 110 will be discussed in more detail below with reference to **FIGURE 2B**.

**[0039]** In one example, the selection module 104 can receive a modification to the first selection to identify the subset such that a modified subset of media content items is identified. In this example, the modification to the first selection can be provided by a user, in order to select or identify the modified subset. A modified

soundtrack can be identified by the soundtrack module 106 based on the modified subset of media content items. A modified set of declarative instructions utilized to determine how each media content item in the modified subset is to be presented during a playback of the modified soundtrack can be provided by the declarative instruction module 108. The modified subset of media content items can be dynamically presented by the dynamic presentation module 110 based on the modified set of declarative instructions. The modified subset of media content items can be presented during the playback of the modified soundtrack and can be presented to represent video content.

**[0040]** In another example, the selection module 104 can receive a modification to the second selection to identify the mood such that a modified mood is identified. In this example, the modification to the second selection can be provided by a user, in order to select or identify the modified mood. A modified soundtrack can be identified by the soundtrack module 106 based on the modified mood. A modified set of declarative instructions utilized to determine how each media content item in the subset is to be presented during a playback of the modified soundtrack can be provided by the declarative instruction module 108. The subset of media content items can be dynamically presented by the dynamic presentation module 110 based on the modified set of declarative instructions. The subset of media content items can be presented during the playback of the modified soundtrack and can be presented to represent video content.

**[0041]** Additionally, in some embodiments, the dynamic video content module 102 can be configured to communicate and/or operate with the at least one data store 120, as shown in the example system 100. The at least one data store 120 can be configured to store and maintain various types of data. In some implementations, the at least one data store 120 can store information associated with the social networking system (e.g., the social networking system 630 of **FIGURE 6**). The information associated with the social networking system can include data about users, social connections, social interactions, locations, geo-fenced areas, maps, places, events, pages, groups, posts, communications, content, feeds, account settings, privacy settings, a social graph, and various other types of data. In some implementations, the at least one data store 120 can store information associated with users, such as user identifiers, user information, profile information, user

locations, user specified settings, content produced or posted by users, and various other types of user data. In some embodiments, the at least one data store 120 can store information that is utilized by the dynamic video content module 102. Again, it is contemplated that there can be many variations or other possibilities associated with the disclosed technology.

**[0042]** **FIGURE 2A** illustrates an example declarative instruction module 202 configured to facilitate dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure. In some embodiments, the declarative instruction module 108 of **FIGURE 1** can be implemented as the declarative instruction module 202. As shown in the example of **FIGURE 2A**, the declarative instruction module 202 can include a starting state module 204, an ending state module 206, an operation module 208, and a time module 210.

**[0043]** As discussed previously, the declarative instruction module 202 can be configured to facilitate providing a set of declarative instructions utilized to determine how each media content item in a selected subset of media content items is to be presented during a playback of an identified soundtrack (i.e., the subset is presented to represent video content with audio corresponding to the soundtrack). In some instances, the declarative instructions can be proprietary. In some cases, the disclosed technology can utilize declarative instructions rather than imperative instructions. In general, imperative programming instructions specify to a computing system (or device) how to perform an operation or task. As a result, what is intended or desired to happen will happen. In contrast, declarative programming instructions specify to the computing system what is intended or desired to happen, and allow the computing system to decide or determine how to perform the operation or task. For instance, imperative programming instructions specify to a compiler, step by step, how an intended or desired operation or task is to be performed, whereas declarative programming instructions describe what result is intended or desired to occur but not necessarily how to achieve the intended or desired result.

**[0044]** In some implementations, based on metadata associated with the subset of media content items, with a selected mood, and/or with an identified soundtrack, the declarative instruction module 202 can generate the set of declarative instructions. In some cases, the declarative instruction module 202 can

cause the set of declarative instructions to be utilized to determine how to transition from a particular media content item in the subset to a next media content item in the subset when the subset is being presented (e.g., being presented to represent or to appear as video content). Many variations are possible.

**[0045]** In some embodiments, the set of declarative instructions can specify, for each media content item in the subset of media content items, at least one of: 1) a respective starting state, 2) a respective ending state, 3) a respective movement operation from the respective starting state to the respective ending state, 4) a respective zoom operation from the respective starting state to the respective ending state, or 5) a respective duration of time in which the respective starting state transitions to the respective ending state. The respective starting state specified in the set of declarative instructions can be provided by the starting state module 204 and the respective ending state specified in the set of declarative instructions can be provided by the ending state module 206. Moreover, the operation module 208 can provide the respective movement operation from the respective starting state to the respective ending state and/or the respective zoom operation from the respective starting state to the respective ending state. Further, the time module 210 can provide the respective duration of time in which the respective starting state transitions to the respective ending state.

**[0046]** In one example, the starting state module 204 can specify that a particular media content item in the subset is to have a particular starting state corresponding to  $X$  by  $X$  pixels and being at the left side of a display screen (or a viewable area of the display screen). The ending state module 206 can specify that the particular media content item is to have a particular ending state corresponding to  $Y$  by  $Y$  pixels and being at the right side of the display screen (or the viewable area of the display screen). The operation module 208 can specify for the particular content item that a particular movement operation from the particular starting state (e.g., left side) to the particular ending state (e.g., right side) is to be linear. The operation module 208 can also specify a speed and/or a direction for the particular movement operation. The operation module 208 can further specify for the particular content item that a particular zoom in-or-out operation from the particular starting state (e.g.,  $X$  by  $X$  pixels) to the particular ending state (e.g.,  $Y$  by  $Y$  pixels) is to be linear. The operation module 208 can also specify a speed and/or a direction for the

particular zoom operation. Further, the time module 210 can specify for the particular content item that a particular duration of time in which the particular starting state is to transition to the particular ending state is two seconds. As discussed previously, it is contemplated that all examples herein are provided for illustrative purposes and that many variations are possible.

**[0047]** **FIGURE 2B** illustrates an example dynamic presentation module 222 configured to facilitate dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure. In some embodiments, the dynamic presentation module 110 of **FIGURE 1** can be implemented as the example dynamic presentation module 222. As shown in **FIGURE 2B**, the dynamic presentation module 222 can include a dynamic execution module 224 and a video file module 226.

**[0048]** The dynamic presentation module 222 can be configured to facilitate dynamically presenting a selected subset of media content items based on a provided set of declarative instructions. In some cases, the subset of media content items can be presented during a playback of an identified soundtrack and can be presented to represent, or to appear as, video content. In some implementations, the dynamic presentation module 222 can utilize the dynamic execution module 224 to dynamically execute one or more declarative instructions in the set of declarative instructions in order to dynamically present the subset of media content items. For instance, the dynamic execution module 224 can dynamically execute the declarative instructions in (or near) real-time as the subset is being presented to represent video content. Moreover, in some cases, the subset of media content items can be presented to represent video content without generating a video file (e.g., an encoded/rendered video file). Accordingly, the subset of media content items presented can correspond to a video content preview.

**[0049]** Furthermore, in some embodiments, the dynamic presentation module 222 can utilize the video file module 226 to facilitate receiving, retrieving, detecting, determining, or otherwise acquiring a command to publish, share, or otherwise post, as video content, the subset of media content items presented based on the set of declarative instructions. In some instances, the video file module 226 can then facilitate generating a video file based on the set of declarative instructions. The video file can, for example, be generated locally in order to utilize available local

GPU resources. Again, it should be appreciated that there can be many variations or other possibilities associated with the disclosed technology.

**[0050]** **FIGURE 3A** illustrates an example scenario 300 associated with dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure. The example scenario 300 illustrates a computing device (or system) 302, which can be configured to present an interface 304 associated with dynamically providing video content based on declarative instructions.

**[0051]** In this example, the interface 304 can enable a user of the computing device 302 to select a subset of media content items out of a set of media content items 306, such as images and/or videos in a local camera roll of the computing device 302. As shown, the user has, for instance, selected five media content items out of the set of media content items 306 so far. Moreover, in some embodiments, the order in which the user selects the subset of media content items can be utilized, at least in part, to determine when each media content items in the subset will be dynamically presented to represent video content. Many variations are possible.

**[0052]** **FIGURE 3B** illustrates an example scenario 320 associated with dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure. The example scenario 320 illustrates a computing device (or system) 322, such as the computing device 302 of **FIGURE 3A**, subsequent to a subset of media content items being selected or identified. In this example scenario 320 of **FIGURE 3B**, the computing device 322 can be configured to present an interface 324 associated with dynamically providing video content based on declarative instructions. The interface 324 can display the subset of media content items being dynamically presented to represent, or to appear as, video content 326.

**[0053]** Moreover, as shown, the interface 324 can also provide the user with a selectable set of moods 328. In this example scenario 320, the set of moods 328 can include at least a happy mood, a hopeful mood, a nostalgic mood, an adventurous mood, and so forth. The disclosed technology can acquire a selection (e.g., user selection, system selection, etc.) for a particular mood out of the set. The selected particular mood can be utilized, at least in part, to determine or identify a soundtrack to be played when the subset is dynamically presented to represent, or to appear as,

video content 326. It should be understood that all examples herein are provided for illustrative purposes and that many variations associated with the disclosed technology are possible.

**[0054] FIGURE 4** illustrates an example method 400 associated with dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure. It should be appreciated that there can be additional, fewer, or alternative steps performed in similar or alternative orders, or in parallel, within the scope of the various embodiments unless otherwise stated.

**[0055]** At block 402, the example method 400 can acquire a first selection to identify a mood out of a set of moods. At block 404, the example method 400 can acquire a second selection to identify a subset of media content items out of a set of media content items. At block 406, the example method 400 can identify a soundtrack based on at least one of first selection or the second selection. The soundtrack can be associated with data that is utilized to determine when each media content item in the subset of media content items is to be presented during a playback of the soundtrack. At block 408, the example method 400 can provide a set of declarative instructions utilized to determine how each media content item in the subset is to be presented during the playback of the soundtrack. At block 410, the example method 400 can dynamically present the subset of media content items based on the set of declarative instructions. The subset of media content items can be presented during the playback of the soundtrack and can be presented to represent video content.

**[0056]** In some embodiments, various operations and/or tasks described above can be performed locally at a computing device (or system) that utilizes the disclosed technology. In some implementations, one or more servers remote from the computing device (or system) can assist in or can facilitate performing the various operations and/or tasks. Moreover, in some cases, graphics, text, animations, motions blurs, textures, filters, and/or other visual treatments/effects/styles can be presented with (or overlaid on) at least some of the subset of media content items. Again, many variations are possible.

**[0057] FIGURE 5A** illustrates an example method 500 associated with dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure. As discussed, it should be understood that

there can be additional, fewer, or alternative steps performed in similar or alternative orders, or in parallel, within the scope of the various embodiments unless otherwise stated.

**[0058]** At block 502, the example method 500 can receive a modification to the second selection such that a modified subset of media content items is identified. At block 504, the example method 500 can identify a modified soundtrack based on the modified subset of media content items. At block 506, the example method 500 can provide a modified set of declarative instructions utilized to determine how each media content item in the modified subset is to be presented during a playback of the modified soundtrack. At block 508, the example method 500 can dynamically present the modified subset of media content items based on the modified set of declarative instructions. The modified subset of media content items can be presented during the playback of the modified soundtrack and can be presented to represent video content.

**[0059]** **FIGURE 5B** illustrates an example method 520 associated with dynamically providing video content based on declarative instructions, according to an embodiment of the present disclosure. Again, it is contemplated that there can be additional, fewer, or alternative steps performed in similar or alternative orders, or in parallel, within the scope of the various embodiments unless otherwise stated.

**[0060]** At block 522, the example method 520 can receive a modification to the first selection such that a modified mood is identified. At block 524, the example method 520 can identify a modified soundtrack based on the modified mood. At block 526, the example method 520 can provide a modified set of declarative instructions utilized to determine how each media content item in the subset is to be presented during a playback of the modified soundtrack. At block 528, the example method 520 can dynamically present the subset of media content items based on the modified set of declarative instructions. The subset of media content items can be presented during the playback of the modified soundtrack and can be presented to represent video content.

**[0061]** It is contemplated that there can be many other uses, applications, features, possibilities, and/or variations associated with various embodiments of the present disclosure. For example, various embodiments can, in some cases, utilize OpenGL technology. In another example, users can, in some cases, choose

whether or not to opt-in to utilize the disclosed technology. The disclosed technology can, for instance, also ensure that various privacy settings, preferences, and configurations are maintained and can prevent private information from being divulged. In a further example, various embodiments of the present disclosure can learn, improve, and/or be refined over time.

#### SOCIAL NETWORKING SYSTEM – EXAMPLE IMPLEMENTATION

**[0062]** **FIGURE 6** illustrates a network diagram of an example system 600 that can be utilized in various scenarios, in accordance with an embodiment of the present disclosure. The system 600 includes one or more user devices 610, one or more external systems 620, a social networking system (or service) 630, and a network 650. In an embodiment, the social networking service, provider, and/or system discussed in connection with the embodiments described above may be implemented as the social networking system 630. For purposes of illustration, the embodiment of the system 600, shown by **FIGURE 6**, includes a single external system 620 and a single user device 610. However, in other embodiments, the system 600 may include more user devices 610 and/or more external systems 620. In certain embodiments, the social networking system 630 is operated by a social network provider, whereas the external systems 620 are separate from the social networking system 630 in that they may be operated by different entities. In various embodiments, however, the social networking system 630 and the external systems 620 operate in conjunction to provide social networking services to users (or members) of the social networking system 630. In this sense, the social networking system 630 provides a platform or backbone, which other systems, such as external systems 620, may use to provide social networking services and functionalities to users across the Internet. In some embodiments, the social networking system 630 can include or correspond to a social media system (or service).

**[0063]** The user device 610 comprises one or more computing devices (or systems) that can receive input from a user and transmit and receive data via the network 650. In one embodiment, the user device 610 is a conventional computer system executing, for example, a Microsoft Windows compatible operating system (OS), Apple OS X, and/or a Linux distribution. In another embodiment, the user device 610 can be a computing device or a device having computer functionality,

such as a smart-phone, a tablet, a personal digital assistant (PDA), a mobile telephone, a laptop computer, a wearable device (e.g., a pair of glasses, a watch, a bracelet, etc.), a camera, an appliance, etc. The user device 610 is configured to communicate via the network 650. The user device 610 can execute an application, for example, a browser application that allows a user of the user device 610 to interact with the social networking system 630. In another embodiment, the user device 610 interacts with the social networking system 630 through an application programming interface (API) provided by the native operating system of the user device 610, such as iOS and ANDROID. The user device 610 is configured to communicate with the external system 620 and the social networking system 630 via the network 650, which may comprise any combination of local area and/or wide area networks, using wired and/or wireless communication systems.

**[0064]** In one embodiment, the network 650 uses standard communications technologies and protocols. Thus, the network 650 can include links using technologies such as Ethernet, 802.11 (e.g., Wi-Fi), worldwide interoperability for microwave access (WiMAX), 3G, 4G, CDMA, GSM, LTE, digital subscriber line (DSL), etc. Similarly, the networking protocols used on the network 650 can include multiprotocol label switching (MPLS), transmission control protocol/Internet protocol (TCP/IP), User Datagram Protocol (UDP), hypertext transport protocol (HTTP), simple mail transfer protocol (SMTP), file transfer protocol (FTP), and the like. The data exchanged over the network 650 can be represented using technologies and/or formats including hypertext markup language (HTML) and extensible markup language (XML). In addition, all or some links can be encrypted using conventional encryption technologies such as secure sockets layer (SSL), transport layer security (TLS), and Internet Protocol security (IPsec).

**[0065]** In one embodiment, the user device 610 may display content from the external system 620 and/or from the social networking system 630 by processing a markup language document 614 received from the external system 620 and from the social networking system 630 using a browser application 612. The markup language document 614 identifies content and one or more instructions describing formatting or presentation of the content. By executing the instructions included in the markup language document 614, the browser application 612 displays the identified content using the format or presentation described by the markup language document 614.

For example, the markup language document 614 includes instructions for generating and displaying a web page having multiple frames that include text and/or image data retrieved from the external system 620 and the social networking system 630. In various embodiments, the markup language document 614 comprises a data file including extensible markup language (XML) data, extensible hypertext markup language (XHTML) data, or other markup language data. Additionally, the markup language document 614 may include JavaScript Object Notation (JSON) data, JSON with padding (JSONP), and JavaScript data to facilitate data-interchange between the external system 620 and the user device 610. The browser application 612 on the user device 610 may use a JavaScript compiler to decode the markup language document 614.

**[0066]** The markup language document 614 may also include, or link to, applications or application frameworks such as FLASH™ or Unity™ applications, the Silverlight™ application framework, etc.

**[0067]** In one embodiment, the user device 610 also includes one or more cookies 616 including data indicating whether a user of the user device 610 is logged into the social networking system 630, which may enable modification of the data communicated from the social networking system 630 to the user device 610.

**[0068]** The external system 620 includes one or more web servers that include one or more web pages 622a, 622b, which are communicated to the user device 610 using the network 650. The external system 620 is separate from the social networking system 630. For example, the external system 620 is associated with a first domain, while the social networking system 630 is associated with a separate social networking domain. Web pages 622a, 622b, included in the external system 620, comprise markup language documents 614 identifying content and including instructions specifying formatting or presentation of the identified content.

**[0069]** The social networking system 630 includes one or more computing devices for a social network, including a plurality of users, and providing users of the social network with the ability to communicate and interact with other users of the social network. In some instances, the social network can be represented by a graph, i.e., a data structure including edges and nodes. Other data structures can also be used to represent the social network, including but not limited to databases, objects, classes, meta elements, files, or any other data structure. The social networking

system 630 may be administered, managed, or controlled by an operator. The operator of the social networking system 630 may be a human being, an automated application, or a series of applications for managing content, regulating policies, and collecting usage metrics within the social networking system 630. Any type of operator may be used.

**[0070]** Users may join the social networking system 630 and then add connections to any number of other users of the social networking system 630 to whom they desire to be connected. As used herein, the term “friend” refers to any other user of the social networking system 630 to whom a user has formed a connection, association, or relationship via the social networking system 630. For example, in an embodiment, if users in the social networking system 630 are represented as nodes in the social graph, the term “friend” can refer to an edge formed between and directly connecting two user nodes.

**[0071]** Connections may be added explicitly by a user or may be automatically created by the social networking system 630 based on common characteristics of the users (e.g., users who are alumni of the same educational institution). For example, a first user specifically selects a particular other user to be a friend. Connections in the social networking system 630 are usually in both directions, but need not be, so the terms “user” and “friend” depend on the frame of reference. Connections between users of the social networking system 630 are usually bilateral (“two-way”), or “mutual,” but connections may also be unilateral, or “one-way.” For example, if Bob and Joe are both users of the social networking system 630 and connected to each other, Bob and Joe are each other’s connections. If, on the other hand, Bob wishes to connect to Joe to view data communicated to the social networking system 630 by Joe, but Joe does not wish to form a mutual connection, a unilateral connection may be established. The connection between users may be a direct connection; however, some embodiments of the social networking system 630 allow the connection to be indirect via one or more levels of connections or degrees of separation.

**[0072]** In addition to establishing and maintaining connections between users and allowing interactions between users, the social networking system 630 provides users with the ability to take actions on various types of items supported by the social networking system 630. These items may include groups or networks (i.e., social networks of people, entities, and concepts) to which users of the social networking

system 630 may belong, events or calendar entries in which a user might be interested, computer-based applications that a user may use via the social networking system 630, transactions that allow users to buy or sell items via services provided by or through the social networking system 630, and interactions with advertisements that a user may perform on or off the social networking system 630. These are just a few examples of the items upon which a user may act on the social networking system 630, and many others are possible. A user may interact with anything that is capable of being represented in the social networking system 630 or in the external system 620, separate from the social networking system 630, or coupled to the social networking system 630 via the network 650.

**[0073]** The social networking system 630 is also capable of linking a variety of entities. For example, the social networking system 630 enables users to interact with each other as well as external systems 620 or other entities through an API, a web service, or other communication channels. The social networking system 630 generates and maintains the “social graph” comprising a plurality of nodes interconnected by a plurality of edges. Each node in the social graph may represent an entity that can act on another node and/or that can be acted on by another node. The social graph may include various types of nodes. Examples of types of nodes include users, non-person entities, content items, web pages, groups, activities, messages, concepts, and any other things that can be represented by an object in the social networking system 630. An edge between two nodes in the social graph may represent a particular kind of connection, or association, between the two nodes, which may result from node relationships or from an action that was performed by one of the nodes on the other node. In some cases, the edges between nodes can be weighted. The weight of an edge can represent an attribute associated with the edge, such as a strength of the connection or association between nodes. Different types of edges can be provided with different weights. For example, an edge created when one user “likes” another user may be given one weight, while an edge created when a user befriends another user may be given a different weight.

**[0074]** As an example, when a first user identifies a second user as a friend, an edge in the social graph is generated connecting a node representing the first user and a second node representing the second user. As various nodes relate or interact

with each other, the social networking system 630 modifies edges connecting the various nodes to reflect the relationships and interactions.

**[0075]** The social networking system 630 also includes user-generated content, which enhances a user's interactions with the social networking system 630. User-generated content may include anything a user can add, upload, send, or "post" to the social networking system 630. For example, a user communicates posts to the social networking system 630 from a user device 610. Posts may include data such as status updates or other textual data, location information, images such as photos, videos, links, music or other similar data and/or media. Content may also be added to the social networking system 630 by a third party. Content "items" are represented as objects in the social networking system 630. In this way, users of the social networking system 630 are encouraged to communicate with each other by posting text and content items of various types of media through various communication channels. Such communication increases the interaction of users with each other and increases the frequency with which users interact with the social networking system 630.

**[0076]** The social networking system 630 includes a web server 632, an API request server 634, a user profile store 636, a connection store 638, an action logger 640, an activity log 642, and an authorization server 644. In an embodiment of the invention, the social networking system 630 may include additional, fewer, or different components for various applications. Other components, such as network interfaces, security mechanisms, load balancers, failover servers, management and network operations consoles, and the like are not shown so as to not obscure the details of the system.

**[0077]** The user profile store 636 maintains information about user accounts, including biographic, demographic, and other types of descriptive information, such as work experience, educational history, hobbies or preferences, location, and the like that has been declared by users or inferred by the social networking system 630. This information is stored in the user profile store 636 such that each user is uniquely identified. The social networking system 630 also stores data describing one or more connections between different users in the connection store 638. The connection information may indicate users who have similar or common work experience, group memberships, hobbies, or educational history. Additionally, the social networking

system 630 includes user-defined connections between different users, allowing users to specify their relationships with other users. For example, user-defined connections allow users to generate relationships with other users that parallel the users' real-life relationships, such as friends, co-workers, partners, and so forth. Users may select from predefined types of connections, or define their own connection types as needed. Connections with other nodes in the social networking system 630, such as non-person entities, buckets, cluster centers, images, interests, pages, external systems, concepts, and the like are also stored in the connection store 638.

**[0078]** The social networking system 630 maintains data about objects with which a user may interact. To maintain this data, the user profile store 636 and the connection store 638 store instances of the corresponding type of objects maintained by the social networking system 630. Each object type has information fields that are suitable for storing information appropriate to the type of object. For example, the user profile store 636 contains data structures with fields suitable for describing a user's account and information related to a user's account. When a new object of a particular type is created, the social networking system 630 initializes a new data structure of the corresponding type, assigns a unique object identifier to it, and begins to add data to the object as needed. This might occur, for example, when a user becomes a user of the social networking system 630, the social networking system 630 generates a new instance of a user profile in the user profile store 636, assigns a unique identifier to the user account, and begins to populate the fields of the user account with information provided by the user.

**[0079]** The connection store 638 includes data structures suitable for describing a user's connections to other users, connections to external systems 620 or connections to other entities. The connection store 638 may also associate a connection type with a user's connections, which may be used in conjunction with the user's privacy setting to regulate access to information about the user. In an embodiment of the invention, the user profile store 636 and the connection store 638 may be implemented as a federated database.

**[0080]** Data stored in the connection store 638, the user profile store 636, and the activity log 642 enables the social networking system 630 to generate the social graph that uses nodes to identify various objects and edges connecting nodes to

identify relationships between different objects. For example, if a first user establishes a connection with a second user in the social networking system 630, user accounts of the first user and the second user from the user profile store 636 may act as nodes in the social graph. The connection between the first user and the second user stored by the connection store 638 is an edge between the nodes associated with the first user and the second user. Continuing this example, the second user may then send the first user a message within the social networking system 630. The action of sending the message, which may be stored, is another edge between the two nodes in the social graph representing the first user and the second user. Additionally, the message itself may be identified and included in the social graph as another node connected to the nodes representing the first user and the second user.

**[0081]** In another example, a first user may tag a second user in an image that is maintained by the social networking system 630 (or, alternatively, in an image maintained by another system outside of the social networking system 630). The image may itself be represented as a node in the social networking system 630. This tagging action may create edges between the first user and the second user as well as create an edge between each of the users and the image, which is also a node in the social graph. In yet another example, if a user confirms attending an event, the user and the event are nodes obtained from the user profile store 636, where the attendance of the event is an edge between the nodes that may be retrieved from the activity log 642. By generating and maintaining the social graph, the social networking system 630 includes data describing many different types of objects and the interactions and connections among those objects, providing a rich source of socially relevant information.

**[0082]** The web server 632 links the social networking system 630 to one or more user devices 610 and/or one or more external systems 620 via the network 650. The web server 632 serves web pages, as well as other web-related content, such as Java, JavaScript, Flash, XML, and so forth. The web server 632 may include a mail server or other messaging functionality for receiving and routing messages between the social networking system 630 and one or more user devices 610. The messages can be instant messages, queued messages (e.g., email), text and SMS messages, or any other suitable messaging format.

**[0083]** The API request server 634 allows one or more external systems 620 and user devices 610 to call access information from the social networking system 630 by calling one or more API functions. The API request server 634 may also allow external systems 620 to send information to the social networking system 630 by calling APIs. The external system 620, in one embodiment, sends an API request to the social networking system 630 via the network 650, and the API request server 634 receives the API request. The API request server 634 processes the request by calling an API associated with the API request to generate an appropriate response, which the API request server 634 communicates to the external system 620 via the network 650. For example, responsive to an API request, the API request server 634 collects data associated with a user, such as the user's connections that have logged into the external system 620, and communicates the collected data to the external system 620. In another embodiment, the user device 610 communicates with the social networking system 630 via APIs in the same manner as external systems 620.

**[0084]** The action logger 640 is capable of receiving communications from the web server 632 about user actions on and/or off the social networking system 630. The action logger 640 populates the activity log 642 with information about user actions, enabling the social networking system 630 to discover various actions taken by its users within the social networking system 630 and outside of the social networking system 630. Any action that a particular user takes with respect to another node on the social networking system 630 may be associated with each user's account, through information maintained in the activity log 642 or in a similar database or other data repository. Examples of actions taken by a user within the social networking system 630 that are identified and stored may include, for example, adding a connection to another user, sending a message to another user, reading a message from another user, viewing content associated with another user, attending an event posted by another user, posting an image, attempting to post an image, or other actions interacting with another user or another object. When a user takes an action within the social networking system 630, the action is recorded in the activity log 642. In one embodiment, the social networking system 630 maintains the activity log 642 as a database of entries. When an action is taken within the social networking system 630, an entry for the action is added to the activity log 642. The activity log 642 may be referred to as an action log.

**[0085]** Additionally, user actions may be associated with concepts and actions that occur within an entity outside of the social networking system 630, such as an external system 620 that is separate from the social networking system 630. For example, the action logger 640 may receive data describing a user's interaction with an external system 620 from the web server 632. In this example, the external system 620 reports a user's interaction according to structured actions and objects in the social graph.

**[0086]** Other examples of actions where a user interacts with an external system 620 include a user expressing an interest in an external system 620 or another entity, a user posting a comment to the social networking system 630 that discusses an external system 620 or a web page 622a within the external system 620, a user posting to the social networking system 630 a Uniform Resource Locator (URL) or other identifier associated with an external system 620, a user attending an event associated with an external system 620, or any other action by a user that is related to an external system 620. Thus, the activity log 642 may include actions describing interactions between a user of the social networking system 630 and an external system 620 that is separate from the social networking system 630.

**[0087]** The authorization server 644 enforces one or more privacy settings of the users of the social networking system 630. A privacy setting of a user determines how particular information associated with a user can be shared. The privacy setting comprises the specification of particular information associated with a user and the specification of the entity or entities with whom the information can be shared. Examples of entities with which information can be shared may include other users, applications, external systems 620, or any entity that can potentially access the information. The information that can be shared by a user comprises user account information, such as profile photos, phone numbers associated with the user, user's connections, actions taken by the user such as adding a connection, changing user profile information, and the like.

**[0088]** The privacy setting specification may be provided at different levels of granularity. For example, the privacy setting may identify specific information to be shared with other users; the privacy setting identifies a work phone number or a specific set of related information, such as, personal information including profile photo, home phone number, and status. Alternatively, the privacy setting may apply

to all the information associated with the user. The specification of the set of entities that can access particular information can also be specified at various levels of granularity. Various sets of entities with which information can be shared may include, for example, all friends of the user, all friends of friends, all applications, or all external systems 620. One embodiment allows the specification of the set of entities to comprise an enumeration of entities. For example, the user may provide a list of external systems 620 that are allowed to access certain information. Another embodiment allows the specification to comprise a set of entities along with exceptions that are not allowed to access the information. For example, a user may allow all external systems 620 to access the user's work information, but specify a list of external systems 620 that are not allowed to access the work information. Certain embodiments call the list of exceptions that are not allowed to access certain information a "block list". External systems 620 belonging to a block list specified by a user are blocked from accessing the information specified in the privacy setting. Various combinations of granularity of specification of information, and granularity of specification of entities, with which information is shared are possible. For example, all personal information may be shared with friends whereas all work information may be shared with friends of friends.

**[0089]** The authorization server 644 contains logic to determine if certain information associated with a user can be accessed by a user's friends, external systems 620, and/or other applications and entities. The external system 620 may need authorization from the authorization server 644 to access the user's more private and sensitive information, such as the user's work phone number. Based on the user's privacy settings, the authorization server 644 determines if another user, the external system 620, an application, or another entity is allowed to access information associated with the user, including information about actions taken by the user.

**[0090]** In some embodiments, the user device 610 can include a dynamic video content module 618. The dynamic video content module 618 can, for example, be implemented as the dynamic video content module 102 of **FIGURE 1**. As discussed previously, it should be appreciated that there can be many variations or other possibilities. For example, in some instances, the dynamic video content module (or at least a portion thereof) can be included or implemented in the social networking

system 630. Other features of the dynamic video content module 618 are discussed herein in connection with the dynamic video content module 102.

#### HARDWARE IMPLEMENTATION

**[0091]** The foregoing processes and features can be implemented by a wide variety of machine and computer system architectures and in a wide variety of network and computing environments. **FIGURE 7** illustrates an example of a computer system 700 that may be used to implement one or more of the embodiments described herein in accordance with an embodiment of the invention. The computer system 700 includes sets of instructions for causing the computer system 700 to perform the processes and features discussed herein. The computer system 700 may be connected (e.g., networked) to other machines. In a networked deployment, the computer system 700 may operate in the capacity of a server machine or a client machine in a client-server network environment, or as a peer machine in a peer-to-peer (or distributed) network environment. In an embodiment of the invention, the computer system 700 may be the social networking system 630, the user device 610, and the external system 620, or a component thereof. In an embodiment of the invention, the computer system 700 may be one server among many that constitutes all or part of the social networking system 630.

**[0092]** The computer system 700 includes a processor 702, a cache 704, and one or more executable modules and drivers, stored on a computer-readable medium, directed to the processes and features described herein. Additionally, the computer system 700 includes a high performance input/output (I/O) bus 706 and a standard I/O bus 708. A host bridge 710 couples processor 702 to high performance I/O bus 706, whereas I/O bus bridge 712 couples the two buses 706 and 708 to each other. A system memory 714 and one or more network interfaces 716 couple to high performance I/O bus 706. The computer system 700 may further include video memory and a display device coupled to the video memory (not shown). Mass storage 718 and I/O ports 720 couple to the standard I/O bus 708. The computer system 700 may optionally include a keyboard and pointing device, a display device, or other input/output devices (not shown) coupled to the standard I/O bus 708. Collectively, these elements are intended to represent a broad category of computer hardware systems, including but not limited to computer systems based on the x86-

compatible processors manufactured by Intel Corporation of Santa Clara, California, and the x86-compatible processors manufactured by Advanced Micro Devices (AMD), Inc., of Sunnyvale, California, as well as any other suitable processor.

**[0093]** An operating system manages and controls the operation of the computer system 700, including the input and output of data to and from software applications (not shown). The operating system provides an interface between the software applications being executed on the system and the hardware components of the system. Any suitable operating system may be used, such as the LINUX Operating System, the Apple Macintosh Operating System, available from Apple Computer Inc. of Cupertino, California, UNIX operating systems, Microsoft® Windows® operating systems, BSD operating systems, and the like. Other implementations are possible.

**[0094]** The elements of the computer system 700 are described in greater detail below. In particular, the network interface 716 provides communication between the computer system 700 and any of a wide range of networks, such as an Ethernet (e.g., IEEE 802.3) network, a backplane, etc. The mass storage 718 provides permanent storage for the data and programming instructions to perform the above-described processes and features implemented by the respective computing systems identified above, whereas the system memory 714 (e.g., DRAM) provides temporary storage for the data and programming instructions when executed by the processor 702. The I/O ports 720 may be one or more serial and/or parallel communication ports that provide communication between additional peripheral devices, which may be coupled to the computer system 700.

**[0095]** The computer system 700 may include a variety of system architectures, and various components of the computer system 700 may be rearranged. For example, the cache 704 may be on-chip with processor 702. Alternatively, the cache 704 and the processor 702 may be packed together as a “processor module”, with processor 702 being referred to as the “processor core”. Furthermore, certain embodiments of the invention may neither require nor include all of the above components. For example, peripheral devices coupled to the standard I/O bus 708 may couple to the high performance I/O bus 706. In addition, in some embodiments, only a single bus may exist, with the components of the computer system 700 being

coupled to the single bus. Moreover, the computer system 700 may include additional components, such as additional processors, storage devices, or memories.

**[0096]** In general, the processes and features described herein may be implemented as part of an operating system or a specific application, component, program, object, module, or series of instructions referred to as “programs”. For example, one or more programs may be used to execute specific processes described herein. The programs typically comprise one or more instructions in various memory and storage devices in the computer system 700 that, when read and executed by one or more processors, cause the computer system 700 to perform operations to execute the processes and features described herein. The processes and features described herein may be implemented in software, firmware, hardware (e.g., an application specific integrated circuit), or any combination thereof.

**[0097]** In one implementation, the processes and features described herein are implemented as a series of executable modules run by the computer system 700, individually or collectively in a distributed computing environment. The foregoing modules may be realized by hardware, executable modules stored on a computer-readable medium (or machine-readable medium), or a combination of both. For example, the modules may comprise a plurality or series of instructions to be executed by a processor in a hardware system, such as the processor 702. Initially, the series of instructions may be stored on a storage device, such as the mass storage 718. However, the series of instructions can be stored on any suitable computer readable storage medium. Furthermore, the series of instructions need not be stored locally, and could be received from a remote storage device, such as a server on a network, via the network interface 716. The instructions are copied from the storage device, such as the mass storage 718, into the system memory 714 and then accessed and executed by the processor 702. In various implementations, a module or modules can be executed by a processor or multiple processors in one or multiple locations, such as multiple servers in a parallel processing environment.

**[0098]** Examples of computer-readable media include, but are not limited to, recordable type media such as volatile and non-volatile memory devices; solid state memories; floppy and other removable disks; hard disk drives; magnetic media; optical disks (e.g., Compact Disk Read-Only Memory (CD ROMS), Digital Versatile Disks (DVDs)); other similar non-transitory (or transitory), tangible (or non-tangible)

storage medium; or any type of medium suitable for storing, encoding, or carrying a series of instructions for execution by the computer system 700 to perform any one or more of the processes and features described herein.

**[0099]** For purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the description. It will be apparent, however, to one skilled in the art that embodiments of the disclosure can be practiced without these specific details. In some instances, modules, structures, processes, features, and devices are shown in block diagram form in order to avoid obscuring the description. In other instances, functional block diagrams and flow diagrams are shown to represent data and logic flows. The components of block diagrams and flow diagrams (e.g., modules, blocks, structures, devices, features, etc.) may be variously combined, separated, removed, reordered, and replaced in a manner other than as expressly described and depicted herein.

**[00100]** Reference in this specification to “one embodiment”, “an embodiment”, “other embodiments”, “one series of embodiments”, “some embodiments”, “various embodiments”, or the like means that a particular feature, design, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the disclosure. The appearances of, for example, the phrase “in one embodiment” or “in an embodiment” in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. Moreover, whether or not there is express reference to an “embodiment” or the like, various features are described, which may be variously combined and included in some embodiments, but also variously omitted in other embodiments. Similarly, various features are described that may be preferences or requirements for some embodiments, but not other embodiments. Furthermore, reference in this specification to “based on” can mean “based, at least in part, on”, “based on at least a portion/part of”, “at least a portion/part of which is based on”, and/or any combination thereof.

**[00101]** The language used herein has been principally selected for readability and instructional purposes, and it may not have been selected to delineate or circumscribe the inventive subject matter. It is therefore intended that the scope of the invention be limited not by this detailed description, but rather by any claims that issue on an application based hereon. Accordingly, the disclosure of the

embodiments of the invention is intended to be illustrative, but not limiting, of the scope of the invention, which is set forth in the following claims.

**WHAT IS CLAIMED IS:**

1. A computer-implemented method comprising:
  - acquiring, by the computing system, a first selection to identify a subset of media content items out of a set of media content items;
  - acquiring, by a computing system, a second selection to identify a mood out of a set of moods;
  - identifying, by the computing system, a soundtrack based on at least one of first selection or the second selection, wherein the soundtrack is associated with data that is utilized to determine when each media content item in the subset of media content items is to be presented during a playback of the soundtrack;
  - providing, by the computing system, a set of declarative instructions utilized to determine how each media content item in the subset is to be presented during the playback of the soundtrack; and
  - dynamically presenting, by the computing system, the subset of media content items based on the set of declarative instructions, the subset of media content items being presented during the playback of the soundtrack and being presented to represent video content.
2. The computer-implemented method of claim 1, further comprising:
  - receiving a modification to the first selection such that a modified subset of media content items is identified;
  - identifying a modified soundtrack based on the modified subset of media content items;
  - providing a modified set of declarative instructions utilized to determine how each media content item in the modified subset is to be presented during a playback of the modified soundtrack; and
  - dynamically presenting the modified subset of media content items based on the modified set of declarative instructions, the modified subset of media content items being presented during the playback of the modified soundtrack and being presented to represent video content.
3. The computer-implemented method of claim 1, further comprising:

receiving a modification to the second selection such that a modified mood is identified;

identifying a modified soundtrack based on the modified mood;

providing a modified set of declarative instructions utilized to determine how each media content item in the subset is to be presented during a playback of the modified soundtrack; and

dynamically presenting the subset of media content items based on the modified set of declarative instructions, the subset of media content items being presented during the playback of the modified soundtrack and being presented to represent video content.

4. The computer-implemented method of claim 1, wherein the data includes information about one or more beats identified based on a beat detection process applied to the soundtrack.

5. The computer-implemented method of claim 1, wherein identifying the soundtrack includes identifying a particular version of the soundtrack based on a quantity of media content items in the subset of media content items, and wherein the particular version of the soundtrack has a particular playback length that is compatible with the quantity of media content items in the subset of media content items.

6. The computer-implemented method of claim 1, wherein the set of declarative instructions is utilized to determine how to transition from a particular media content item in the subset to a next media content item in the subset when the subset is being presented.

7. The computer-implemented method of claim 1, wherein the set of declarative instructions specifies, for each media content item in the subset of media content items, at least one of: 1) a respective starting state, 2) a respective ending state, 3) a respective movement operation from the respective starting state to the respective ending state, 4) a respective zoom operation from the respective starting state to the respective ending state, or 5) a respective duration of time in which the respective starting state transitions to the respective ending state.

8. The computer-implemented method of claim 1, wherein one or more declarative instructions in the set of declarative instructions are dynamically executed in order to dynamically present the subset of media content items.

9. The computer-implemented method of claim 1, wherein the subset of media content items is presented to represent video content without generating a video file.

10. The computer-implemented method of claim 1, further comprising:  
acquiring a command to post, as video content, the subset of media content items presented based on the set of declarative instructions; and  
generating a video file based on the set of declarative instructions.

11. A system comprising:  
at least one processor; and  
a memory storing instructions that, when executed by the at least one processor, cause the system to perform:  
acquiring a first selection to identify a subset of media content items out of a set of media content items;  
acquiring a second selection to identify a mood out of a set of moods;  
identifying a soundtrack based on at least one of first selection or the second selection, wherein the soundtrack is associated with data that is utilized to determine when each media content item in the subset of media content items is to be presented during a playback of the soundtrack;  
providing a set of declarative instructions utilized to determine how each media content item in the subset is to be presented during the playback of the soundtrack; and  
dynamically presenting the subset of media content items based on the set of declarative instructions, the subset of media content items being presented during the playback of the soundtrack and being presented to represent video content.

12. The system of claim 11, wherein the instructions cause the system to further perform:

receiving a modification to the first selection such that a modified subset of media content items is identified;

identifying a modified soundtrack based on the modified subset of media content items;

providing a modified set of declarative instructions utilized to determine how each media content item in the modified subset is to be presented during a playback of the modified soundtrack; and

dynamically presenting the modified subset of media content items based on the modified set of declarative instructions, the modified subset of media content items being presented during the playback of the modified soundtrack and being presented to represent video content.

13. The system of claim 11, wherein the instructions cause the system to further perform:

receiving a modification to the second selection such that a modified mood is identified;

identifying a modified soundtrack based on the modified mood;

providing a modified set of declarative instructions utilized to determine how each media content item in the subset is to be presented during a playback of the modified soundtrack; and

dynamically presenting the subset of media content items based on the modified set of declarative instructions, the subset of media content items being presented during the playback of the modified soundtrack and being presented to represent video content.

14. The system of claim 11, wherein the set of declarative instructions is utilized to determine how to transition from a particular media content item in the subset to a next media content item in the subset when the subset is being presented.

15. The system of claim 11, wherein the set of declarative instructions specifies, for each media content item in the subset of media content items, at least

one of: 1) a respective starting state, 2) a respective ending state, 3) a respective movement operation from the respective starting state to the respective ending state, 4) a respective zoom operation from the respective starting state to the respective ending state, or 5) a respective duration of time in which the respective starting state transitions to the respective ending state.

16. A non-transitory computer-readable storage medium including instructions that, when executed by at least one processor of a computing system, cause the computing system to perform a method comprising:

acquiring a first selection to identify a subset of media content items out of a set of media content items;

acquiring a second selection to identify a mood out of a set of moods;

identifying a soundtrack based on at least one of first selection or the second selection, wherein the soundtrack is associated with data that is utilized to determine when each media content item in the subset of media content items is to be presented during a playback of the soundtrack;

providing a set of declarative instructions utilized to determine how each media content item in the subset is to be presented during the playback of the soundtrack; and

dynamically presenting the subset of media content items based on the set of declarative instructions, the subset of media content items being presented during the playback of the soundtrack and being presented to represent video content.

17. The non-transitory computer-readable storage medium of claim 16, wherein the instructions cause the computing system to further perform:

receiving a modification to the first selection such that a modified subset of media content items is identified;

identifying a modified soundtrack based on the modified subset of media content items;

providing a modified set of declarative instructions utilized to determine how each media content item in the modified subset is to be presented during a playback of the modified soundtrack; and

dynamically presenting the modified subset of media content items based on the modified set of declarative instructions, the modified subset of media content items being presented during the playback of the modified soundtrack and being presented to represent video content.

18. The non-transitory computer-readable storage medium of claim 16, wherein the instructions cause the computing system to further perform:

receiving a modification to the second selection such that a modified mood is identified;

identifying a modified soundtrack based on the modified mood;

providing a modified set of declarative instructions utilized to determine how each media content item in the subset is to be presented during a playback of the modified soundtrack; and

dynamically presenting the subset of media content items based on the modified set of declarative instructions, the subset of media content items being presented during the playback of the modified soundtrack and being presented to represent video content.

19. The non-transitory computer-readable storage medium of claim 16, wherein the set of declarative instructions is utilized to determine how to transition from a particular media content item in the subset to a next media content item in the subset when the subset is being presented.

20. The non-transitory computer-readable storage medium of claim 16, wherein the set of declarative instructions specifies, for each media content item in the subset of media content items, at least one of: 1) a respective starting state, 2) a respective ending state, 3) a respective movement operation from the respective starting state to the respective ending state, 4) a respective zoom operation from the respective starting state to the respective ending state, or 5) a respective duration of time in which the respective starting state transitions to the respective ending state.

100 ↗

1/10

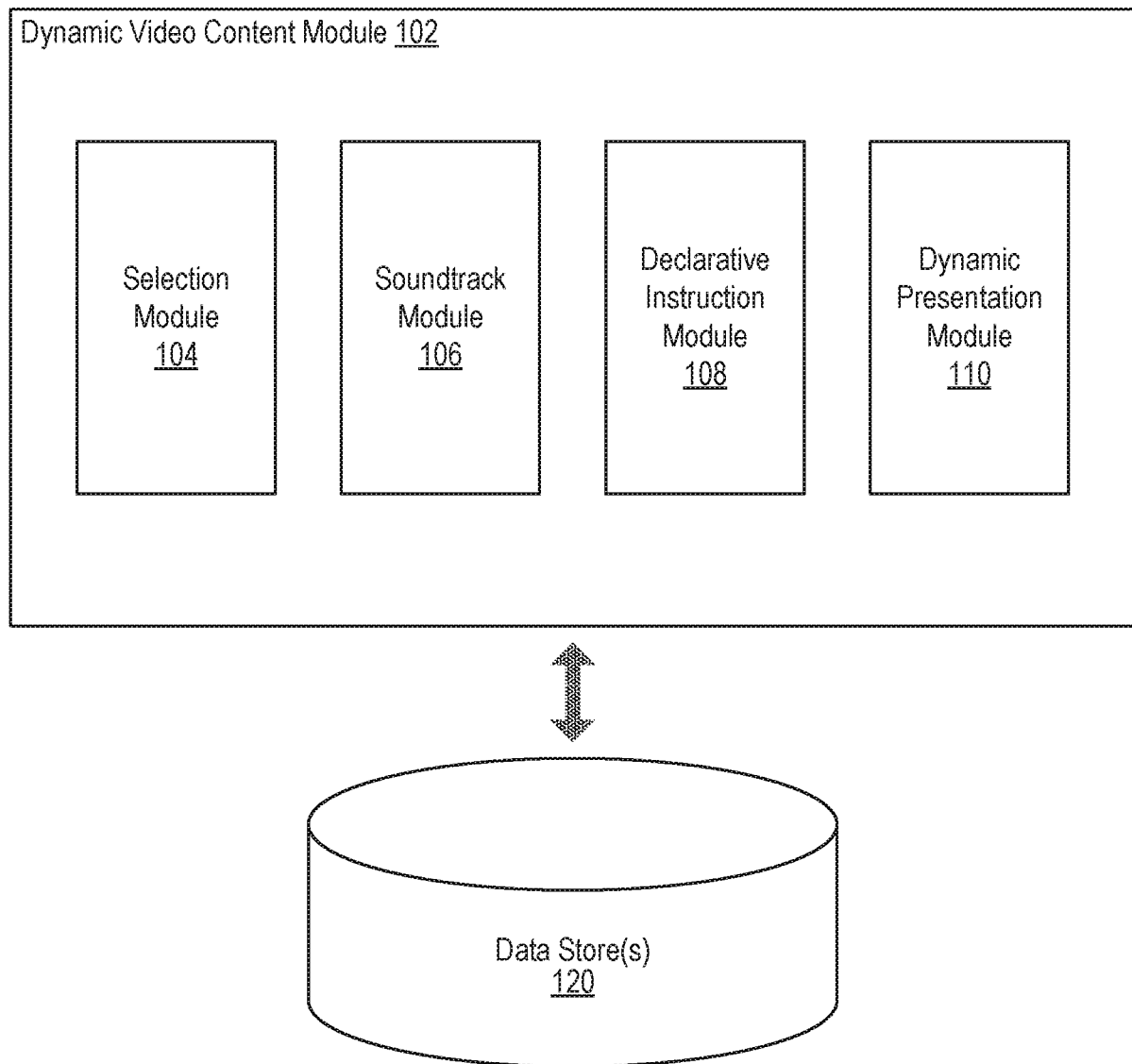


FIGURE 1

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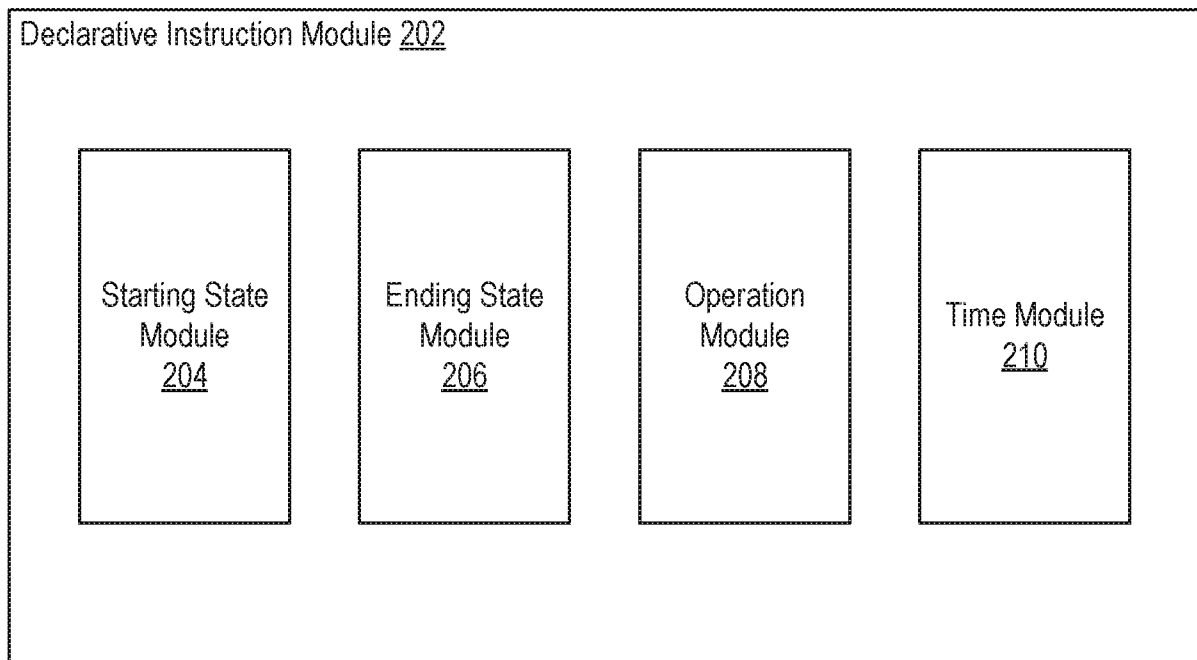


FIGURE 2A

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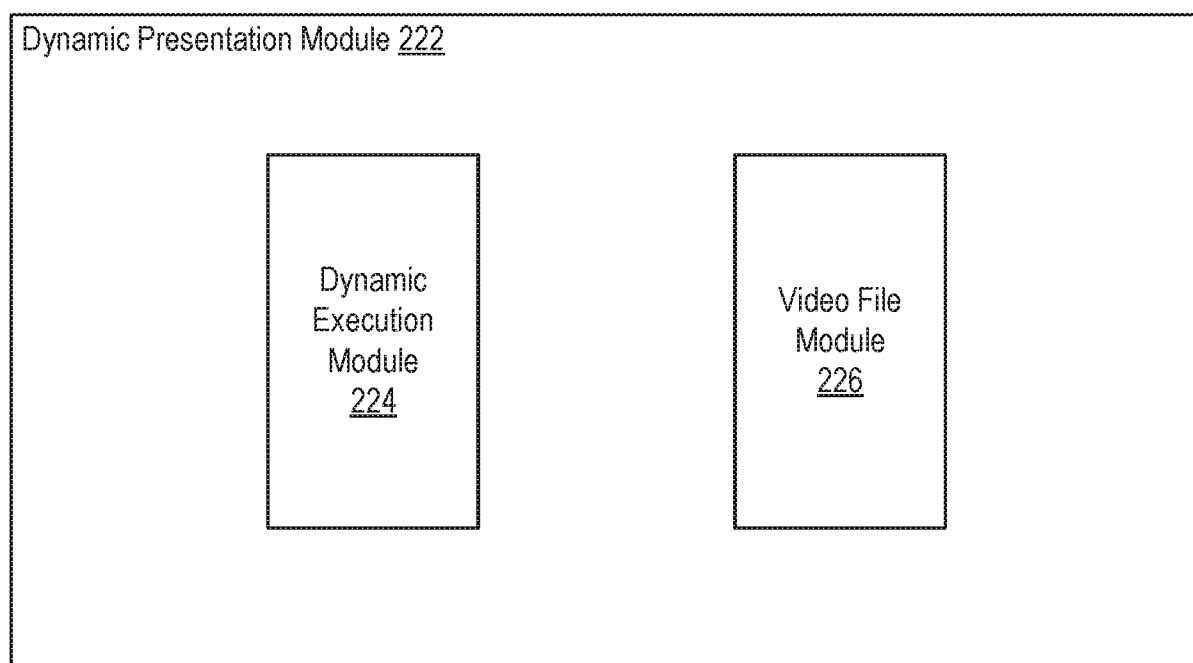


FIGURE 2B

300 ↗

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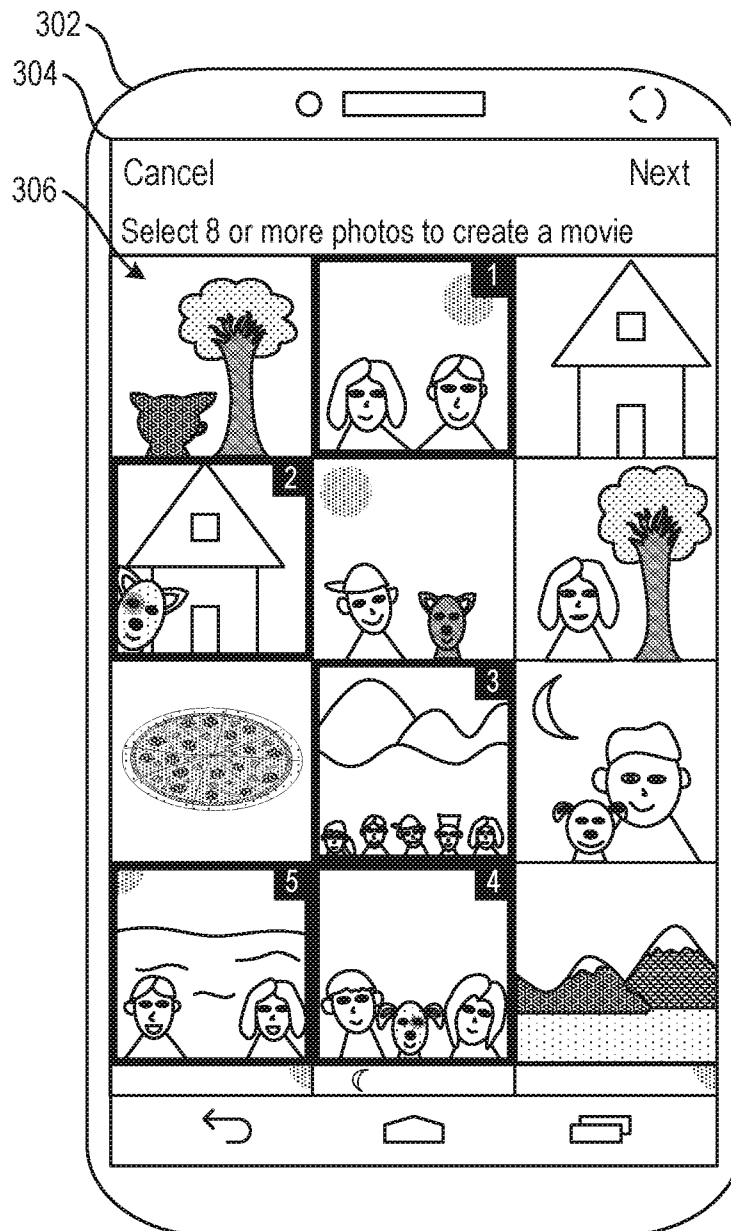


FIGURE 3A

320 ↗

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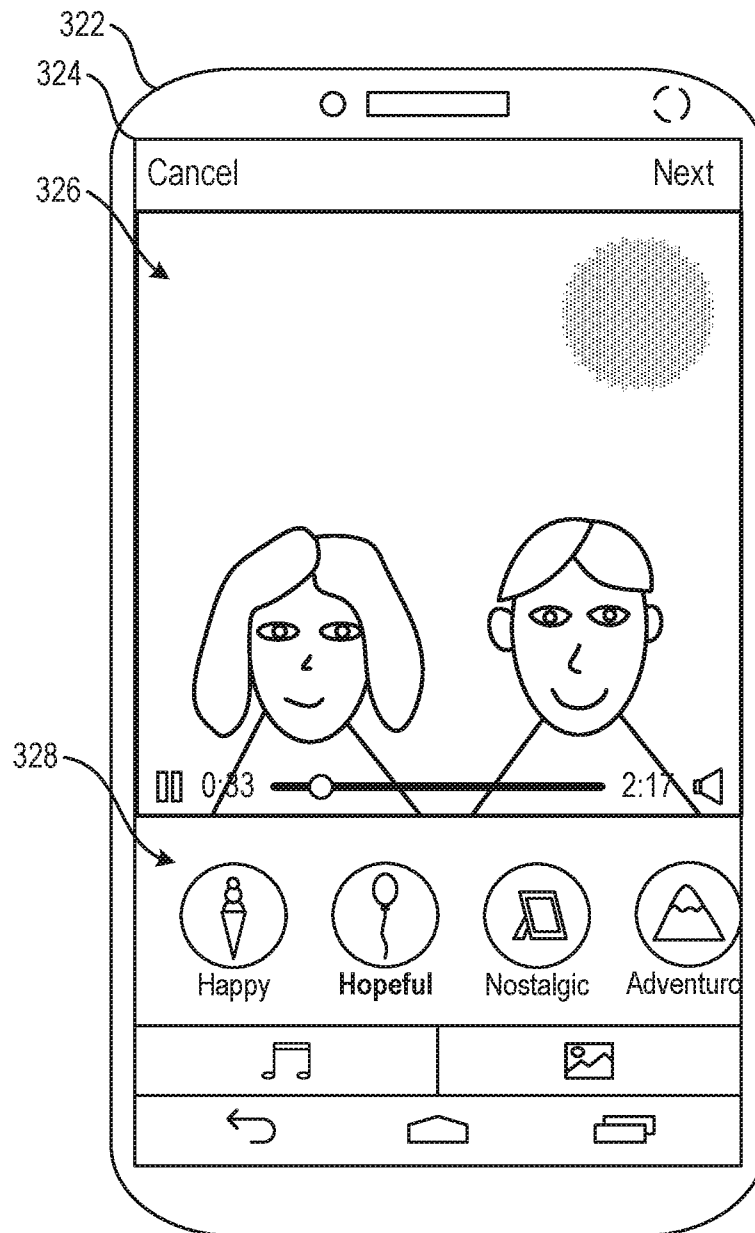


FIGURE 3B

400 ↗

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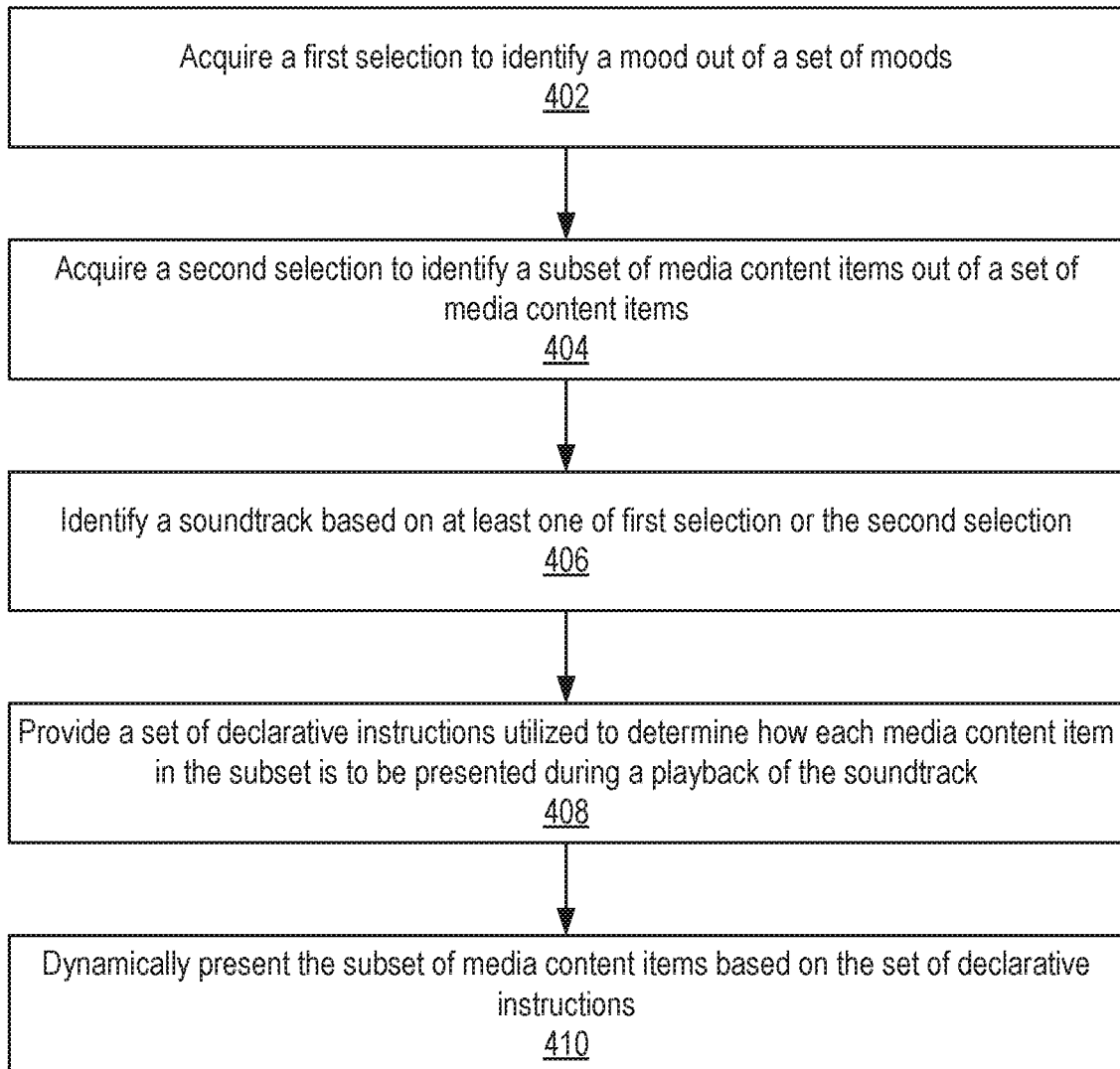


FIGURE 4

500 ↗

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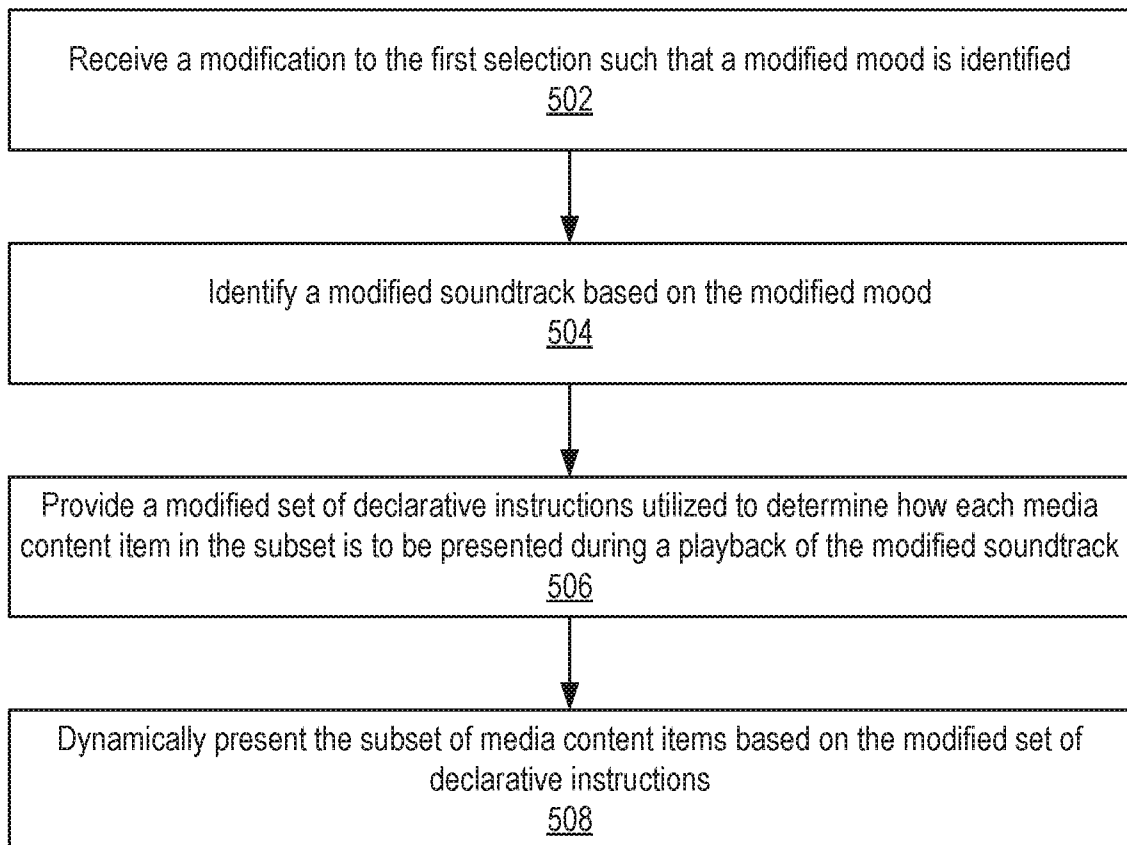


FIGURE 5A

520 ↪

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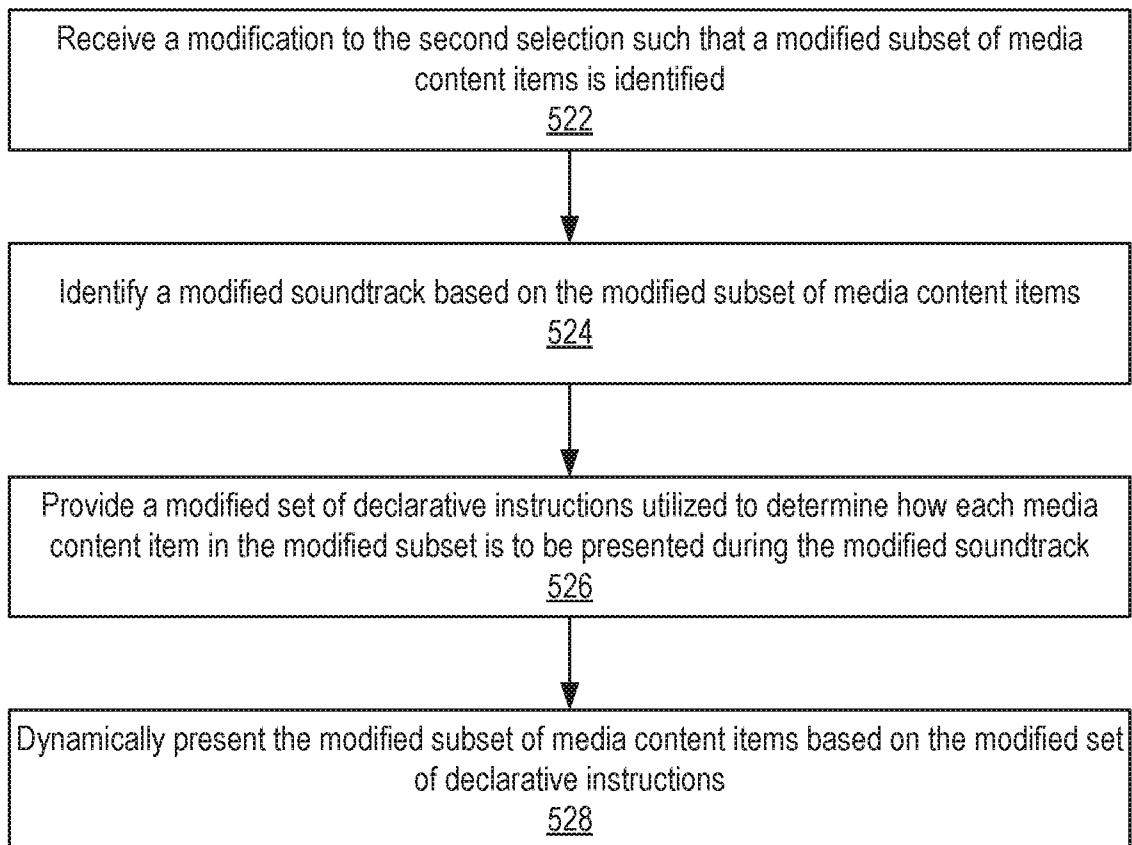


FIGURE 5B

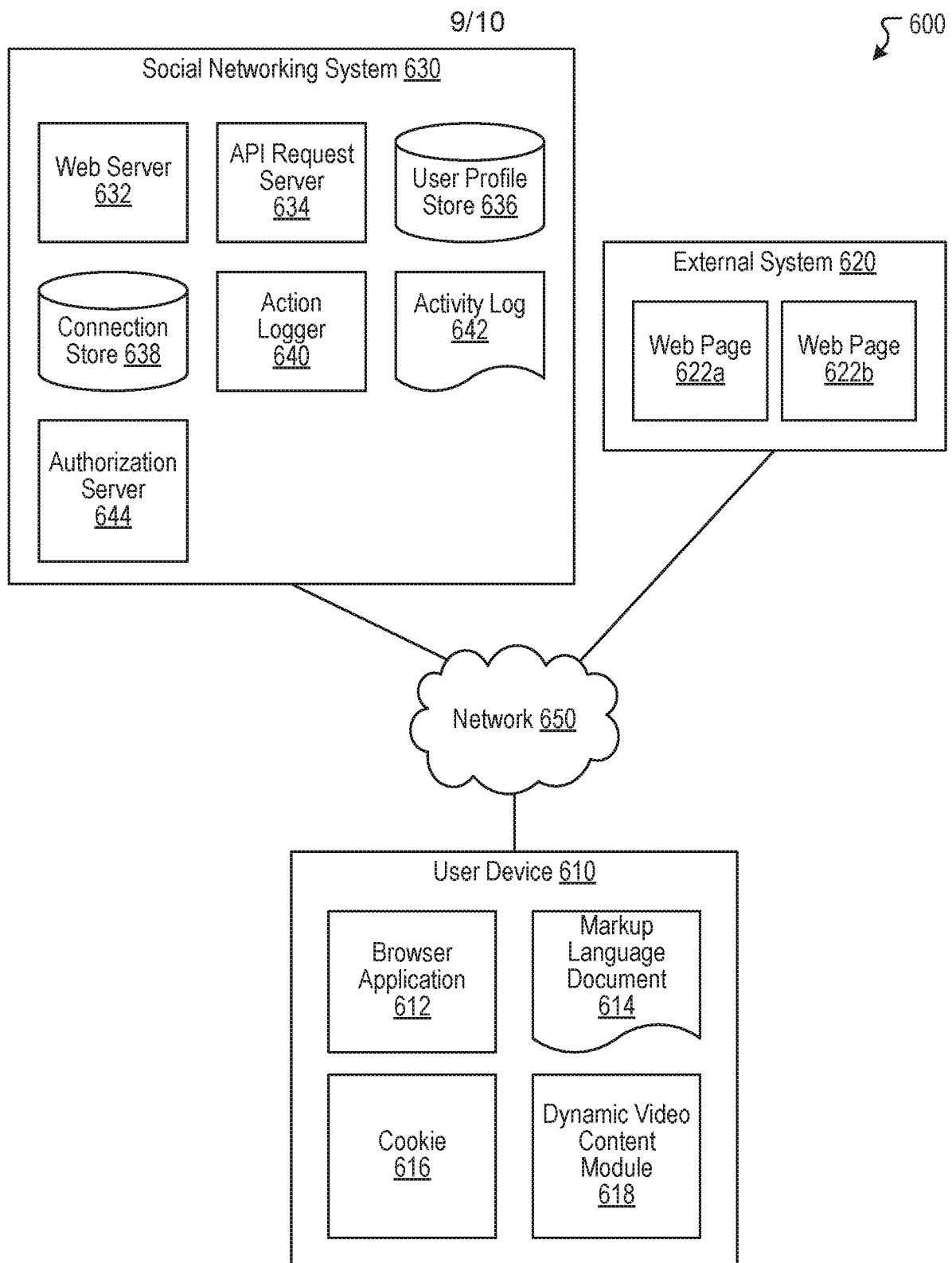


FIGURE 6

10/10

700

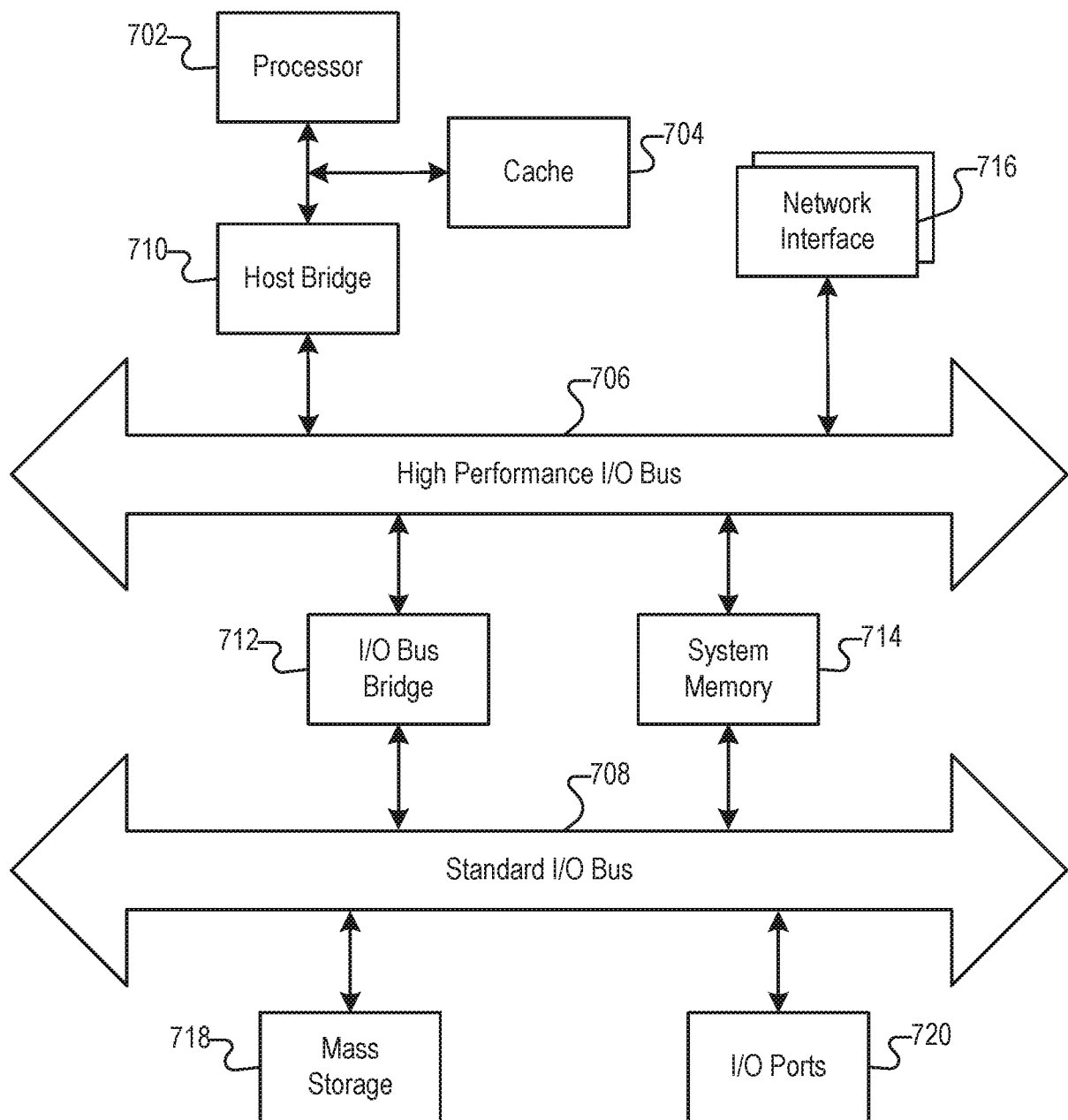


FIGURE 7

**A. CLASSIFICATION OF SUBJECT MATTER**

**H04N 21/43(2011.01)i, H04N 5/76(2006.01)i, G11B 27/036(2006.01)i, H04N 21/81(2011.01)i, H04N 21/854(2011.01)i, H04N 21/2368(2011.01)i**

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)

H04N 21/43; G06F 3/048; H04N 5/76; G06F 17/00; H04N 21/4545; G03B 31/00; G11B 27/00; H04N 5/781; G11B 27/036; H04N 21/81; H04N 21/854; H04N 21/2368

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & keywords: media content, mood, music, declarative instructions, playback

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|------------------------------------------------------------------------------------|-----------------------|
| X         | US 2005-0117032 A1 (YUTAKA UEDA et al.) 02 June 2005                               | 1-3, 9, 11-13, 16-18  |
| Y         | See paragraphs [0079]-[0097]; claims 43-44, 46; and figures 4-5.                   | 4-8, 10, 14-15, 19-20 |
| Y         | US 2003-0160944 A1 (JONATHAN FOOTE et al.) 28 August 2003                          | 4-6, 14, 19           |
|           | See paragraph [0069]; claim 1; and figure 6.                                       |                       |
| Y         | US 2006-0204214 A1 (MEHUL Y. SHAH et al.) 14 September 2006                        | 7, 15, 20             |
|           | See paragraph [0007].                                                              |                       |
| Y         | US 2011-0113331 A1 (TILMAN HERBERGER et al.) 12 May 2011                           | 8                     |
|           | See paragraph [0092]; and figure 10.                                               |                       |
| Y         | US 2014-0250452 A1 (AT&T INTELLECTUAL PROPERTY) 04 September 2014                  | 10                    |
|           | See paragraph [0012]; and claim 1.                                                 |                       |



Further documents are listed in the continuation of Box C.



See patent family annex.

\* Special categories of cited documents:

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

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"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

22 May 2017 (22.05.2017)

Date of mailing of the international search report

**24 May 2017 (24.05.2017)**

Name and mailing address of the ISA/KR

International Application Division

Korean Intellectual Property Office

189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea

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Telephone No. +82-42-481-3580



**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2016/050284**

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s)                                                                                        | Publication<br>date                                                              |
|-------------------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| US 2005-0117032 A1                        | 02/06/2005          | AU 2003-203190 A1<br>CN 1620683 A<br>EP 1469456 A1<br>JP 2003-288094 A<br>KR 10-2004-0077748 A<br>WO 03-063132 A1 | 02/09/2003<br>25/05/2005<br>20/10/2004<br>10/10/2003<br>06/09/2004<br>31/07/2003 |
| US 2003-0160944 A1                        | 28/08/2003          | JP 2003-259302 A<br>US 7027124 B2                                                                                 | 12/09/2003<br>11/04/2006                                                         |
| US 2006-0204214 A1                        | 14/09/2006          | None                                                                                                              |                                                                                  |
| US 2011-0113331 A1                        | 12/05/2011          | EP 2320335 A2<br>EP 2320335 A3<br>US 8327268 B2                                                                   | 11/05/2011<br>15/06/2011<br>04/12/2012                                           |
| US 2014-0250452 A1                        | 04/09/2014          | US 2011-0088054 A1<br>US 8769560 B2                                                                               | 14/04/2011<br>01/07/2014                                                         |