Title: METHOD AND APPARATUS FOR NAVIGATING THROUGH A VIDEO SIGNAL

Abstract: Circuits (1) for navigating in a user-friendly way through video signals comprising shots and scenes shots are provided with shot boundary detectors (3) for detecting shot boundaries between shots and with scene boundary detectors (2) for detecting scene boundaries between scenes and with controllers (4) for controlling the boundary detectors (2,3) for said navigating. Scene control parts (42) control the scene boundary detectors (2) for finding one or more shots at the start or at the end of a particular scene and shot control parts (43) control the shot boundary detectors (3) for finding a particular shot. Direction control parts (44) control the scene control parts (42) for detecting scene boundaries in one of two opposite directions and control the shot control parts (43) for detecting shot boundaries in the other one of the two opposite directions. Output parts (71-73) of output interfaces (7) provide first images of first shots and second images of second shots for being displayed simultaneously. Selection control parts (45) select the first and second images.
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Method and apparatus for navigating through a video signal

The invention relates to a circuit for navigating through a video signal comprising shots and scenes, and also relates to a device comprising a circuit, to a method, to a computer program product and to a medium.

Examples of such a circuit are integrated circuits and non-integrated circuits, and examples of such a device are video players and video recorders and personal computers.

A prior art circuit is known from US 5,179,449, which discloses an apparatus comprising a shot boundary detector, in the patent falsely called scene boundary detector, for detecting shot boundaries for editing purposes. This shot boundary detector is relatively old-fashioned.

The known circuit is disadvantageous, inter alia, owing to the fact that its relatively old-fashioned shot boundary detector is relatively inaccurate. In fact, even up-to-date shot boundary detectors are relatively inaccurate. As a result, the known circuit is relatively user-unfriendly.

A shot of a video signal comprises a number of video images that, when being played, has a total duration of for example one to ten seconds. A scene of a video signal comprises a number of video images that, when being played, has a total duration of for example one to ten minutes. So, a scene for example comprises one to a thousand shots.

It is an object of the invention, inter alia, to provide a circuit for navigating through a video signal in a relatively user-friendly way.

Further objects of the invention are, inter alia, to provide a device comprising a circuit, a method, a computer program product and a medium for navigating through a video signal in a relatively user-friendly way.

The circuit according to the invention for navigating through a video signal comprising shots and scenes, comprises
- a shot boundary detector for detecting a shot boundary between two
subsequent shots of the video signal,
- a scene boundary detector for detecting a scene boundary between two
subsequent scenes of the video signal, and
- a controller for controlling the boundary detectors for said navigating.

By providing the circuit with a combination of a shot boundary detector and a
scene boundary detector and by providing the circuit with a controller for controlling the
boundary detectors, a possible inaccuracy of a sole scene boundary detector is compensated
by adding a shot boundary detector. Such a shot boundary detector detects shot boundaries
between two subsequent shots and is therefore relatively accurate. As a result, a video signal
can be navigated in a relatively user-friendly way. A user operating the circuit or operating a
device comprising the circuit can, while navigating through a video signal, jump to a scene
boundary as well as jump to a shot boundary.

To minimize time spent for navigating through the video signal, the controller
may be caused, e.g. via a user input first, to provide the navigation through the video signal
on the scene level, then to switch to the navigation on the shot level, or vice versa. The
controller may be adapted to alternatively switch between the shot boundary detector and the
scene boundary detector so as to change from one navigation level to another navigation
level. By switching between the scene level navigation and shot level navigation, the
navigation becomes relatively fast and flexible.

The circuit according to the invention is further advantageous, inter alia, in
that its scene boundary detector can be a relatively inaccurate and therefore low cost detector.

It should be noted that a shot boundary detector is known from WO
2004/075537 ("Segmentation based Shot Boundary Detection" by F. Ernst and J. Nesvadba,
Koninklijke Philips Electronics N.V., Eindhoven, NL). When using a sole shot boundary
detector, a navigation is user-unfriendly too, owing to the fact that there are so many shots in
a one or two hour video signal. As a result, with a sole shot boundary detector, a user
navigates relatively slowly. From this point of view, a possible slowness resulting from using
a sole shot boundary detector can be compensated by adding a scene boundary detector. Such
a scene boundary detector detects boundaries between two subsequent scenes and, owing to
the fact that there are always fewer scenes than shots, is therefore relatively fast. Again, as a
result, a user can jump to a scene boundary as well as jump to a shot boundary.

A comparison of shot boundary detectors is described in the article
"Comparison of Shot Boundary Detectors" (doc), Poster, Int. Conf. for Multimedia and
Expo (ICME 2005), pp 788-791, Amsterdam, The Netherlands, June 6-8, 2005. by J.
Nesvadba, F. Ernst, J. Perhavic, J. Benois-Pineau and L. Primaux. A potential scene boundary
detector is described in article "Low-level cross-media statistical approach for semantic
partitioning of audio-visual content in a home multimedia environment", Proc. IEEE Int. 5
Workshop on Systems, Signals and Image Processing (IWSSIP'04), pp. 235-238, Poznan,
Poland, September 13-15, 2004 by J. Nesvadba, N. Louis, J. Benois-Pineau, M. Desainte-
Catherine and M. Klein Middelink, which describes semantic partitioning into scenes.

It should further be noted that in some prior art documents, the word "scene" is used
where the word "shot" is meant (as in US 5,179,449), and vice versa. Usually a shot is
cited above. In this first case, the boundary detector performs a boundary detection on the fly,
in parallel to a navigation. In a second case, at least some of the boundaries have already
been detected before the navigation is started. In this second case, a second kind of boundary
detector is to be used that uses a boundary from (already available) boundary information.
Such a second kind of boundary detector for example comprises a memory with the boundary
information or a memory with links to the boundary information. Alternatively and/or in
addition, such a second kind of boundary detector might comprise a transceiver comprising a
transmitter for transmitting a trigger signal to a memory with the boundary information and
comprising a receiver for receiving the boundary information from this memory and/or might
comprise a detector for detecting the boundary information stored in a memory and/or might
comprise a receiver for receiving the boundary information from a memory etc. Mixtures of
both cases whereby for example shot boundaries have been detected before a navigation is
started and whereby scene boundaries are detected on the fly, in parallel to the navigation, are
not to be excluded. Therefore, the "detection of the scene boundary" and the "detection of the
shot boundary" may be interpreted as the actual processing of the video signal to find at least
one boundary, or as a simple reception of data already incorporating information about at
least one boundary.

An embodiment of the circuit according to the invention is defined by the
controller comprising a scene control part for controlling the scene boundary detector for
finding one or more shots at the start or at the end of a particular scene and comprising a shot
control part for controlling the shot boundary detector for finding a particular shot. The different control parts allow the different detectors to be controlled individually and for example allow a user to find one or more shots.

An embodiment of the circuit according to the invention is defined by the controller comprising a direction control part for controlling the scene control part for detecting scene boundaries in one of two opposite directions and for controlling the shot control part for detecting shot boundaries in the other one of the two opposite directions. When going forward in a scene wise way and going backward in a shot wise way, or vice versa, the user-friendliness is further improved.

The device according to the invention is defined by comprising a circuit according to the invention and by further comprising an input interface for receiving input commands for commanding the controller. These input commands may be entered directly by a user via the input interface of the device or may be entered indirectly by a user via a remote control unit that communicates with the input interface of the device.

An embodiment of the device according to the invention is defined by the controller comprising a scene control part for controlling the scene boundary detector for finding one or more shots at the start or at the end of a particular scene and comprising a shot control part for controlling the shot boundary detector for finding a particular shot, and the input commands comprising a scene input command for commanding the scene control part and comprising a shot input command for commanding the shot control part. The different input commands allow the different control parts to be commanded individually.

An embodiment of the device according to the invention is defined by the controller comprising a direction control part for controlling the scene control part for detecting scene boundaries in one of two opposite directions and for controlling the shot control part for detecting shot boundaries in the other one of the two opposite directions. Again, when going forward in a scene wise way and going backward in a shot wise way, or vice versa, the user-friendliness is further improved.

An embodiment of the device according to the invention is defined by the device further comprising an output interface for outputting images of shots or scenes for being displayed. Such an output interface may for example comprise a screen or a display or a monitor or a television receiver or a projector or may communicate with a screen or a display or a monitor or a television receiver or a projector.

An embodiment of the device according to the invention is defined by the output interface comprising a first output part for outputting a first image of a first shot (or of
a first scene) and a second output part for outputting a second image of a second shot (or of a second scene) for being displayed simultaneously. By simultaneously displaying different images of different shots, for example via a main screen and a picture-in-picture screen or via two picture-in-picture screens, the user-friendliness is further improved.

To allow a user to determine a direction (i.e. forward or backward) in which the video signal is to be navigated on the scene level or the shot level, the user may be advantageously provided, via the output interface, with the first image and the second image simultaneously.

An embodiment of the device according to the invention is defined by the controller comprising a selection control part for selecting the first image being an image of the first shot found via the scene boundary detector and for selecting the second image being an image of the second shot found via the shot boundary detector to be displayed simultaneously. By simultaneously displaying different images of different shots, at least one shot being found via the scene boundary detector and at least one shot being found via the shot boundary detector, for example via a main screen and a picture-in-picture screen or via two picture-in-picture screens, the user-friendliness is further improved. Preferably, either at least one shot found via the scene boundary detector and at least two shots found via the shot boundary detector are displayed simultaneously, or at least two shots found via the scene boundary detector and at least one shot found via the shot boundary detector are displayed simultaneously, for example via a main screen and two picture-in-picture screens or via three picture-in-picture screens.

Embodiments of the method according to the invention and of the computer program product according to the invention and of the medium according to the invention correspond with the embodiments of the device according to the invention.

The invention is based upon an insight, inter alia, that a sole scene boundary detector is relatively inaccurate and that a sole shot detector makes a navigation relatively slow, and is based upon a basic idea, inter alia, that a scene boundary detector and a shot boundary detector are to be used together and controlled by a controller for said navigating (and/or for browsing).

The invention solves the problem, inter alia, to provide a circuit (or apparatus) for navigating through (and/or for browsing) a video signal in a relatively user-friendly way, and is further advantageous, inter alia, in that its scene boundary detector can be a relatively inaccurate and therefore low cost detector.

These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments(s) described hereinafter.
In the drawings:

Fig. 1 shows diagrammatically a device according to the invention comprising a circuit according to the invention,

Fig. 2 shows scenes and shots and a commercial block detection A,

Fig. 3 shows screens corresponding with the scenes and shots from the Fig. 2,

Fig. 4 shows scenes and shots and a commercial block detection B,

Fig. 5 shows screens corresponding with the scenes and shots from the Fig. 4,

Fig. 6 shows scenes and shots and a commercial block detection C,

Fig. 7 shows screens corresponding with the scenes and shots from the Fig. 6,

Fig. 8 shows scenes and shots and a commercial block detection D,

Fig. 9 shows screens corresponding with the scenes and shots from the Fig. 8,

Fig. 10 shows scenes and shots and a commercial block detection E,

Fig. 11 shows screens corresponding with the scenes and shots from the Fig. 10,

Fig. 12 shows scenes and shots and a commercial block detection F, and

Fig. 13 shows screens corresponding with the scenes and shots from the Fig. 12.

The device 10 according to the invention shown in the Fig. 1 comprises a circuit 1 for navigating through a video signal comprising scenes and shots. The circuit 1 comprises a scene boundary detector 2 for detecting a scene boundary between two subsequent scenes of the video signal, a shot boundary detector 3 for detecting a shot boundary between two subsequent shots of the video signal, a controller 4 for controlling the boundary detectors for said navigating, and a buffer 5 coupled to both detectors 2 and 3. Alternatively, the buffer 5 may be located outside the circuit 1.

The device 10 further comprises an input interface 6 for receiving input commands for commanding the controller 4, an output interface 7 for outputting images of shots for being displayed, a switch 8 coupled to the buffer 5 and a memory 9 coupled to the buffer 5. The output interface 7 for example comprises a first output part 71 for outputting a first image of a first shot and a second output part 72 for outputting a second image of a second shot and a third output part 73 for outputting a third image of a third shot for being displayed simultaneously. Each output part 71-73 is thereto coupled to the switch 8.
The detectors 2 and 3 may be provided via the buffer 5 with the video signal e.g. from a TV tuner, video camera, or a data carrier such a CD-ROM disc (Compact Disc Read Only Memory) or a DVD disc (Digital Versatile Disc). The video signal may comprise video data (e.g., video images, photos, graphics), or the video data in combination with at least one of: audio data, text information, and other digital data such, e.g., meta-data according to the MPEG-7 standard. The expression "video data" is used as data which are visible such as a motion picture, "still pictures", video text etc. The video data may be in formats like GIF (Graphic Interchange Format), JPEG (named after the Joint Photographic Experts Group), MPEG-4, etc. The expression "audio data" pertains to audio comprising audible tones, silence, speech, music, tranquility, external noise or the like. The audio data may be in formats like the MPEG-I layer III (mp3) standard (Moving Picture Experts Group), AVI (Audio Video Interleave) format, WMA (Windows Media Audio) format, etc. The video signal may incorporate the information about at least one scene boundary or at least one shot boundary.

The controller 4 comprises a scene control part 42 coupled to the scene boundary detector 2 for controlling the scene boundary detector 2 for finding one or more shots at the start or at the end of a particular scene and comprises a shot control part 43 coupled to the shot boundary detector 3 for controlling the shot boundary detector 3 for finding a particular shot. The controller 4 further comprises a direction control part 44 for controlling the scene control part 42 for detecting scene boundaries in one of two opposite directions and for controlling the shot control part 43 for detecting shot boundaries in the other one of the two opposite directions. These directions for example comprise a forward direction and a backward direction, with the forward direction corresponding with a playing direction of the video signal. The input commands comprise a scene input command for commanding the scene control part 42 and comprising a shot input command for commanding the shot control part 43.

The controller 4 further comprises a selection control part 45 for selecting the first image being an image of the first shot found via the scene boundary detector 2 and for selecting the second image being an image of the second shot found via the shot boundary detector 3 to be displayed simultaneously. The selection control part 45 further controls a communication between the buffer 5 and the switch 8 and is thereto coupled to the switch 8 and to the buffer 5. The controller 4 further comprises a memory control part 46 for controlling the memory 9. The memory control part 46 further controls a communication
between the buffer 5 and the memory 9 and is thereto coupled to the memory 9 and to the
buffer 5.

The controller 4 also comprises a main control part 41 coupled to the other
control parts 42-46 and to the input interface 6 for general control purposes. The controller 4
may comprise a processor whereby one or more of the control parts 41-46 comprise hardware
or software or a mixture of both. Alternatively, the main control part 41 may comprise a
processor with one or more of the control parts 42-46 comprising hardware or software or a
mixture of both. Further alternatively, one or more of the control parts 41-46 may comprise a
processor etc. In view of this, two or more of the parts 41-46 may be integrated into a new
part without departing from the scope of this invention.

The input interface 6 may comprise a mouse or a keyboard or may comprise a
wireless receiver for communication with a wireless transmitter of a remote control etc. The
output interface 7 may for example comprise a screen or a display or a monitor or a television
receiver or a projector or may comprise a wired or wireless transmitter for communication
with a wired or wireless receiver of a screen or a display or a monitor or a television receiver
or a projector etc.

Each boundary detector 2,3 might be a boundary detector as for example
defined in the literature cited in the introduction. In that case, the boundary detector 2,3
performs a boundary detection on the fly, in parallel to a navigation. Alternatively, at least
some of the boundaries may already have been detected before the navigation is started, in
which case the boundary detector 2,3 detects a boundary from (already available) boundary
information. Such a kind of boundary detector 2,3 for example comprises a memory
comprising the boundary information and/or comprises a memory with links to the boundary
information and/or comprises a transceiver comprising a transmitter for transmitting a trigger
signal to a memory with the boundary information and comprising a receiver for receiving
the boundary information from this memory and/or comprises a detector for detecting the
boundary information stored in a memory and/or comprises a receiver for receiving the
boundary information from a memory etc.

The scenes and shots and the commercial block detection A shown in the Fig.
2 comprise the scenes c0-c3. The scenes c0 and c1 form part of a commercial block and each
for example comprise a commercial. The scene c1 comprises a shot hi. The scenes c2 and c3
form part of a non-commercial block such as a movie or a soap. The scene c2 comprises the
shots h2-h4 and the scene c3 comprises the shots h5-h6. A commercial block detector has
detected the end of the commercial block at a detection A located in the shot h2.
The screens corresponding with the scenes and shots from the Fig. 2 are shown in the Fig. 3 and show a left screen and a right screen, each screen with a main window and two picture-in-picture (pip) windows in the left and right upper corners. A user is navigating through the video signal comprising the commercial block and the non-commercial block for example to remove the commercial block. In response to the commercial block detection A, the left screen is shown that shows a main window with an image A (from the shot h2) and a left upper pip window with the scene c2 and a right upper pip window with the scene c3. The user sees that the main window and the left upper pip window show a non-commercial content and presses a backward button of the input interface 6 or of the remote control that communicates with the input interface 6. As a result the right screen is shown that shows a main window with the scene c2 and a left upper pip window with the scene c1 and a right upper pip window with the shot h3. This provides the user the confirmation that a proper end of the commercial block has been found and the user freezes the boundary found via a freezing and/or marking and/or confirming button of the input interface 6 or of the remote control. This way, the user has navigated efficiently through the video signal and has found the correct boundary with minimal effort.

The scenes and shots and the commercial block detection B shown in the Fig. 4 comprise the scenes and shots that are already shown in the Fig. 2. The commercial block detector has detected the end of the commercial block at a detection B located in the shot h5.

The screens corresponding with the scenes and shots from the Fig. 4 are shown in the Fig. 5 and show a left screen and a middle screen and a right screen, each screen with a main window and two picture-in-picture (pip) windows in the left and right upper corners. A user is navigating through the video signal comprising the commercial block and the non-commercial block for example to remove the commercial block. In response to the commercial block detection B, the left screen is shown that shows a main window with an image B (from the shot h5) and a left upper pip window with the scene c3 and a right upper pip window with the scene c4. The user sees that all windows show a non-commercial content and presses the backward button. As a result the middle screen is shown that shows a main window with the scene c3 and a left upper pip window with the scene c2 and a right upper pip window with the shot h6. Again, the user sees that all windows show a non-commercial content and presses the backward button once more. As a result the right screen is shown that shows a main window with the scene c2 and a left upper pip window with the scene c1 and a right upper pip window with the shot h3. This provides the user the confirmation that a proper end of the commercial block has been found and the user freezes
the boundary found via the freezing and/or marking and/or confirming button. This way, the user has navigated efficiently through the video signal and has found the correct boundary with minimal effort.

The scenes and shots and the commercial block detection C shown in the Fig. 6 comprise the scenes and shots that are already shown in the Fig. 2, only this time the scene boundary detector 2 has missed a scene boundary. As a result, a scene c1’ comprises the shots h1-h4 and a scene c2’ comprises the shots h5-h6. The commercial block detector has detected the end of the commercial block at a detection C located in the shot h2.

The screens corresponding with the scenes and shots from the Fig. 6 are shown in the Fig. 7 and show a left screen and a middle screen and a right screen, each screen with a main window and two picture-in-picture (pip) windows in the left and right upper corners. A user is navigating through the video signal comprising the commercial block and the non-commercial block for example to remove the commercial block. In response to the commercial block detection C, the left screen is shown that shows a main window with an image C (from the shot h2) and a left upper pip window with the scene c1’ and a right upper pip window with the scene c2’. The user doubts that the detection C is the proper end of the commercial block and presses the backward button. As a result the middle screen is shown that shows a main window with the scene c1’ and a left upper pip window with the scene c0 and a right upper pip window with the shot h2. Now, the user sees a commercial content in the left upper pip window and presses a forward button of the input interface 6 or of the remote control. According to one aspect of the invention, when pressing the backward button the navigation goes scene wise and when pressing the forward button the navigation goes shot wise, or vice versa, as controlled by the direction control part 44. As a result the right screen is shown that shows a main window with the shot h1 and a left upper pip window with the shot h2 and a right upper pip window with the shot h3. This provides the user the confirmation that a proper end of the commercial block has been found and the user freezes the boundary found via the freezing and/or marking and/or confirming button. This way, the user has navigated efficiently through the video signal and has found the correct boundary with minimal effort.

The scenes and shots and the commercial block detection D shown in the Fig. 8 comprise the scenes and shots that are already shown in the Fig. 2. The commercial block detector has detected the end of the commercial block at a detection D located in the shot h2.

The screens corresponding with the scenes and shots from the Fig. 8 are shown in the Fig. 9 and show a left screen and a right screen, each screen with a main
window and two picture-in-picture (pip) windows in the left and right upper corners. A user is navigating through the video signal comprising the commercial block and the non-commercial block for example to remove the commercial block. In response to the commercial block detection D, the left screen is shown that shows a main window with an image D (from the shot hi) and a left upper pip window with the scene c1 and a right upper pip window with the scene c2. The user sees a commercial content in the main window and presses the forward button. As a result the right screen is shown that shows a main window with the scene c2 and a left upper pip window with the shot hi and a right upper pip window with the scene c3. This provides the user the confirmation that a proper end of the commercial block has been found and the user freezes the boundary found via the freezing and/or marking and/or confirming button. This way, the user has navigated efficiently through the video signal and has found the correct boundary with minimal effort.

The scenes and shots and the commercial block detection E shown in the Fig. 10 comprise the scenes and shots that are already shown in the Fig. 2. The commercial block detector has detected the end of the commercial block at a detection E located in the shot h0.

The screens corresponding with the scenes and shots from the Fig. 10 are shown in the Fig. 11 and show a left screen and a middle screen and a right screen, each screen with a main window and two picture-in-picture (pip) windows in the left and right upper corners. A user is navigating through the video signal comprising the commercial block and the non-commercial block for example to remove the commercial block. In response to the commercial block detection E, the left screen is shown that shows a main window with an image E (from the shot h0) and a left upper pip window with the scene c0 and a right upper pip window with the scene c1. The user sees a commercial content only and presses the forward button. As a result the middle screen is shown that shows a main window with the scene c1 and a left upper pip window with the shot h0 and a right upper pip window with the scene c2. Now, the user sees a commercial content in the main window and the left upper pip window and presses the forward button once more. As a result the right screen is shown that shows a main window with the scene c2 and a left upper pip window with the shot hi and a right upper pip window with the scene c3. This provides the user the confirmation that a proper end of the commercial block has been found and the user freezes the boundary found via the freezing and/or marking and/or confirming button. This way, the user has navigated efficiently through the video signal and has found the correct boundary with minimal effort.
The scenes and shots and the commercial block detection F shown in the Fig. 12 comprise the scenes and shots that are already shown in the Fig. 2, only this time the scene boundary detector 2 has missed a scene boundary. As a result, a scene c1’ comprises the shots h1-h4 and a scene c2’ comprises the shots h5-h6. Further, the scene c0 comprises a shot h0 and a scene c3 is also present. The commercial block detector has detected the end of the commercial block at a detection F located in the shot h1.

The screens corresponding with the scenes and shots from the Fig. 12 are shown in the Fig. 13 and show five screens, each screen with a main window and two picture-in-picture (pip) windows in the left and right upper corners. A user is navigating through the video signal comprising the commercial block and the non-commercial block for example to remove the commercial block. In response to the commercial block detection F, the first screen is shown that shows a main window with an image F (from the shot h1) and a left upper pip window with the scene c1’ and a right upper pip window with the scene c2’. The user presses the forward button and as a result the second screen is shown that shows a main window with the scene c2' and a left upper pip window with the shot h4 and a right upper pip window with the scene c3'. Now, the user sees non-commercial content only and presses the backward button. According to one aspect of the invention, when pressing the forward button the navigation goes scene wise and when pressing the backward button the navigation goes shot wise, or vice versa, as controlled by the direction control part 44. As a result the third screen is shown that shows a main window with the shot h4 and a left upper pip window with the shot h3 and a right upper pip window with the shot h5. The user presses again the backward button and as a result the fourth screen is shown that shows a main window with the shot h3 and a left upper pip window with the shot h2 and a right upper pip window with the shot h4. Again the user presses again the backward button and as a result the fifth screen is shown that shows a main window with the shot h2 and a left upper pip window with the shot h1 and a right upper pip window with the shot h3. This provides the user the confirmation that a proper end of the commercial block has been found and the user freezes the boundary found via the freezing and/or marking and/or confirming button. This way, the user has navigated efficiently through the video signal and has found the correct boundary with minimal effort.

Although the Fig. 2-13 are described at the hand of a commercial block detection A-F, the invention is not to be limited to such a commercial block detection. On the contrary, the invention offers an improved navigation that is that good that the commercial block detection might be avoided. So, the invention is in general about navigating through a
video signal comprising scenes and shots by detecting a scene boundary between two
subsequent scenes of the video signal, detecting a shot boundary between two subsequent
shots of the video signal, and controlling the detecting of the boundaries for said navigating.

Preferably, a direction control is used that for example detects and/or stores
that the user goes forward (backward) in a respective scene wise way or shot wise way and
that then, in case the user wants to go backward (forward), automatically selects the
respective shot wise or scene wise way etc. such that the user only needs to press the forward
and backward buttons.

It should be noted that the above-mentioned embodiments illustrate rather than
limit the invention, and that those skilled in the art will be able to design many alternative
embodiments without departing from the scope of the appended claims. In the claims, any
reference signs placed between parentheses shall not be construed as limiting the claim. Use
of the verb "to comprise" and its conjugations does not exclude the presence of elements or
steps other than those stated in a claim. The article "a" or "an" preceding an element does not
exclude the presence of a plurality of such elements. The invention may be implemented by
means of hardware comprising several distinct elements, and by means of a suitably
programmed computer. In the device claim enumerating several means, several of these
means may be embodied by one and the same item of hardware. The mere fact that certain
measures are recited in mutually different dependent claims does not indicate that a
combination of these measures cannot be used to advantage.
CLAIMS:

1. A circuit (1) for navigating through a video signal comprising shots and scenes, the circuit (1) comprising
   - a shot boundary detector (3) for detecting a shot boundary between two subsequent shots of the video signal, and
   - a scene boundary detector (2) for detecting a scene boundary between two subsequent scenes of the video signal,
   - a controller (4) for controlling the boundary detectors (2,3) for said navigating.

2. The circuit (1) according to claim 1, the controller (4) comprising a scene control part (42) for controlling the scene boundary detector (2) for finding one or more shots at the start or at the end of a particular scene and comprising a shot control part (43) for controlling the shot boundary detector (3) for finding a particular shot.

3. The circuit (1) according to claim 2, the controller (4) comprising a direction control part (44) for controlling the scene control part (42) for detecting scene boundaries in one of two opposite directions and for controlling the shot control part (43) for detecting shot boundaries in the other one of the two opposite directions.

4. A device (10) comprising the circuit (1) according to claim 1, the device (10) further comprising an input interface (6) for receiving input commands for commanding the controller (4).

5. The device (10) according to claim 4, the controller (4) comprising a scene control part (42) for controlling the scene boundary detector (2) for finding one or more shots at the start or at the end of a particular scene and comprising a shot control part (43) for controlling the shot boundary detector (3) for finding a particular shot, and the input commands comprising a scene input command for commanding the scene control part (42) and comprising a shot input command for commanding the shot control part (43).
6. The device (10) according to claim 5, the controller (4) comprising a direction control part (44) for controlling the scene control part (42) for detecting scene boundaries in one of two opposite directions and for controlling the shot control part (43) for detecting shot boundaries in the other one of the two opposite directions.

7. The device (10) according to claim 4, the device (10) further comprising an output interface (7) for outputting images of shots for being displayed.

8. The device (10) according to claim 7, the output interface (7) comprising a first output part (71) for outputting a first image of a first shot and a second output part (72) for outputting a second image of a second shot for being displayed simultaneously.

9. The device (10) according to claim 8, the controller (4) comprising a selection control part (45) for selecting the first image being an image of the first shot found via the scene boundary detector (2) and for selecting the second image being an image of the second shot found via the shot boundary detector (3) to be displayed simultaneously.

10. A method for navigating through a video signal comprising shots and scenes, the method comprising the steps of
- detecting a shot boundary between two subsequent shots of the video signal,
- detecting a scene boundary between two subsequent scenes of the video signal, and
- controlling the detecting of the boundaries for said navigating.

11. A computer program product for performing the steps of the method according to claim 10.

12. A medium comprising the computer program product according to claim 11.
FIG. 6

FIG. 7
FIG. 10

FIG. 11
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<th>Citation of document, with indication where appropriate, of the relevant passages</th>
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