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(54) Title: METHOD AND SYSTEM FOR PROVIDING PERSONALIZED BROADCAST TELEVISION HIGHLIGHTS SERVICE
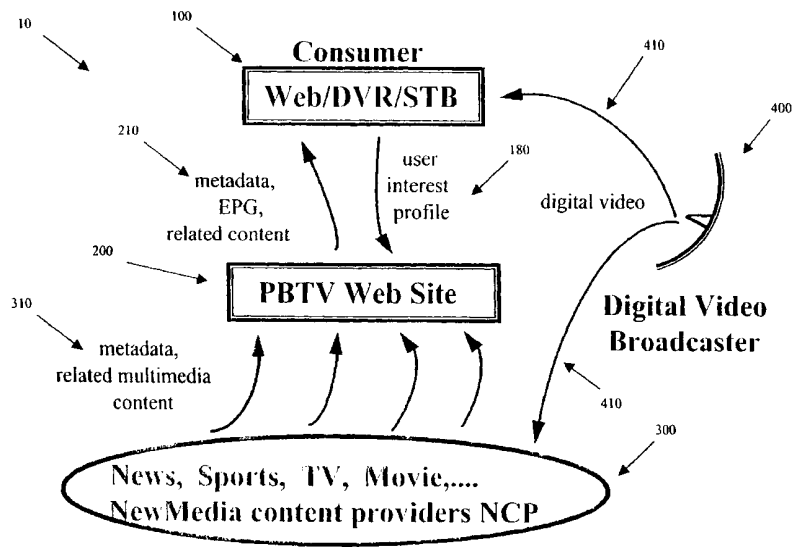
(57) Abstract: A system and method for selectively presenting portions of at least broadcast quality audio/visual content from at least one broadcaster via a broadcast network and portions of user-interactive content accessible via a computer network based upon a user's interests and using a presentation device. The system includes: an input device for providing data indicative of at least one user interest; at least one web site for providing access to data indicative of the audio/visual content; a plurality of memory locations storing computing instructions for identifying the portions of the audio/visual content using the data indicative of the least at least one user interest and data indicative of the audio/visual content; and, a storage device for recording the identified portions of the audio/visual content.

METHOD AND SYSTEM FOR PROVIDING PERSONALIZED BROADCAST TELEVISION HIGHLIGHTS SERVICE

Field of Invention

5   The present invention relates generally to audio/visual content presentation, and particularly to methods and systems for presenting high quality audio/visual content and user-interactive information.

Background of Invention

10   The rise in popularity of the global interconnection of computing devices and networks commonly referred to as the Internet offers new levels of interactivity for users accessing entertainment and information. However, Internet communication channels are relatively low in bandwidth as compared to more traditional entertainment transport systems such as broadcast television (TV). Further, the

15   amount of bandwidth available is typically inconsistent over time. Because high-quality video, such as broadcast TV quality, requires a consistently available, relatively high bandwidth, audio/visual content provided to users over the Internet is typically of low-quality, with regard to frame-rate and resolution, or undesirably slow to download or otherwise access.

20   In contrast, broadcast television in its current form offers better quality audio/visual content, and is likely to improve in the near future with the widespread arrival and acceptance of digital television (DTV) and high-definition television

(HDTV). However, this next generation television still doesn't offer the interactivity and rich variety of user-interactive content that the Internet does. A characteristic that broadcast television and the Internet do have in common is the skyrocketing amount of available content, leading to "information overload" for the user. Smart 5 systems are needed to help a user sort through this vast amount of content.

Accordingly, it is an object of the present invention to provide a system and method for providing delivery of high quality video in combination with interactive components designed to help the user sort through, or have automatically sorted through, available content and further retrieve user-interactive content.

10 Personalized television services such as TiVo and REPLAYTV provide ·personalized, automated digital recording of broadcast video. However, while these services address some of the shortcomings addressed above, such as the problem of finding what you want in the glut of broadcast video content, they are only crudely personalized. Essentially, they are user-friendly, minimally intelligent, digital video 15 recorders. WEBTV offers services that begin to integrate TV and the Internet, however does not offer program-specific metadata.

In the area of sports, PRAJA offers sports-program-content-based information over the web, with metadata and hyperlinks. However PRAJA does not integrate broadcast TV in any way, and thus can only offer Internet-quality 20 audio/visual content. Also, PRAJA does not offer any personalization of the information presented.

Summary of Invention

A method for identifying at least a portion of high quality audio/visual content being of potential interest to a user and available via a first communications network and corresponding user-interactive content available via a second communications network, the method including: storing data indicative of at least one user interest; receiving data indicative of scheduling information for the high quality audio/visual content via the first or second communications network; receiving data indicative of the high quality audio/visual data and data indicative of the user-interactive content via the first or second network; and, automatically identifying select portions of the high quality audio/visual content and corresponding user-interactive content dependently upon the stored data indicative of the at least one user interest using the data indicative of scheduling information, data indicative of the high quality audio/visual data and data indicative of the user-interactive content.

Brief Description of the Figures

Figure 1 illustrates a block diagram of a system according to one aspect of the present invention; and,

Figure 2 illustrates a block diagram of a set top box according to another aspect of the present invention and suitable for use with the system of Figure 1.

Detailed Description of the Invention

The present invention introduces a hybrid system that merges the advantages of broadcast TV and the Internet, which is hereinafter referred to as a Personalized Broadcast TV Highlights Service (PBTV). According to one aspect of the present invention, PBTV delivers broadcast-quality audio/visual content plus web content and interactivity to provide a personalized and enriched viewing experience. Based on an individual user's preferences, the PBTV system provides efficient storage, indexing, search, and retrieval of broadcast-quality digital audio/visual content, along with related multimedia content, and hyperlinks to related Web Sites.

Referring now to the Figures, like references identify like elements of the Invention. Figure 1 illustrates a block diagram of a system 10 according to one aspect of the present invention. The system 10 includes at least one consumer electronics, set-top box (WEB/DVR/STB) or STB 100, at least one website 200 (PBTV website 200), at least one content provider (NCP) 300 and at least one digital video broadcaster 400. The present invention will be discussed in a non-limiting example which includes a single user 100, website 200, NCP 300 and broadcaster 400 for sake of clarity. The Digital Video Broadcaster 400 provides high-quality digital audio/visual (A/V) content 410 in the PBTV system 10. This A/V content 410 can be provided via a satellite or cable television system for example. Participating NewMedia Content Providers (NCPs) 300 provide metadata and multimedia information and analysis 310, as well as hyperlinks to web sites related to high quality audio/visual content 410. Metadata, as used herein generally refers to data which describes or is associated with programs 410 or portions of programs

410.   The Web/Digital-video-recorder/Set-top-box STB 100 is a consumer

electronics device.   The PBTV Web Site 200 acts as a source or gateway for

electronic program guides (EPGs), and as a gateway to NewMedia Content

Providers (NCPs) 300 for the STB 100.   Program-related metadata and multimedia

5   content, e.g., program-related information and analysis, is downloaded 210 via the

PBTV Web site 200 to the user's STB 100 in response to requests therefore as will

be described.

Referring now also to Figure 2, therein is illustrated a block diagram of an

STB 100 according to another aspect of the present invention and suitable for use

10   with the system of Figure 1. The STB 100 includes a microprocessor 120, decoder

110 for decoding broadcast content, modem 130 for communicating with the website

200, e.g. communications 180, 210, and accessing the Internet, and storage device

140 such as a hard disk drive, for storing A/V data and other information.

Communications mediums for the back-channel to the website 200 from the STB

15   100 include conventional telephone lines, digital subscriber lines (DSLs), cable

modem channels and cellular and other wireless networks for example. The decoder

110 also provides audio/visual content to the display device 160, such as a television

or other suitable monitor. The device 100 further includes one or more input devices

170 such a keyboard, mouse or remote control, for operation of the STB 100 using a

20   Graphical User Interface (GUI) displayed using the display device 160 via the

microprocessor 120 and decoder 110.

Video programming content 410 is provided by the digital video broadcaster

400 to the STB 100 and NCP 300, and is the actual broadcast-quality video the

PBTV system 10 delivers to the display 160. The Electronic Program Guides (EPGs) are provided by either the broadcaster 400 or via the PBTV Web Site 200, and provide scheduling information for programming content. Metadata is supplied by an NCP 300 via the PBTV Web Site 200, and describes the program content 410, including time-of-occurrence information, such as for a scene beginning at time "X", data describing who, what, where, when, why, or how. User Interest Profiles (UIPs) are personalized by a user via the PBTV Web Site 200 and describe, for each participating NCP 300, the interests of an individual user, expressed in terms of the metadata available from that NCP 300. For example, "I am interested in all scenes where Brad Pitt appeared," or "I am interested in all New York Jets third-down plays where Vinny Testaverde passed the ball" can be used to generate UIPs. UIPs can be stored as database records. Related multimedia content is information and analysis furnished by the NCPs 300 via the PBTV Web Site 200, and includes such things as related news, e.g. an article about Brad Pitt's previous movie or Vinny Testaverde's injury status, evaluation of the program content, e.g. a criticism of Brad Pitt's acting or Vinny Testaverde's game performance, or related statistics, e.g. Brad Pitt's resume or third-down statistics for the Jets for the game and the season. Hyperlinks to related multimedia content, e.g. websites, are also furnished by an NCP 300 via the PBTV Web Site 200, and provide a user with opportunities for further exploration, e.g. a hyperlink to a Universal Pictures web site or to an NFL web site.

Referring still to Figure 2, a PBTV user begins by personalizing a UIP template for a NewMedia Content Provider (NCP) 300 associated with one of the user's general areas of interest, e.g. sports, movies or news, for example as

communication 180. The UIP template for an NCP 300 is preferably designed to facilitate searching and retrieving video and related content using the metadata available from that NCP 300, and the EPG. In other words, a personalized UIP for an NCP 300 describes the user's personal interests in terms of the metadata available from that particular NCP 300. The EPG data and metadata can be queried using a UIP to not only identify programs 410 of potential interest to a user, but portions of programs 410 of potential interest to a user as well.

Based on the UIP and the EPG, the PBTV system 10 identifies, by using appropriately formed queries based upon the UIP, which broadcast programs 410 are of potential interest to the user, and the times those "interesting" programs 410, or even portions of programs 410 will be broadcast. According to an aspect of the invention, based upon the results, the STB 100 automatically records the compressed bitstreams of those "interesting" programs 410, or portions of programs 410, using the storage device 140. The user can play back the PBTV-recorded broadcast-quality video programming, thus seeing programming content 410 that has been sifted according to the user's UIP. According to another aspect of the invention, this playback also facilitates user-guided exploring of related multimedia content and hyperlinks provided by an NCP 300 via the PBTV Web Site 200 by means of a GUI. The GUI used to present the PBTV content for a particular NCP 300 is preferably tailored to the needs of the metadata and related content available from that NCP 300. This can also be accomplished by analogously querying data indicative of websites using a UIP, to identify ones of the websites of potential interest to the user.

According to an aspect of the present invention, in order to use the EPG and metadata to drive the STB 100 to accurately record and index the desired broadcast video, and then retrieve that stored video, the PBTV system 10 uniquely identifies any arbitrary point in the video broadcast, and links that instant in the broadcast with

5 corresponding points in the metadata and the EPG. According to another aspect of the present invention, the PBTV system 10 achieves this synchronization using the Presentation Time Stamp (PTS) of the programming content 410, which can take the form of an MPEG-2 ATSC compliant video bitstream, for example. By calculating a difference between the PTS at the beginning of a broadcast program, which

10 corresponds to a time in the EPG associated with this program, and the PTS at a particular point in the broadcast program, that point in the program can be uniquely identified within a resolution of the frequency-of-occurrence of the PTSs. Therefore, by simply receiving the programming content 410, decoding the PTSs, and calculating changes in the PTSs, a metadata author such as NCP 300 can uniquely

15 identify or refer to any event in the broadcast programming content 410. Since a PTS occurs at least every 700 milliseconds in an ATSC compliant bitstream, this PTS-based approach to synchronization permits an event in the broadcast programming content 410 to be identified to within 21 frames, or less than 1 second. The recording cues calculated for the Web/DVR/STB 100 recording process based

20 on the EPG and UIP can take this tolerance into account, to insure that all desired audio/visual content is recorded.

As set forth, the PBTV system 10 allows a user to specify not only which programs are of interest, but even which parts of those programs are of interest using

UIPs. According to yet another aspect of the invention, in cases where only portions of a program 410 are of interest, in order to more efficiently utilize the capacity of the storage device 140, the STB 100 uses a video "crunching" operation to further compress the recorded bitstream. According to yet another aspect of the present invention, where metadata cannot be guaranteed to be available concurrently with programming content 410, in the case of a live sports broadcast for example, the STB 100 begins by recording in its entirety, a program 410 which, based on information in the EPG and the UIP, may be of interest to the user. Once corresponding metadata is available from an NCP 300 via the PBTV Web Site 200 for a program 410 that has been recorded, the system 10 queries the now available metadata based upon the UIP, and "crunches" the previously recorded bitstream by removing from the STB 100 storage device 140 any "uninteresting" portions of the bitstream, such as advertisements for example. The exact portions of the previously stored bitstream to be erased are determined by matching the PTS information in the metadata with the PTSs in the encoded video bitstream, as has been discussed This approach of initially recording an entire program and then later "crunching" that program, permits a time lag between when a program 410 is broadcast, and when the program-related metadata is available. According to yet another aspect of the present invention, where metadata cannot be guaranteed to be available concurrently with programming content 410, delivery of the programming content 410 to the display device 160 can be buffered or delayed, using the STB for example, for a suitable temporal duration, such as 5 seconds for example, so as to allow an opportunity for the metadata to become available.

According to another aspect of the present invention, another approach to video "crunching" is graduated removal. With this technique, rather than completely removing "uninteresting" portions of the stored, compressed bitstream, these portions are transcoded to a lower bitrate, so that they take up less space in storage device 140. User prioritization on video content, expressed in the UIP, can act as a guide for this graduated removal process. Graduated removal can also be utilized when the available capacity of storage device 140 approaches a given threshold, in order to free-up space so that additional compressed audio/visual content can be recorded for example.

The recording followed by "crunching" of a stored video can be performed either serially or in a pipelined fashion, depending on the amount of lag time between program broadcast 410 and metadata availability from the NCP 300. Following the video crunching process, in order to more efficiently use available storage space of the device 140, de-fragmentation as is conventionally understood can be is performed on the remaining compressed video bitstreams so as to achieve more efficient packing of the "crunched" programming content.

UIPs can reside in either the user's STB 100 or PBTV Web Site 200. The EPG can be obtained as part of the digital video broadcast 410, or from the PBTV Web Site 200, and can be stored at the PBTV Web Site 200, or in the user's STB 100. The computations to control automated recording can be performed at the PBTV Web Site 200, or in the user's STB 100. Further, appropriately sifted metadata can be batch downloaded to the user's STB 100 or reside at the PBTV Web Site 200 and be accessed on an as needed basis by the STB 100. Related multimedia

content can also be pre-downloaded to the user's STB 100, or downloaded on-the-fly

at time of video playback from the web site 200.

Although the invention has been described and pictured in a preferred form

with a certain degree of particularity, it is understood that the present disclosure of

5   the preferred form, has been made only by way of example, and that numerous

changes in the details of construction and combination and arrangement of parts may

be made without departing from the spirit and scope of the invention as hereinafter

claimed. It is intended that the patent shall cover by suitable expression in the

appended claims, whatever features of patentable novelty exist in the invention

10   disclosed.

Claims

We Claim:

1.   A system (10) for selectively presenting portions of at least broadcast quality audio/visual content (410) from at least one broadcaster via a broadcast network and portions of user-interactive content (310) accessible via a computer network based upon a user's interests and using a presentation device (160), said system (10) comprising:

an input device (170) for providing data indicative of at least one user interest;

at least one web site (200) for providing access to data (210) indicative of said audio/visual content;

a plurality of memory locations storing computing instructions for identifying said portions of said audio/visual content using said data indicative of said at least one user interest and data indicative of said audio/visual content; and,

a storage device (140) for recording said identified portions of said audio/visual content.

2.   The system of Claim 1, wherein said instructions utilize time stamps (PTS) to identify said portions of said audio/visual content (410).

3.   The system of Claim 1, further comprising a set top box (100) which includes said storage device (140) and a processor (120) for executing said instructions, and said plurality of memory locations.

4.   The system of Claim 3, wherein said storage device (140) records said at least one other portion than said select portion of said audio/visual content, and said processor (120) and storage device (140) erase said at least one other portion based upon said data indicative of said audio/visual content.

5.   A method for identifying at least a portion of high quality audio/visual content being of potential interest to a user and available via a communications network, said method comprising:

        storing data indicative of at least one user interest;

        receiving data indicative of scheduling information for said audio/visual content;

        receiving data indicative of said audio/visual content; and,

        automatically identifying select portions of said audio/visual content dependently upon said stored data indicative of said at least one user interest using said data indicative of scheduling information and data indicative of said audio/visual content.

6.   The method of Claim 5, further comprising:

receiving data indicative of user-interactive content corresponding to said audio/visual content and being available via a second network; and,

automatically identifying select portions of said user-interactive content using said data indicative of at least one user interest and data indicative of said user-interactive content;

wherein said first network comprises a broadcast network and said second network comprises a computer network.

7.   The method of Claim 5, further comprising: storing at least a portion of said audio/visual content so as to be accessible to said user at a rate sufficient to enable real-time presentation of said audio/visual content.

8.   The method of Claim 7, further comprising selectively deleting at least a portion of said stored audio/visual content.

9.   A device (100) for selectively presenting select portions of audio/visual broadcasts (410) received via a broadcast network (400) and being of potential interest to a user, said device (100) comprising:

at least one input (170) for receiving data indicative of at least one user interest;

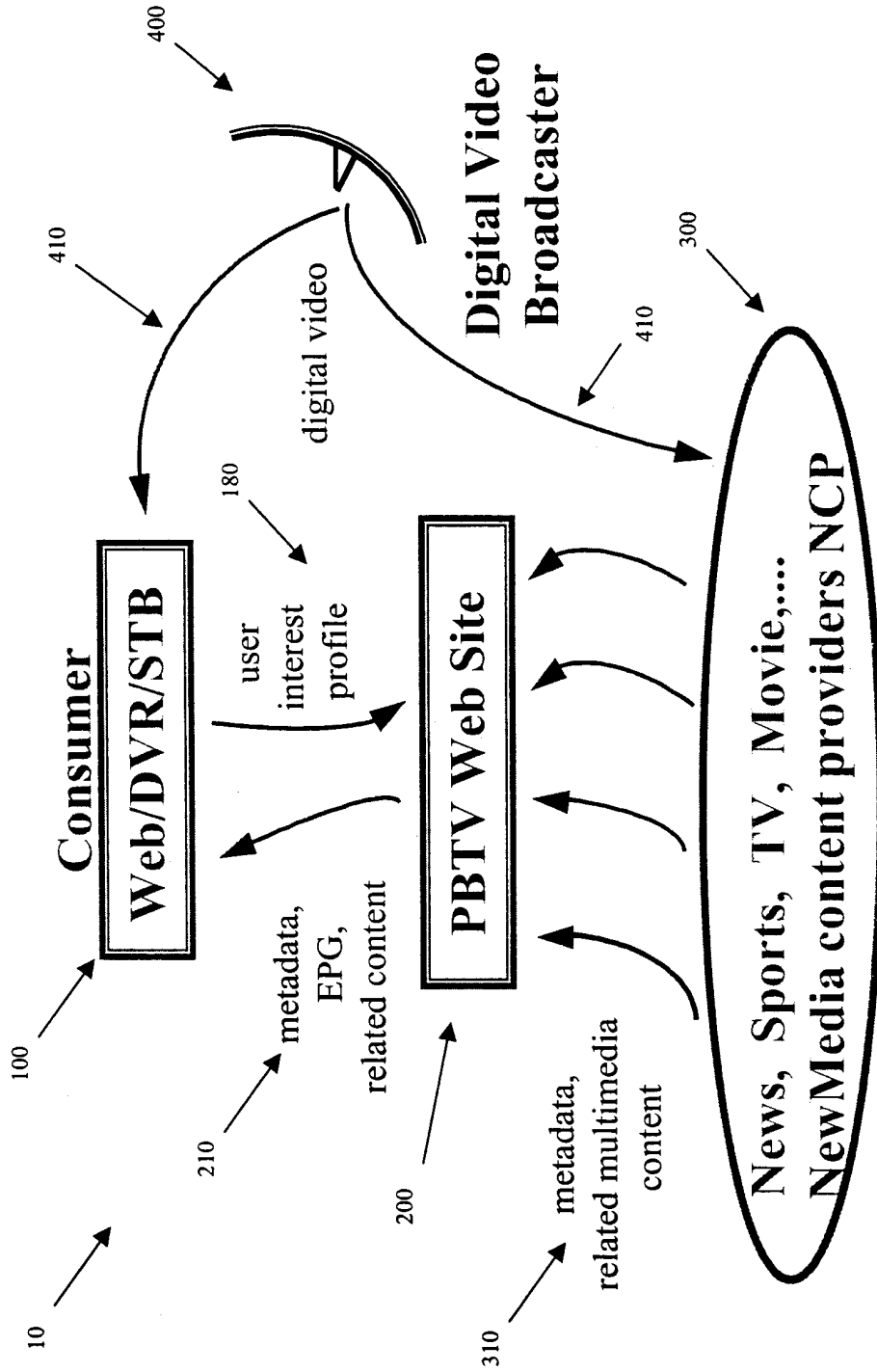a decoder (110) for receiving said audio/visual broadcasts (410);

a modem (130) for receiving data associated with said audio/visual broadcasts (410) via a computer network (200);

at least one memory device (140) for storing at least said select portions of said audio/visual broadcasts (410); and,

at least one processor (120) electrically coupled to said decoder (110), modem (130) and memory device (140), and for identifying said select portions of said audio/visual broadcasts (410) using said received data associated with said audio/visual broadcasts (410).

10.   The device of Claim 5, further comprising at least one processor memory storing instructions for causing said processor (120) to selectively delete fractions of said stored audio/visual broadcasts (410) from said at least one storage device (140) using said received data indicative of said audio/visual broadcasts (410).

Fig. 1

Consumer

Web/DVR/STB

user
interest
profile

metadata,
EPG,
related content

PBTV Web Site

metadata,
related multimedia
content

digital video

**Digital Video
Broadcaster**

**News, Sports, TV, Movie,....
NewMedia content providers NCP**

400

410

180

100

210

200

310

10

300

410

Page 1 of 2
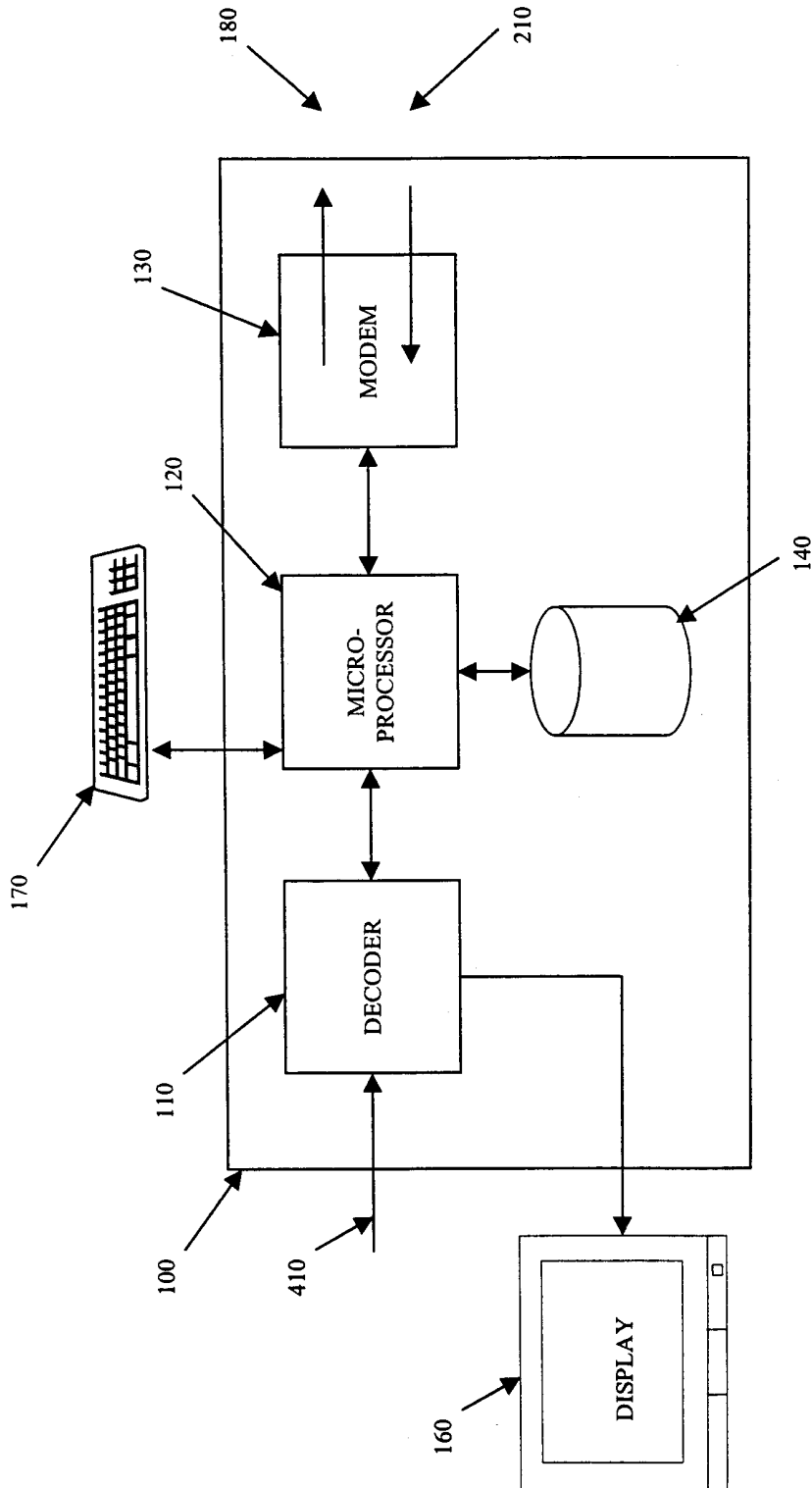
Fig. 2

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INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   H04N5/445   H04N5/00

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)
IPC 7   H04N   G06F

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 practical, search terms used)

PAJ, WPI Data, EPO-Internal

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| X | Further documents are listed in the continuation of box C. | X | Patent family members are listed in annex. |

° Special categories of cited documents :

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

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
1 February 2001	07/02/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Fuchs, P

Form PCT/ISA/210 (second sheet) (July 1992)

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