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(54) **Identification and profiling of groups of TV viewers**

(57) The present application concerns the field of personalized application for Digital TV.
It is proposed a method to populate profile information related to television viewing experience by a TV decoder coupled to a biometric identification device, said method comprising the steps of, in an initialization phase :
- registering a plurality of viewers by obtaining the biometric data from the biometric identification device of each viewer,
- generating many profile records as the number of

groups that can be generated with N registered viewers ($2^N - 1$ groups),
And in the exploitation phase:
- detecting the viewers currently taking advantage of a viewing experience corresponding to a specific event having associated metadata, said viewers forming a current group,
- selecting the profile record corresponding to the current group,
- recording the metadata of the vent to the profile record corresponding to the current group.

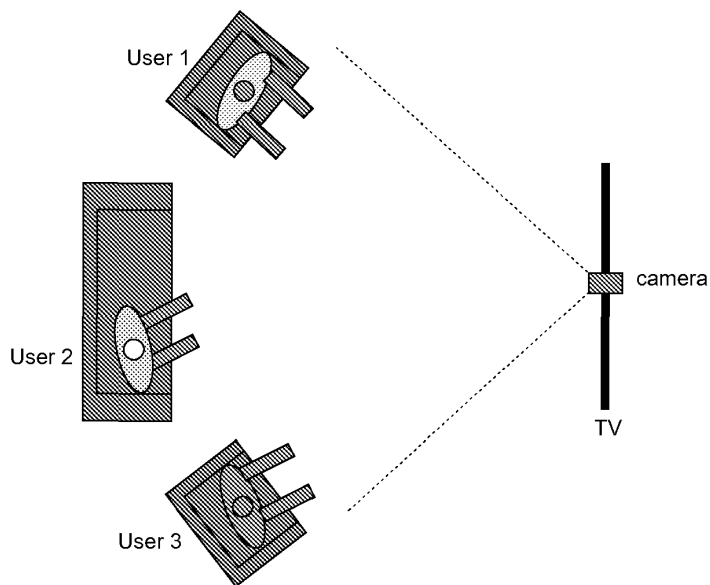


Fig. 1

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Description

Field of the invention

[0001] The present application concerns the field of personalized application for Digital TV.

Background art

[0002] The TV experience can be improved with new interactive features taking into account the individuality of TV viewers: content recommendation, Electronic Program Guide with preferred channels, personal widget space, parental control...

[0003] In this context, it becomes important to know who is actually watching TV. To answer this question, it is foreseen to use biometric sensors to recognize householders who have originally been enrolled in the system. The benefit is twofold: some biometric technologies ensure effortless/covert identification; in addition, they usually offer a means to reliably authenticate users.

[0004] Once a TV viewer is identified, applications can be customized accordingly. In the typical example of content recommendation, the related profile of the identified viewer is used by the recommendation engine to suggest contents that match the viewer's tastes.

[0005] However, unlike a personal computer, TV is a shared device which is usually used by several people in a household at the same time. Therefore, it is actually necessary to identify all the people simultaneously watching TV and to recommend contents that match the group's tastes. Unfortunately, it is very difficult to infer the profile of a group based on the profile of the individuals belonging to the group. Indeed, according to the character of individuals and the type of relationship within a group, one person may dominate the group and impose his selection on others.

[0006] The US patent 7,260,823 "Profiling and Identification of Television viewers" from J.A. Schlack tackles this same subject but with a different approach; it generates consumption data for each TV viewing session and associates this data to the TV viewer profile that has the closest signature; however, it has no guarantee that the TV viewer (or group of TV viewers) to whom is assigned the consumption data is actually the actual one since no biometric system is used to provide a reliable identification of TV viewers.

Brief description of the invention

[0007] The present application proposes a solution to this problem since it assumes that a biometric sensor is available to identify the actual TV viewers.

[0008] It is proposed a system comprising a biometric identification technology coupled to a profiling technology applied to a digital TV decoder to identify one or multiple TV viewers watching TV in order to personalize the TV experience based on people's profile, the system in-

stantiating as many profile records as the number of groups that can be generated with N enrolled householders ($2^N - 1$ groups) in order to add profiling data into the corresponding profile.

[0009] In other words, the digital TV decoder will manage profiles corresponding to the number of combination of known users. If only two users are enrolled in the system, the system will manage 3 profiles, one for the first user alone, the other one for the second user alone and a third profile when both users are identified.

[0010] In the same manner, for 4 enrolled users, the number of managed profile will be 7 ($2^4 - 1$).

Brief description of the figures

[0011] This invention will be better understood thanks to the attached figures in which :

- figure 1 illustrates the audience facing the television screen
- figure 2 illustrates the manual enrolment process
- figure 3 illustrates the combination of the group configuration change

Detailed description

[0012] In a typical embodiment, the biometric sensor is a camera and the identification technique is based on face recognition algorithm. People sit in front of the TV like as illustrated in the figure 1.

[0013] All people living in the same household are first enrolled in the system at set-up. This enrolment consists in capturing one or several pictures of their face and to store the pictures or some biometric parameters in a database.

[0014] When the system is running in nominal mode, the camera captures images which are analyzed to recognize the presence and position of faces. For each detected face, biometric parameters are computed according to the face recognition algorithm and compared against all records of the database. The nearest record identifies the individual. At the end of the process, the identity of all TV viewers is known.

[0015] In case a person is not recognized because of bad capture conditions (light, pose...) or the person has not been enrolled in the system, that person is ignored by the system.

[0016] In the following, we will assume that the system has identified a group of people sitting in front of the TV.

[0017] In case one of the identified TV viewers is not interested in the TV experience, it is possible that one of the people watching TV manually exclude this person. As an example, it may be possible to press a dedicated button on the remote control to pop up a window with the list of identified persons; then, the checkbox corresponding to the person to be excluded is simply unchecked as

described in the figure 2.

[0018] The previous description is only a typical example in case the identification system is based on a camera. Note that other technologies could be used to identify multiple viewers, even technologies which are limited to the identification of a unique individual at a time. For example, we could use a dedicated button per householders on the remote control, a fingerprint sensor on the remote control, a skin spectroscopy sensor on the remote control, etc... Since it is cumbersome to circulate the remote control to allow each TV viewer to sign in one after the other in order to identify a group of people, we may propose that a primary viewer first signs in with the identification technology, then he declares other TV viewers using for example a pop-up window with checkboxes as described earlier.

[0019] In the following, we will assume that a group of people has been identified, no matter which of the above technologies is used.

Profiling

[0020] In the context of content recommendation, it is important to adapt the recommendation to the tastes of the TV viewers' group. Unfortunately, even if we know the profile of each individual of the group (i.e. tastes, preferences, history of consumption...), it is very hazardous to infer what the group's profile is.

[0021] The solution that is proposed is to consider each group as an individual which requires dedicated customization and profiling.

[0022] This means that the system has to manage a lot of profiles. Let's count them for a few examples:

If a household has 4 people enrolled in the system (2 parents and 2 kids), we have 1 profile per individual, 6 possible pairs, 4 groups of 3 people and 1 group corresponding to the whole family. This leads to 15 different profiles.

[0023] If a household has 5 people enrolled in the system, there are 31 different profiles.

[0024] In theory, using combinations in mathematics, we can calculate the maximum number of groups that can be made with a N-people household as follows:

$$\sum_{p=1}^N \frac{N!}{(N-p)! p!} = 2^N - 1$$

[0025] Therefore, when a new user is enrolled in the

system, the idea consists in instantiating the profiles that correspond to all new groups that can be made with the existing enrolled users. In total, if there are N users, there will be (2^N-1) profiles. In addition, when a user is removed from the system, all profiles corresponding to groups encompassing this particular user are discarded.

[0026] Each generated profile is empty when it is first created. One option consists in defining each profile by providing preferences of the group. Unfortunately, given the number of profiles, it seems very cumbersome to do this manually. In a preferred embodiment, each profile is adaptively built and updated based on users' habits and/or feedbacks.

[0027] As an example, profiling data may be derived from users' consumed programs (e.g. metadata related to watched movies such as theme, actors, directors...), time and date of consumption, users' explicit rating of movies, etc...

[0028] Each time people watching TV select a new content (channel change or VoD session launch), it may be necessary to consider a minimum duration to post the related profiling data into the current group's profile. Indeed, if people zap after 1 minute, it is irrelevant to consider this viewing in their profile. Alternatively, we could consider that a 1-minute viewing session is a dislike indication which is worth being considered into the profile but it is a risky assumption since the reason might be that something much more interesting is available elsewhere. Taste is a relative concept.

[0029] Based on all profiling data posted in a group's profile, we assume that a recommendation engine is capable of suggesting entertainments to the identified group of people.

Change of group configuration

[0030] Each time the system detects a new group configuration (i.e. someone enters or leaves the scope of the camera), a new session is initiated. However, we will consider a minimum dwell time that is required to reliably validate the consumption data for the group. This feature is valid for all identification techniques.

[0031] Let's take an example:

We assume that A and B are watching a program; if C sits in front of TV for 1 minute then he leaves the room because the TV program is not interesting, it is irrelevant to fill the group's profile corresponding to A/B/C with the consumption data. We even propose to resume the first session initiated by A and B as if C never entered the room.

[0032] Similarly, if A and B are watching a program and B leaves the room for a short while, this short transient session will be discarded as if B never left the room.

[0033] Let's take another example:

We assume that A and B are watching a program; if

C sits in front of TV for 1 minute to convince B to stop watching TV, B and C will thus leave the room, leaving A alone until the end of the program. In that case, the consumption data corresponding to the TV program will be added to both the A/B group profile (1st session) and the A profile (3rd session).

[0034] The figure 3 illustrates the combination of the group configuration change with the TV program change in the case a short viewing of a TV event is ignored by the profiling system.

[0035] In a nutshell, a new session starts each time a new event starts or a new group configuration is detected by the identification system. When the session is too short, the profiling data corresponding to the TV event are not added in the profile record corresponding to the group of TV viewers.

[0036] According to an embodiment, the event currently broadcasted is identified by the TV decoder thanks to the metadata associated to the event. The TV decoder has knowledge when an event starts and when it finishes. During the event, the system can periodically detect the viewers currently watching and determine which group was in fact the longest group watching this event. The metadata associated with the event will be then recorded with this determined group.

[0037] In this determination, it is possible to discard the time during which the advertisement is broadcasted.

Claims

1. Method to populate profile information related to television viewing experience by a TV decoder coupled to a biometric identification device, said method comprising the steps of, in a initialization phase :

- registering a plurality of viewers by obtaining the biometric data from the biometric identification device of each viewer,
- generating many profile records as the number of groups that can be generated with N registered viewers ($2^N - 1$ groups),

And in the exploitation phase :

- detecting the viewers currently taking advantage of a viewing experience corresponding to a specific event having associated metadata, said viewers forming a current group,
- selecting the profile record corresponding to the current group,
- recording the metadata of the vent to the profile record corresponding to the current group.

2. Method of claim 1, wherein the group as detected by the biometric identification device is updated by adding or withdrawing manually a viewer, and up-

dating the current group according to the remaining viewer(s).

3. Method of claims 1 or 2, wherein it comprises the steps of:

- periodically detecting the viewers during the event,
- determining the group having the longest presence during such event,
- recording the metadata of the event to the profile information related to the group previously determined.

4. Method of claim 3, wherein it comprises a step of detecting that the viewing experience correspond to advertisement material and discarding the group or groups corresponding to the detected viewers during the advertisement while determining the longest presence.

5. Method of any of the claims 1 to 3, wherein it comprises the steps of:

- detecting a transient change of the group configuration following the presence or absence of a viewer,
- updating the current group only after a predefined time with the same group configuration.

6. A system comprising a digital TV decoder having a plurality of profile records and a biometric identification device to identify one or multiple TV viewers watching TV in order to personalize the TV experience based on viewer's profile, the system comprises means to identify the biometric data of a viewer, and means to generate as many profile records as the number of groups that can be generated with N enrolled viewers ($2^N - 1$ groups), and means to record the current viewing experience to the profile record corresponding to the group identified by the biometric identification device.

7. The system according to claim 6, further comprising a means to add or withdraw manually the identity of TV viewers detected by the biometric identification device, and means to update the profile record corresponding to the new group after the add or withdraw operation.

8. The system according to claim 6 or 7, in which the means to record the current viewing experience comprises timer means, the current viewing experience being recorded only after a predefined time from the beginning of the viewing experience.

9. The system according to claim 6, where a short transient change of group configuration following the

presence or absence of a viewer is discarded as long as the duration of this change is lower than a predefined value.

10. The system according to any of the claims 6 to 9, wherein the biometric identification device is a camera.

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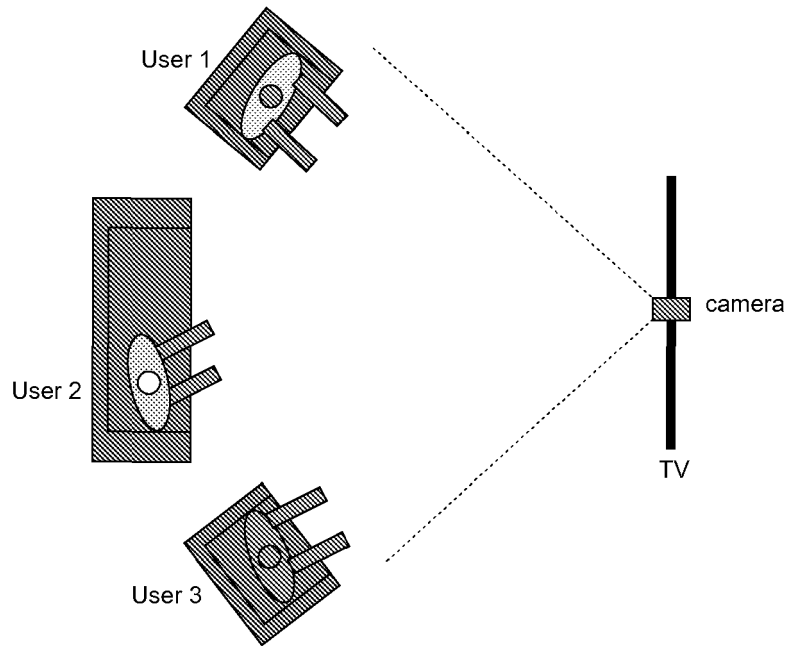


Fig. 1

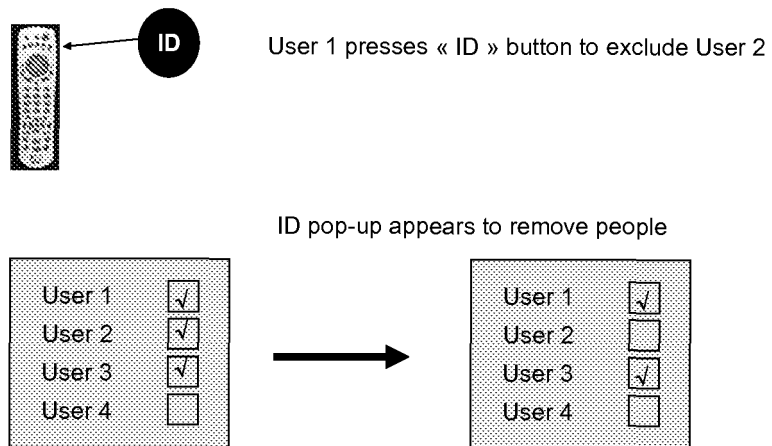


Fig. 2

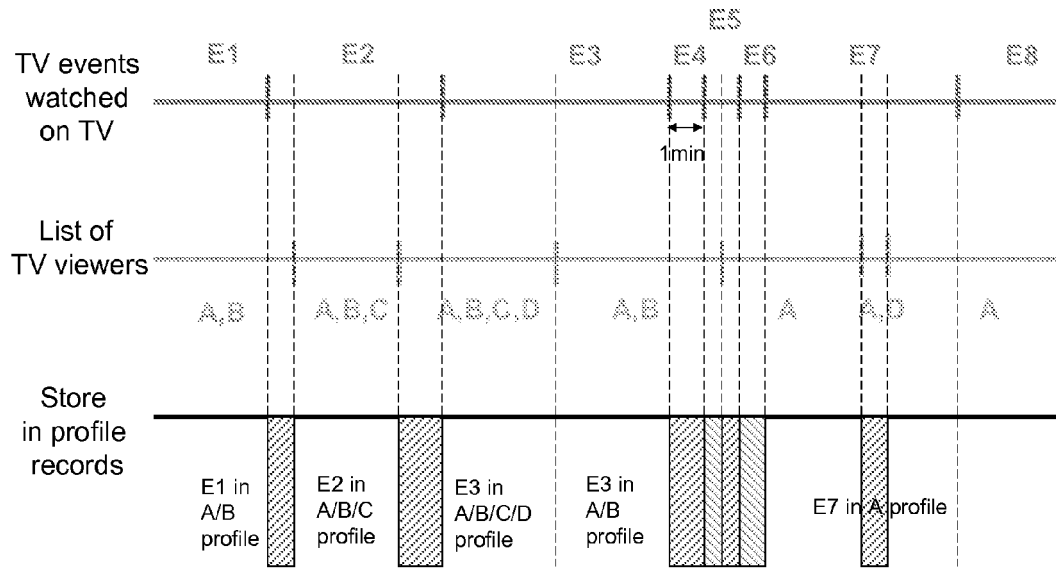


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 10 19 2695

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2004/003392 A1 (TRAJKOVIC MIROSLAV [US] ET AL) 1 January 2004 (2004-01-01)	1,6,10	INV. H04H60/45 H04H60/46
Y	* paragraphs [0002], [0020], [0022], [0028], [0044] * * page 3, line 1, paragraph 31 - page 3, line 10, paragraph 31 * * figure 2b *	2,5,7-9	
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		9 February 2011	Taddei, Hervé
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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