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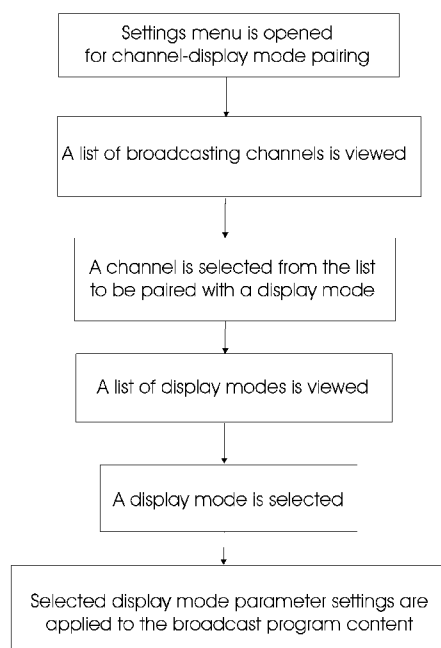
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(54) Title: IMAGE DISPLAY DEVICE WITH AUTOMATIC DISPLAY MODE ENHANCEMENT FUNCTION

Fig. 1



(57) Abstract: The present invention relates to an image display device having a channel and display mode pairing function such that the user defines a preferred display mode for a specific channel through an automatically generated pairing list. More specifically, the present invention relates to an image display device for performing broadcast program content genre and display mode pairing function so as to match alternative display modes with a broadcast program content genre, the image display device receiving a plurality of broadcasting services and comprising a control unit and a database of a plurality of display modes in association with a certain broadcast program content genre.

Description**IMAGE DISPLAY DEVICE WITH AUTOMATIC DISPLAY MODE ENHANCEMENT
FUNCTION**

- [0001] The present invention relates to an image display device having a channel – display mode pairing function such that the user defines a preferred display mode for a specific channel through an automatically generated pairing list.
- [0002] It is known that digital and interactive TV systems provide a comprehensive amount of TV channels and programs leading to the general outcome that a user may need to change default display mode settings such as standard mode, movie, sport or natural display modes in a dynamic manner. Assuming that a TV service may have hundreds of channels, which might take almost one hour before every single channel is viewed at least once, such a manual attempt would prove unmanageable in view of a vast number of channels.
- [0003] It is to be noted that, the adjustment of the display mode of the image display device may be needed depending on personal viewing preferences of the user. Image display devices may be preconfigured to apply certain display modes being presented to the user to increase perceived display mode quality by enabling the user to select a display mode preset. For instance, a user watching a TV channel broadcasting movies may adjust the display mode of the image display device to the movie mode. However, other TV channels broadcasting different program contents leads to the general outcome that manual display mode adjustment is necessary with each channel transition. Consequently, conventional methods for adjusting a TV channel's display mode corresponding to the personal viewing preferences of the user among a plurality of display mode alternatives may become inefficient to the extent it is unperformable in a time-saving manner.
- [0004] Among others, one of the prior art disclosures in the technical field of the present invention may be referred to as JP2009225483, which discloses an apparatus discriminating a program class to be processed, cooperatively with an electronic program guide (EPG) and selects an

optimal video processing method in accordance with the program class. An electronic program guide (EPG) is obtained by an electronic program receiving section. A broadcasting time and a channel of a video image to be processed are selected by a video selecting section and the selected video image is input via a video input section. Furthermore, a video class of the video image selected by the video selecting section is discriminated by a video class discriminating section. In a video processing method, a video processing method is determined, in accordance with the video class discriminated by the video class discriminating section. In accordance with the video processing method determined by the video processing method determining section, a video processing section performs picture quality adjustment on the video image input by the video input section.

- [0005] The present invention provides a system and a method by which an image display device is operated such that a channel and display mode pairing function is performed either depending on the analysis of the incoming information relevant to the context of the displayed content or by assigning a specific predefined display mode to a certain channel according to the personal viewing preferences of the user.
- [0006] The present invention therefore provides a system and method by which an image display device is operable to dynamically provide different display modes as provided by the characterizing features defined in Claim 1.
- [0007] Primary object of the present invention is to provide an image display device performing a program content/channel and display mode pairing function either depending on the context of the displayed content or by predefining specific display modes. Therefore, by automatic selection of one of the available display modes, the user will save the effort from adjusting individual parameters such as contrast and brightness depending on the program or TV channel being watched.
- [0008] The present invention proposes an image display device such as a TV set having an internal database with a plurality of display modes for instance in the form of specific contrast and brightness value sets associated with

different broadcast program content genres. The image display device readjusts the display mode depending on the broadcast program content genre. The genre information can be either manually set by the user for a specific channel or can be retrieved from a broadcasting service provider on a channel-specific or program-specific basis.

- [0009] Alternatively, the image display device may retrieve the display mode parameter settings from the broadcasting service provider in the form of a machine readable code in a dynamical manner before the broadcast program and the genre of the broadcast program changes.
- [0010] Accompanying drawings are given solely for the purpose of exemplifying a system and method by which an image display device capable of performing channel/program and display mode pairing is operable, whose advantages over prior art were outlined above and will be explained in brief hereinafter.
- [0011] The drawings are not meant to delimit the scope of protection as identified in the claims nor should they be referred to alone in an effort to interpret the scope identified in the claims without recourse to the technical disclosure in the description of the present invention.
- [0012] Fig. 1 demonstrates a general workflow diagram of the image display device TV channel/program and display mode pairing operation according to a first embodiment of the present invention.
- [0013] The present invention relates to an image display device having channel/program and display mode pairing function effectuating matching of alternative display modes with a specific TV channel or specific program contents. The user can thereby preconfigure the display mode to apply certain display settings to individual channels or programs to enhance the viewing experience and the perceived display quality. The channel and display mode pairing can be performed manually through a respective settings menu on the control interface of the image display device or automatically by means of a control unit of the image display device as will be delineated hereinafter.
- [0014] The settings menu interface may typically allow pairing of a given channel with a certain display mode. This is advantageous in that a certain display

mode can be set for a specific TV channel broadcasting program contents of a single genre such as movies. In the respective section of the setting menu, the user can preview the list of broadcasting channels and assign a preferred display mode to a certain channel from a display mode list. The display mode of preference for the corresponding channel can then be reached from the respective menu where channels matched with certain display modes are listed. In the matched channels section, the user can preview the list of assigned display modes and modify the settings. Therefore, the settings menu of the control interface typically allows the user to form a list of channels with preferred display modes so as to enhance the display quality of the broadcast program contents on a given channel.

[0015] The channels assigned with a certain display mode are displayed with the saved display settings of the specific channel when viewed on the screen.

[0016] The image display device alternatively performs display mode adaptation according to the genre information. It is known that digital broadcasting services provide information in regards to the genre of the programs being watched. The genre information may typically define a certain number of categories characterizing the content of a program. A content identifier therefore describes the contextual category of the digital program so as to let the users obtain information as to the classification of an event or a program.

[0017] In accordance with the invention, content identifiers in association with different programs as provided by the broadcaster can be used in order for determining the genre of a program. A plurality of programs is assigned to various program genres and the image display device retrieves the genre information in the form of a plurality of program genres indicative of the contextual character of a given program. This is especially advantageous if a given channel has no specific genre and broadcasts a multitude of broadcast program contents in different genres. Therefore, the image display device obtains the information as to the genre of the program and accordingly selects the appropriate display mode parameters on a program-specific basis.

- [0018] To this end, the image display device of the present invention is fitted with an internal memory storing the specific display mode parameter settings of a channel-specific or program-specific genre in relation with a given channel or broadcast program content. The display mode parameter settings for instance at least include contrast and brightness levels and many other known image control or color arrangements so that specific display mode settings (such as different contrast and brightness levels) in relation with a given channel or broadcast program content can be applied.
- [0019] The control unit of the image display device thereby automatically performs display mode adaptation based on the user assigned display mode on a channel-specific basis or the broadcaster-conveyed genre information is periodically retrieved and updated by the image display device so as to readjust the display mode on a program-specific manner. The database of various display modes as associated with respective program genres such as movie or sport is therefore accessed by the control unit to apply respective parameter settings. The image display device matches the corresponding display mode with the program genre of the channel being viewed. For example, if the identified program genre is a sport program, the control unit automatically adjusts the display mode to sport mode.
- [0020] The automatically activated display mode for the channel or program being viewed can be previewed, changed and inactivated through the settings menu of the image display device. The user may alternatively set the display mode on the settings menu independent from the general genre of the channel or the program. Therefore, the present invention enables user-activated display modes in connection with a given channel or automatically on a program genre based manner.
- [0021] According to an alternative embodiment of the present invention, the image display device may dynamically retrieve the required display mode parameters from the broadcasters in the form of a machine readable code, such as barcode, two-dimensional or matrix code as in the case of Quick Response (QR) codes. The machine readable codes may be discontinuously displayed on the TV screen in a non-intrusive manner, i.e.

interfering with the actual program content in a minimal level. The machine readable code will be displayed on the screen in a manner to be overlaid on the actual program or between consecutive frames so as to be replaced periodically as long as necessary, i.e. at times when readjustment of the display mode parameters is needed, that is for instance when the scene changes to a darker shot and a visual enhancement is considered advantageous.

[0022] The arrangement of dynamic change of the display mode is particularly advantageous in that display mode adjustment can also be effected within the same program content, i.e. for instance during a single movie. The machine readable code can be retrieved by way of analysing consecutive frames of the video sequence of the actual broadcast program in the manner that a screen portion where a constant image region is detected for a predetermined time period.

[0023] Accordingly, the control unit of the image display device reconfigures the previously applied display mode parameters as these are no longer appropriate in view of the actual visual content, a new parameter set as provided in the machine readable code and retrieved by a digital image processing unit of the control unit is applied to the actual program content. In other words, instead of selecting the most appropriate parameter settings from among a plurality of existing presets on channel-specific or genre-specific basis, the control unit can directly receive specially determined parameter settings in relation with the actual broadcast program content. Therefore, such machine readable codes as provided by broadcasters are processed by the image display device.

[0024] In summary, the present invention proposes an image display device for performing broadcast program content genre and display mode pairing function so as to match alternative display modes with a broadcast program content genre, the image display device receiving a plurality of broadcasting services and comprising a control unit and a database of a plurality of display modes in association with certain broadcast program content genres.

[0025] In one embodiment of the present invention, the database of a plurality of

display modes in association with certain broadcast program content genres is accessed by the control unit to apply respective display mode parameter settings.

- [0026] In another embodiment of the present invention, a broadcast program content genre is either manually assigned to a specific channel or retrieved from a broadcasting service provider on a channel-specific or program-specific basis.
- [0027] In a further embodiment of the present invention, the control unit automatically performs display mode adaptation on a program-specific basis according to the genre information of each broadcast program content as conveyed by the broadcasting service provider.
- [0028] In a further embodiment of the present invention, the display mode parameters include contrast and brightness levels to be applied in different levels.
- [0029] In a further embodiment of the present invention, the image display device is fitted with an internal memory storing the database of a plurality of display modes as specific display mode parameter settings of a channel-specific or program-specific genre in relation with a given channel or broadcast program content.
- [0030] In a further embodiment of the present invention, the image display device dynamically retrieves the display mode parameter settings from the broadcasting service provider in the form of a machine readable code.
- [0031] In a further embodiment of the present invention, a digital image processor of the image display device detects a machine readable code in the broadcast program content.
- [0032] In a further embodiment of the present invention, the machine readable code contains a block of information as to the specific display mode parameter settings of the broadcast program content.
- [0033] In a further embodiment of the present invention, the machine readable code is a barcode, two-dimensional or matrix code in the form of Quick Response (QR) code.
- [0034] In a further embodiment of the present invention, the machine readable codes are discontinuously displayed on the image display device screen

overlaid on the actual broadcast program content or between consecutive frames at times when readjustment of the display mode parameters is needed.

[0035] In a further embodiment of the present invention, the machine readable codes contain information as to the specific display mode parameter settings of a given broadcast program content and are displayed immediately before the given broadcast program content starts.

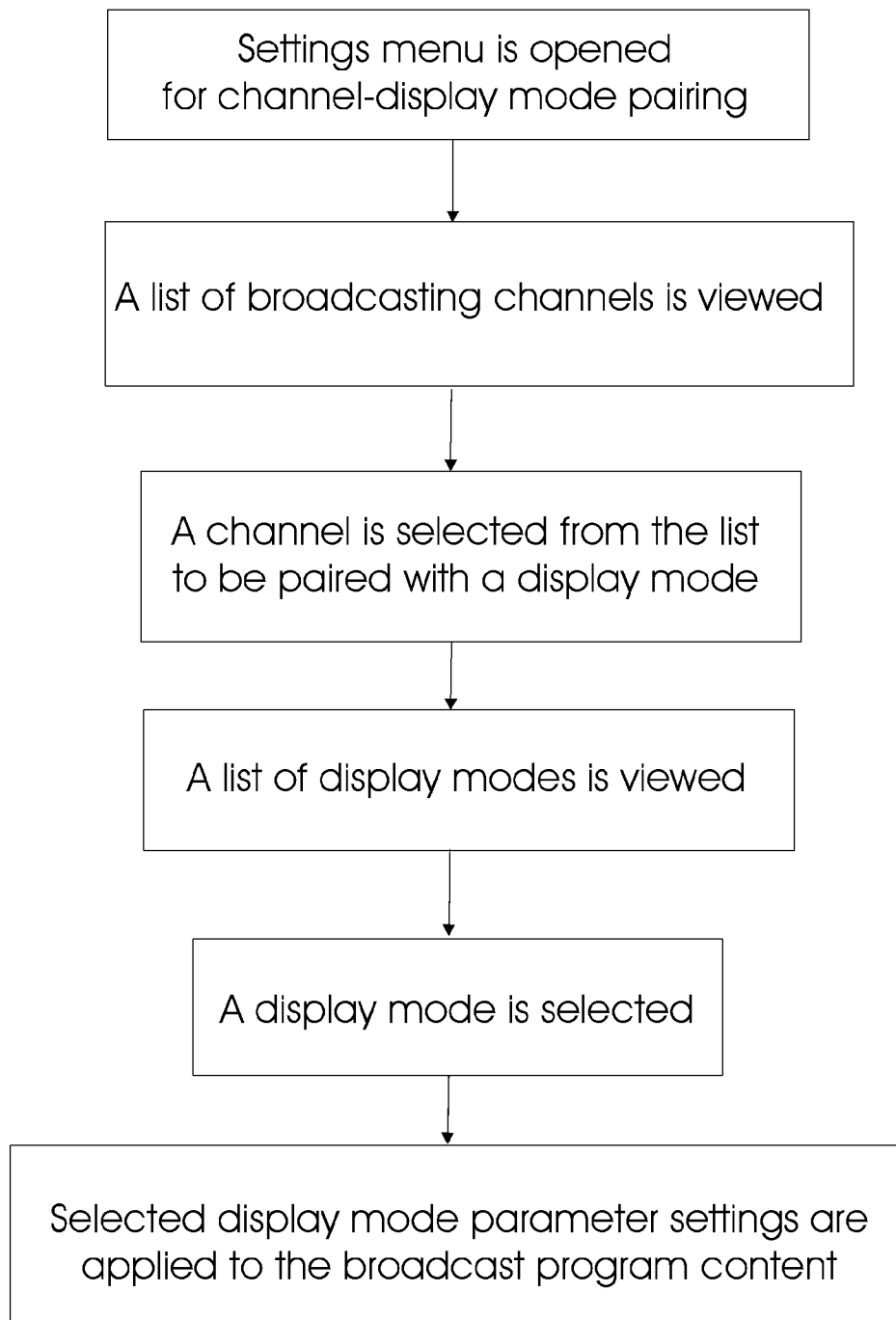
[0036] Therefore, an enhanced display mode and viewing experience is ensured by the present invention by way of automatically applying a specifically adapted display mode. The user will as such save the effort from adjusting individual parameters such as contrast and brightness levels depending on the TV channel or program being watched.

Claims

1. An image display device for performing broadcast program content genre and display mode pairing function so as to match alternative display modes with a broadcast program content genre, the image display device receiving a plurality of broadcasting services and comprising a control unit and a database of a plurality of display modes in association with certain broadcast program content genres, **characterized in that**
 - the database of a plurality of display modes in association with certain broadcast program content genres is accessed by the control unit to apply respective display mode parameter settings and
 - a broadcast program content genre is either manually assigned to a specific channel or retrieved from a broadcasting service provider on a channel-specific or program-specific basis.
2. An image display device as in Claim 1, **characterized in that** the control unit automatically performs display mode adaptation on a program-specific basis according to the genre information of each broadcast program content as conveyed by the broadcasting service provider.
3. An image display device as in Claim 1 or 2, **characterized in that** the display mode parameters include contrast and brightness to be applied in different levels.
4. An image display device as in Claim 1 or 2, **characterized in that** the image display device is fitted with an internal memory storing the database of a plurality of display modes as specific display mode parameter settings of a channel-specific or program-specific genre in relation with a given channel or broadcast program content.
5. An image display device as in Claim 1, 2 or 4, **characterized in that** the image display device dynamically retrieves the display mode parameter settings from the broadcasting service provider in the form of a machine readable code.
6. An image display device as in Claim 5, **characterized in that** a digital image processor of the image display device detects a machine readable code in the broadcast program content.
7. An image display device as in Claim 5, **characterized in that** the machine readable code contains a block of information as to the specific display mode

parameter settings of the broadcast program content.

8. An image display device as in Claim 5, 6 or 7, **characterized in that** the machine readable code is a barcode, two-dimensional or matrix code in the form of Quick Response (QR) code.
9. An image display device as in Claim 5, 6, 7 or 8, **characterized in that** the machine readable codes are discontinuously displayed on the image display device screen overlaid on the actual broadcast program content or between consecutive frames at times when readjustment of the display mode parameters is needed.
10. An image display device as in Claim 7 or 9, **characterized in that** the machine readable codes contain information as to the specific display mode parameter settings of a given broadcast program content and are displayed immediately before the given broadcast program content starts.

Fig. 1

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N21/43 H04N13/00 H04N21/485 H04N21/81
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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

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 469 863 A2 (TOSHIBA KK [JP]) 27 June 2012 (2012-06-27) paragraphs [0017] - [0024], [0028]; claims; figures -----	1-10
X	EP 2 495 962 A1 (SHARP KK [JP]) 5 September 2012 (2012-09-05) the whole document -----	1-10
X	US 2006/221260 A1 (FUJINE TOSHIYUKI [JP] ET AL) 5 October 2006 (2006-10-05) paragraphs [0007], [0011] - [0017], [0027] - [0067], [0162] - [0172]; claims; figures -----	1-10
X	JP 2001 111916 A (FUNAI ELECTRIC CO; FUNAI ELECTRIC ENG CO LTD) 20 April 2001 (2001-04-20) the whole document -----	1-10



Further documents are listed in the continuation of Box C.



See patent family annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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