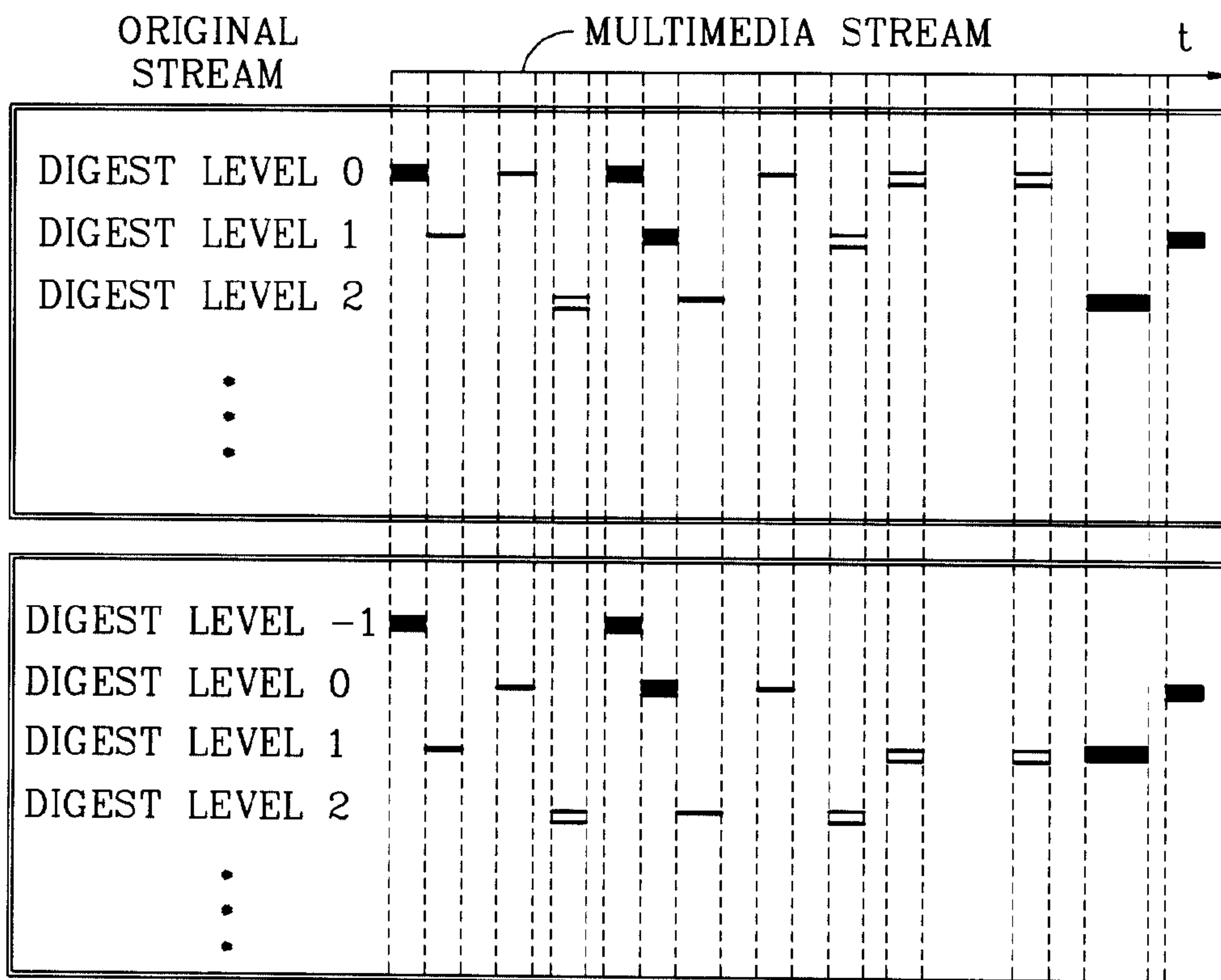




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(54) Titre : METHODE PERMETTANT D'OBTENIR UN CONDENSE CONTINU A NIVEAUX MULTIPLES SELON LES PREFERENCES DE L'UTILISATEUR
 (54) Title: METHOD FOR PROVIDING USER-ADAPTIVE MULTI-LEVEL DIGEST STREAM



(57) **Abrégé/Abstract:**

A method for providing a user-adaptive digest stream provides a digest stream of a multimedia stream having a user-desired length and reflecting the user's preference/non-preference. The method can dynamically provide the user-adaptive digest stream according to user preference information. The method includes searching user preference information having user preference/non-

(57) Abrégé(suite)/Abstract(continued):

preference level by categories for a multimedia stream, and reconstructing multi-level digest stream information on a multimedia stream as multi-level digest stream information according to the user preference information, using both the searched user preference information and content-based data of the multimedia stream. As a result, it is possible to quickly, accurately and conveniently provide a multi-level digest stream corresponding to the user's preference without inputting an additional query condition.

METHOD FOR PROVIDING USER-ADAPTIVE MULTI-LEVEL DIGEST STREAM

ABSTRACT OF THE DISCLOSURE

5 A method for providing a user-adaptive digest stream provides a digest
stream of a multimedia stream having a user-desired length and reflecting the
user's preference/non-preference. The method can dynamically provide the
user-adaptive digest stream according to user preference information. The
method includes searching user preference information having user
10 preference/non-preference level by categories for a multimedia stream, and
reconstructing multi-level digest stream information on a multimedia stream as
multi-level digest stream information according to the user preference
information, using both the searched user preference information and content-
based data of the multimedia stream. As a result, it is possible to quickly,
15 accurately and conveniently provide a multi-level digest stream corresponding
to the user's preference without inputting an additional query condition.

METHOD FOR PROVIDING USER-ADAPTIVE MULTI-LEVEL DIGEST STREAM

BACKGROUND OF THE INVENTION

5 1. Field of the Invention

The present invention relates to video recognition technology, and more particularly, to a method for providing a multimedia stream.

2. Background of the Related Art

10 As digital video technology and image or video recognition technology are developed, a user can access desired information by searching or browsing certain particular segments of a whole stream of content. In other words, a user can effectively understand the contents of a predetermined video stream by reproducing the video stream and browsing only a desired
15 portion of the video stream or indexing a digest of the video stream without viewing the whole video stream.

For this purpose, processing a multimedia stream in order to describe content-based data with the whole multimedia stream or its segments and search the content-based data when the user requests a desired multimedia
20 stream has been studied. The content-based data includes information on the entire contents of a program, such as information on a production company, director and cast, and semantic information on each segment in a multimedia stream. Such semantic information can include information on the appearance/disappearance of an object or background, occurrence of an
25 event, and relation between objects and events, throughout the multimedia stream.

When the above information is stored in a content-based data region for a multimedia stream, the user can selectively search a desired stream, or browse only a desired portion in a multimedia stream, by retrieving the

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content-based data. Therefore, if there is a user's request, saying that, for example, "show only the scene in which a main actor appears in close-up," an apparatus employing a method for providing a multimedia stream based on the content-based data outputs the corresponding segment. Here, the content-based data contains an appearance of an audiovisual object, status of an audiovisual object, event, background, and segment information. In addition, the segment information contains start and finish points of time, audiovisual objects representing a segment, text description for a segment, and events shown in a segment.

In U.S. Patent No. 5,913,013, a content map is constructed by using a method of setting a level of a violence scene, nude scene, portion in which an actor and/or actress appears, etc. and setting a code of segments, and the user can easily browse only the desired portion.

The method for providing a multimedia stream according to the related art will be described in more detail.

Figure 1 is a diagram illustrating an example of a method for describing content-based data for a multimedia stream according to the related art, in which a number of comments (comment 1, comment 2, ...) are described along with segment information. As shown in Figure 1, the comments relate to an appearance of an audiovisual object, status of an audiovisual object, event, background, and segment information, and S_i ($i=0, 1, 2, \dots$) relates to a segment. However, while the above content-based comment helps the user to easily search a desired portion, it is difficult for the comment to properly meet the user's need for understanding the whole contents of the multimedia stream within a short time.

Figure 2 is a diagram illustrating a related art multi-level digest segment information scheme and the corresponding multi-level digest stream, in which digest levels (0, 1, 2, ...) according to the level importance of segments of a multimedia stream and multi-level digest streams ($H_0, H_1, H_2,$

...) are described. As shown in Figure 2, the digest stream (H_0) consists of digest segments of the digest level (0), the digest stream (H_1) consists of segments of the digest level (0, 1), and the digest stream (H_2) consists of segments of the digest level (0, 1, 2).

5 The multi-level digest segment information scheme shows a digest stream in multi-levels by giving an importance level to each digest segment. That is, the multi-level digest segment information scheme describes each digest segment not by using physical data with respect to multi-level digest segments, but by using segment information and importance level information
10 of the digest segments. However, these related art methods are inconvenient in that the user has to input a filtering condition or search condition on every filtering or search operation, using content-based data described in a content-based data region or a content map, in order to browse a user-desired segment or contents.

15 To mitigate the inconvenience, another related art system employs a method for automatically recommending a user-preferred program or providing only segments which the user is likely to want by combining user profile information based on the history of the user, a content map for a multimedia stream, etc. The user profile is stored in a portable nonvolatile
20 memory device such as smart card, a fixed non-volatile memory of a user's terminal, or a nonvolatile memory space of a multimedia server. In addition, the user profile is automatically learned from the browsing history of the user, or is updated by the editing of a pre-registered user.

25 However, most users want to save time by browsing a digest of a multimedia stream before browsing the whole multimedia stream, in order to determine whether to view the whole multimedia stream. With a multi-level digest stream information scheme, content providers can describe multiple versions of highlights with a small amount of additional data and users can request a variety of digest streams in 10, 20, and 30 minutes segments, with

respect to an original multimedia stream with a running time of two hours. However, since the method for providing a digest stream gives a level to segments in the order of importance in understanding the whole contents irrespective of various inclinations of the users, a digest stream reflecting
5 each user's preference or character cannot be provided.

Meanwhile, when both of the multi-level digest stream information and the content-based data for the multimedia stream are used, it is possible to meet a request for a multimedia stream based on a user query. However, related art methods for providing a multimedia stream require additional
10 actions, take longer to process and are inconvenient in that the user has to input a condition of a digest, whenever necessary, using a natural language or other interface.

SUMMARY OF THE INVENTION

15 The present invention may address the above problems and/or disadvantages and may provide certain advantages as described hereinafter.

The present invention may provide a method for processing a multimedia stream that mitigates one or more problems caused by disadvantages of the related art.

20 The present invention may provide a method for processing a multimedia stream that provides a user-adaptive multi-level digest stream.

The present invention may provide a method for providing a user-adaptive multi-level digest stream that provides a multimedia stream having a user-desired length and reflecting the user's preference/non-preference, to
25 the user without inputting additional query conditions.

The present invention may provide a user-adaptive multi-level digest stream method that provides a multimedia stream having a user-desired length and reflecting the user's preference/non-preference by using user preference information and content-based data for a multimedia stream.

The present invention may provide a method for providing a user-adaptive multi-level digest stream that provides a multimedia stream having a user-desired length and reflecting the user's preference/non-preference by using user preference information and a multi-level digest segment information scheme for a multimedia stream.

In accordance with one aspect of the invention, there is provided, in a server/client system, a method for providing a user-adaptive multi-level digest stream for multimedia content. The method involves: storing, in a memory unit, representations of digest levels associated with categorized digest segment information relating to a multi-level digest stream; storing, in a memory unit, user preference information representing user preferences relating to categories of digest segment information; causing a server device to adjust the digest levels of at least some of the digest segment information according to user preferences relating to categories with which the digest segment information is associated, to associate adjusted digest levels with the at least some of the digest segment information; and causing the server device to provide digest segments of the multi-level digest stream to a client device in response to the adjusted digest levels.

The multi-level digest stream may be dynamically provided to the client device.

The categorized digest segment information may include a description of information including at least one of characters, director, production company, appearance/status of an audiovisual object, occurrence of an event, segment characteristics, audiovisual background and segment information.

User preference information may be generated by user-editing of user preference information stored in the memory unit.

The digest levels may represent the importance of the digest segment information.

Storing the representations of digest levels in the memory unit may include storing the representations of digest levels in at least one of an external portable nonvolatile memory unit, a smart card, a nonvolatile memory unit of a predetermined server and a nonvolatile memory unit of the client device.

In accordance with another aspect of the invention, there is provided, in a server/client system, a method for providing a user-adaptive multi-level digest stream for multimedia content. The method involves receiving from a user, at a server device, a digest stream request for a multi-level digest stream; causing the server device to adjust importance levels of digest segment information associated with the multi-level digest stream, according to user preference information stored in memory accessible by the server device, the user preference information indicating user preferences associated with categories of information contained in the digest segment information; and causing the server device to provide digest segments of the multi-level digest stream to a client device in response to the adjusted digest levels and the digest stream request.

Receiving a digest stream request may include receiving from a user, at the server device, a digest stream request specifying a length of a digest stream to be provided to the user.

Adjusting the importance levels may include increasing the importance level of digest segments containing information in a category preferred by the user and decreasing the importance level of digest segments containing information in a category non-preferred by the user, in response to the user-preference information.

The user preference information may include user preference levels associated with categories of information and the importance levels may be adjusted by adding a predetermined weight value according to a user preference level associated with at least one category.

In accordance with another aspect of the invention, there is provided, in a client/server system, a method for processing a multimedia stream. The method involves: causing a server device to set user preference information by storing, in a memory unit, representations of digest levels associated with digest segment information of a multi-level digest stream, in response to a pattern of accessing multimedia content, exhibited by a user; causing the server to store multimedia content based data for the multimedia stream in the memory unit; causing the server to generate multi-level digest stream information for the multimedia stream in response to the user preference

information and the multimedia content based data; and causing the server to provide, to a client device, a user-adaptive multi-level digest stream in response to the generated multi-level digest stream information.

5 Additional advantages and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The advantages and features of the invention may be realized and attained as particularly pointed out in the appended claims.

10

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will be described in detail with reference to the following drawings in which like reference numerals refer to like elements wherein:

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Figure 1 is a diagram illustrating an example of a method for describing content-based data for a multimedia stream according to the related art;

Figure 2 is a diagram illustrating a multi-level digest segment information scheme and the corresponding multi-level digest streams according to the related art;

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Figure 3 is a diagram illustrating user preference information according to a preferred embodiment of the present invention; and

25

Figure 4 is a diagram illustrating a method for providing user-adaptive multi-level digest streams in a preferred embodiment using both multi-level digest segment information scheme and user preference/non-preference information.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Preferred embodiments according to the present information relate to methods for providing user-adaptive multi-level digest stream that provide a digest stream of a multimedia stream reflecting user preference/non-preference. Such methods can automatically provide user-adaptive multi-level digest streams by setting user preference information (e.g., information described by preference/non-preference levels and preference categories) for user preference categories.

A preferred embodiment of a method for providing a user-adaptive multi-level digest stream according to the present invention will now be described. A step of defining preference levels of the contents of a multimedia stream by user preference categories and generating a digest stream according to the preference levels in order to provide user-desired information by filtering for the preferred embodiment will now be described.

Figure 3 is a diagram illustrating exemplary user preference information according to the preferred embodiment of the present invention, in which user preference categories (director, genre, actor or actress, player, team, ...) are described in preference/non-preference levels. As shown in Figure 3, if the preference categories are described using the preference/non-preference levels, the user can describe a multimedia stream that the user wants to get, and accordingly, can get a digest of the multimedia stream that better reflects the user's preference. The user preference information is preferably stored in a portable nonvolatile memory device, such as a server memory, a client device, and a smart card.

Defining a digest stream of a multimedia using the preference information in the preferred embodiment will now be described. Figure 4 is a diagram illustrating a multi-level digest segment information scheme and the corresponding multi-level digest stream according to the preferred embodiment. Figure 4 illustrates a method for describing a multimedia stream

(MS) in digest levels (0, 1, 2, ...) using a multi-level digest segment information scheme and a method for describing a multimedia stream (MS) in digest levels (... , -1, 0, 1, 2, ...) using user preference/non-preference data.

5 As shown in Figure 4, a thick line indicates a digest segment section preferred by the user, and a double line indicates a digest segment section non-preferred by the user.

10 As described above, when the user provides appropriate preference information to a multimedia stream, and selects a digest level or the quantity of a digest stream, the user preference information of the user who has requested a digest stream is read out, and the importance level of digest segments is readjusted according to the read out user preference information. Then, a digest stream having a user-requested length using the readjusted digest segment importance levels is provided, as a user-adaptive multi-level digest stream, according to the present invention.

15 The information set for the multimedia stream is obtained by comparing pre-stored user preference information and content-based data related to the multimedia stream. In other words, it is determined whether the content-based data, such as the operation of an audiovisual object, state of an audiovisual object, event background, segment information, etc. is consistent
20 with the user preference information or not, for thereby reflecting the user preference/non-preference with respect to the categories described in the user preference information.

25 The multimedia stream can be described in a multi-level digest segment information scheme according to the user preference information, for example, by increasing the level of the digest segment preferred by the user (or decreasing the number of the digest level) and decreasing the level of the digest segment non-preferred by the user (or increasing the number of the digest level). Thus, digest segment information is constructed as a

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multimedia stream having a user-desired length and containing desired digest level information.

As shown in Figure 4, the level movement of segments preferred by the user and segments non-preferred by the user is described as one-level movement as illustrated in Figure 3. However, the present invention is not intended to be so limited. For example, the weight value of the preference to each category can be described in multiple levels in the range of -4 to +4.

Accordingly, in the preferred embodiment of the method for providing a multimedia stream according to the present invention, for example, according to the respective preference information of users of which user A likes news and situation comedies but dislikes sports, and user B likes news and sports but dislikes situation comedies, appropriate programs can be recommended and provided to each user. With respect to the recommended or provided programs, the user can be provided with a multi-level digest stream reflecting the user's preference by effectively searching or browsing the digest stream of the programs.

In addition, in a method for providing multimedia according to the preferred embodiment, since the above user preference information and the user preference information generated by previously learning from the information using the multimedia stream used by the user (e.g., history information) can be edited by the user, a multi-level digest stream reflecting the user's preference and non-preference and having a desired length can be provided to the user without inputting an additional query condition.

The foregoing embodiments and advantages are merely exemplary and are not to be construed as limiting the present invention. The present teaching can be readily applied to other types of apparatuses. The description of the present invention is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications, and variations will be apparent to those skilled in the art.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

- 5 **1.** In a server/ client system, a method for providing a user-adaptive multi-level digest stream for multimedia content, the method comprising:

10 storing, in a memory unit, representations of digest levels associated with categorized digest segment information relating to a multi-level digest stream;

 storing, in a memory unit, user preference information representing user preferences relating to categories of digest segment information;

15 causing a server device to adjust said digest levels of at least some of said digest segment information according to user preferences relating to categories with which said digest segment information is associated, to associate adjusted digest levels with said at least some of said digest segment information; and

 causing said server device to provide digest segments of said multi-level digest stream to a client device in response to said adjusted digest levels.

- 25 **2.** The method according to claim 1 wherein said multi-level digest stream is dynamically provided to said client device.

- 30 **3.** The method according to claim 1 wherein said categorized digest segment information includes a description of information including at least one of characters, director, production company, appearance/status of an audiovisual object, occurrence of an event,

segment characteristics, audiovisual background and segment information.

5 4. The method according to claim 3 wherein said user preference information is generated by user-editing of user preference information stored in said memory unit.

10 5. The method according to claim 1 wherein said user preference information is generated by user-editing of user preference information stored in said memory unit.

 6. The method according to claim 1 wherein said digest levels represent importance of said digest segment information.

15 7. The method according to claim 1 wherein storing said representations of digest levels in said memory unit comprises storing said representations of digest levels in at least one of an external portable nonvolatile memory unit, a smart card, a nonvolatile memory unit of a predetermined server and a nonvolatile memory unit of the client device.

20

 8. In a server/ client system, a method for providing a user-adaptive multi-level digest stream for multimedia content, comprising:

25 receiving from a user, at a server device, a digest stream request for a multi-level digest stream;

30 causing said server device to adjust importance levels of digest segment information associated with said multi-level digest stream, according to user preference information stored in memory accessible by said server device, said user preference information indicating user preferences associated with categories of information contained in said digest segment information; and

causing said server device to provide digest segments of said multi-level digest stream to a client device in response to said adjusted digest levels and said digest stream request.

5

9. The method of claim 8 wherein receiving a digest stream request comprises receiving from a user, at said server device, a digest stream request specifying a length of a digest stream to be provided to said user.

10

10. The method according to claim 8, wherein adjusting said importance levels comprises increasing the importance level of digest segments containing information in a category preferred by the user and decreasing the importance level of digest segments containing information in a category non-preferred by the user, in response to said user-preference information.

15

11. The method according to claim 8, wherein said user preference information comprises user preference levels associated with categories of information and wherein said importance levels are adjusted by adding a predetermined weight value according to a user preference level associated with at least one category.

20

12. In a client/ server system, a method for processing a multimedia stream, comprising:

25

causing a server device to set user preference information by storing, in a memory unit, representations of digest levels associated with digest segment information of a multi-level digest stream, in response to a pattern of accessing multimedia content, exhibited by a user;

30

causing the server to store multimedia content based data for the multimedia stream in the memory unit;

5

causing the server to generate multi-level digest stream information for the multimedia stream in response to said user preference information and said multimedia content based data; and

10

causing the server to provide, to a client device, a user-adaptive multi-level digest stream in response to the generated multi-level digest stream information.

FIG. 1
(PRIOR ART)

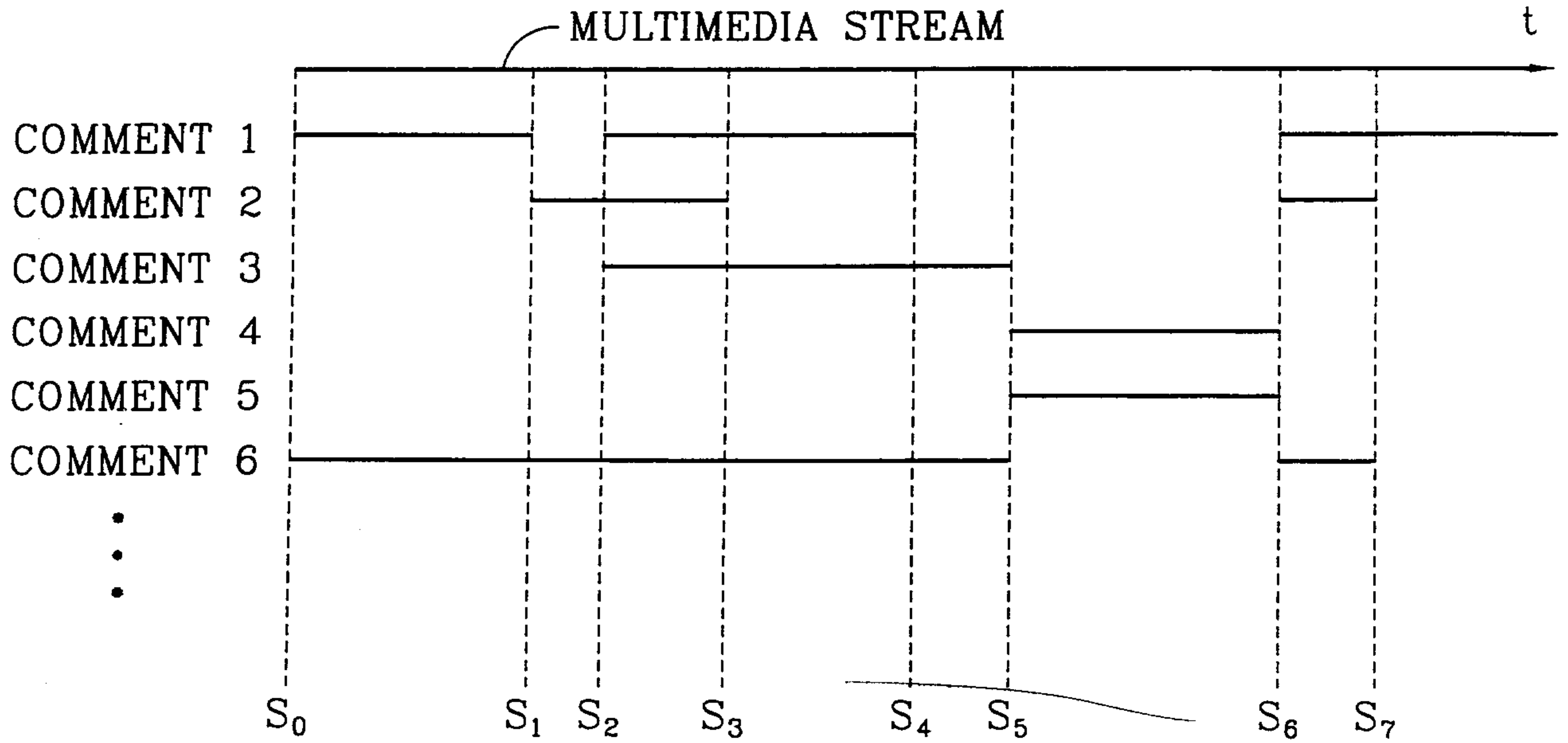


FIG. 2
(PRIOR ART)

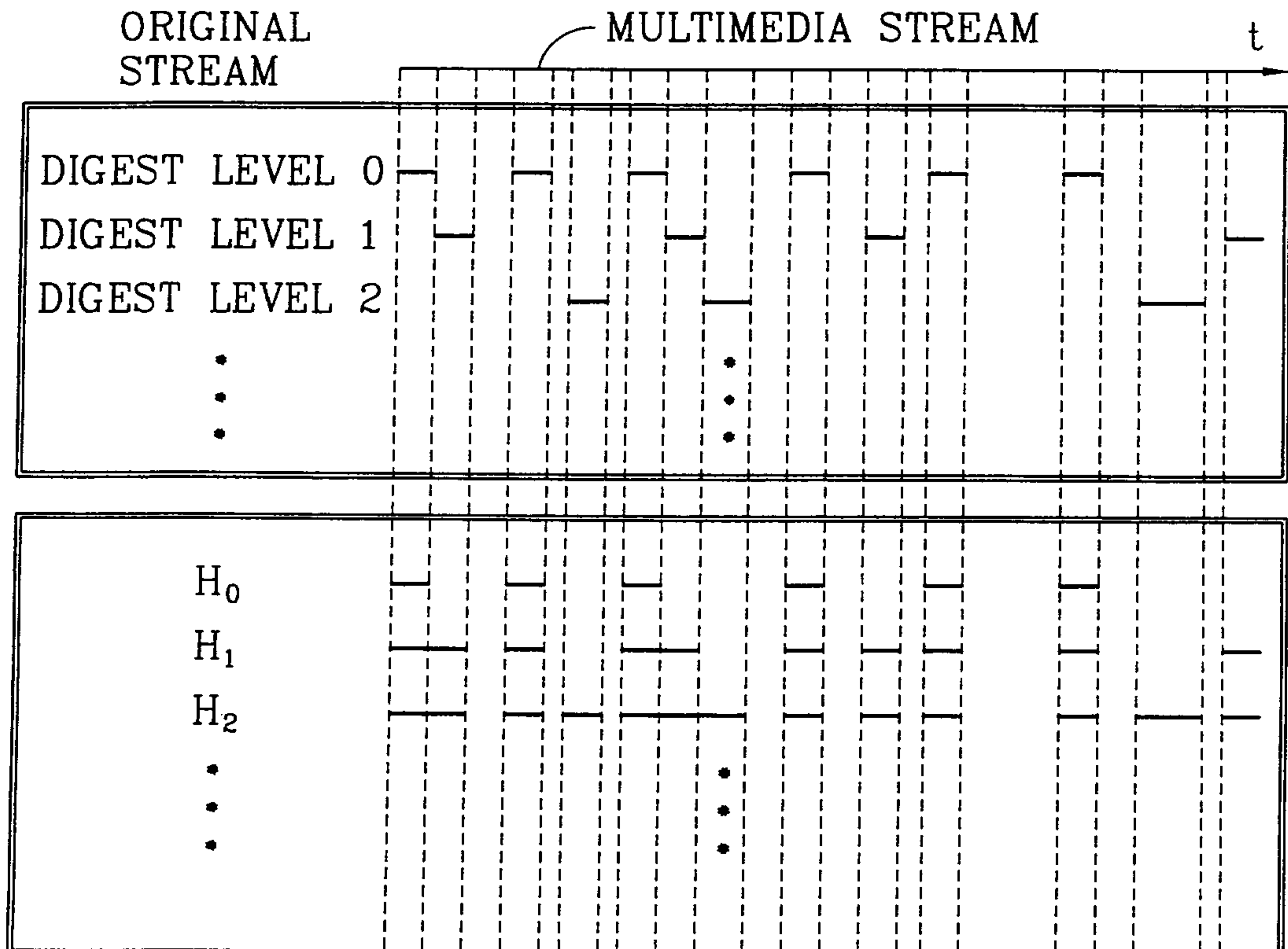


FIG. 4

