

(21) Application No: 1321721.1

(22) Date of Filing: 09.12.2013

(71) Applicant(s):
ZebraLogik Ltd.
37 Alexandra Road, EPSOM, Surrey, KT17 4DA,
United Kingdom

(72) Inventor(s):
Leo Sarsam
Marios Lambis

(74) Agent and/or Address for Service:
Withers & Rogers LLP
4 More London Riverside, LONDON, SE1 2AU,
United Kingdom

(51) INT CL:
G06F 17/30 (2006.01) H04N 1/00 (2006.01)

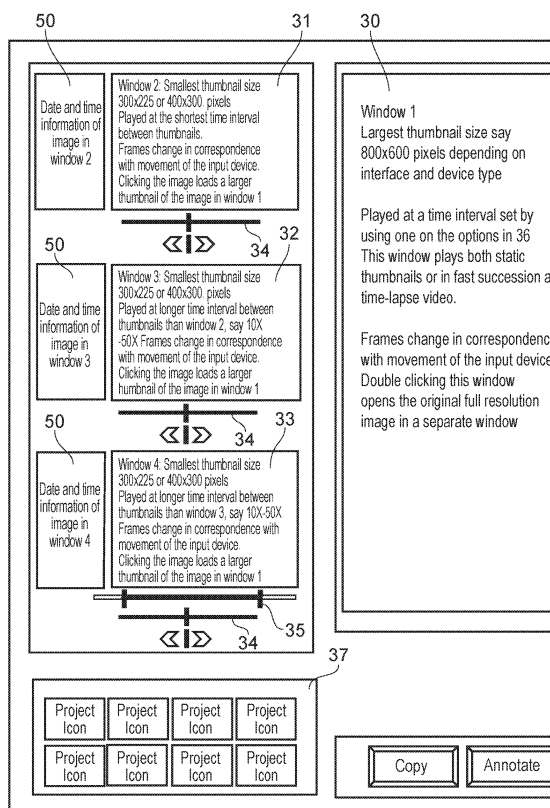
(56) Documents Cited:
EP 2083564 A2 EP 2073110 A1
WO 2008/112759 A1 US 20090164944 A1
US 20080301584 A1
KR 1020070083026

(58) Field of Search:
 INT CL **G06F, G11B, H04N**
 Other: **EPODOC, WPI**

(54) Title of the Invention: **Image management system**
 Abstract Title: **Displaying a sequence of thumbnails at a rate controlled by an input device**

(57) A method of processing and reviewing images comprising receiving a sequence of chronologically captured images, transforming the sequence of images into a corresponding sequence of thumbnails, and displaying the sequence of thumbnails via a user interface at a rate controlled by an input device. The rate controlled by the input device may include the speed and direction of the sequence of thumbnails. The input device may be the mouse of a computer comprising a wheel feature, wherein displaying the sequence of thumbnails is controlled by the motion of the wheel feature. The sequence of chronologically captured images may be from a sequence of time lapsed digital photographs of a scene, or video frames in a video.

FIG. 3



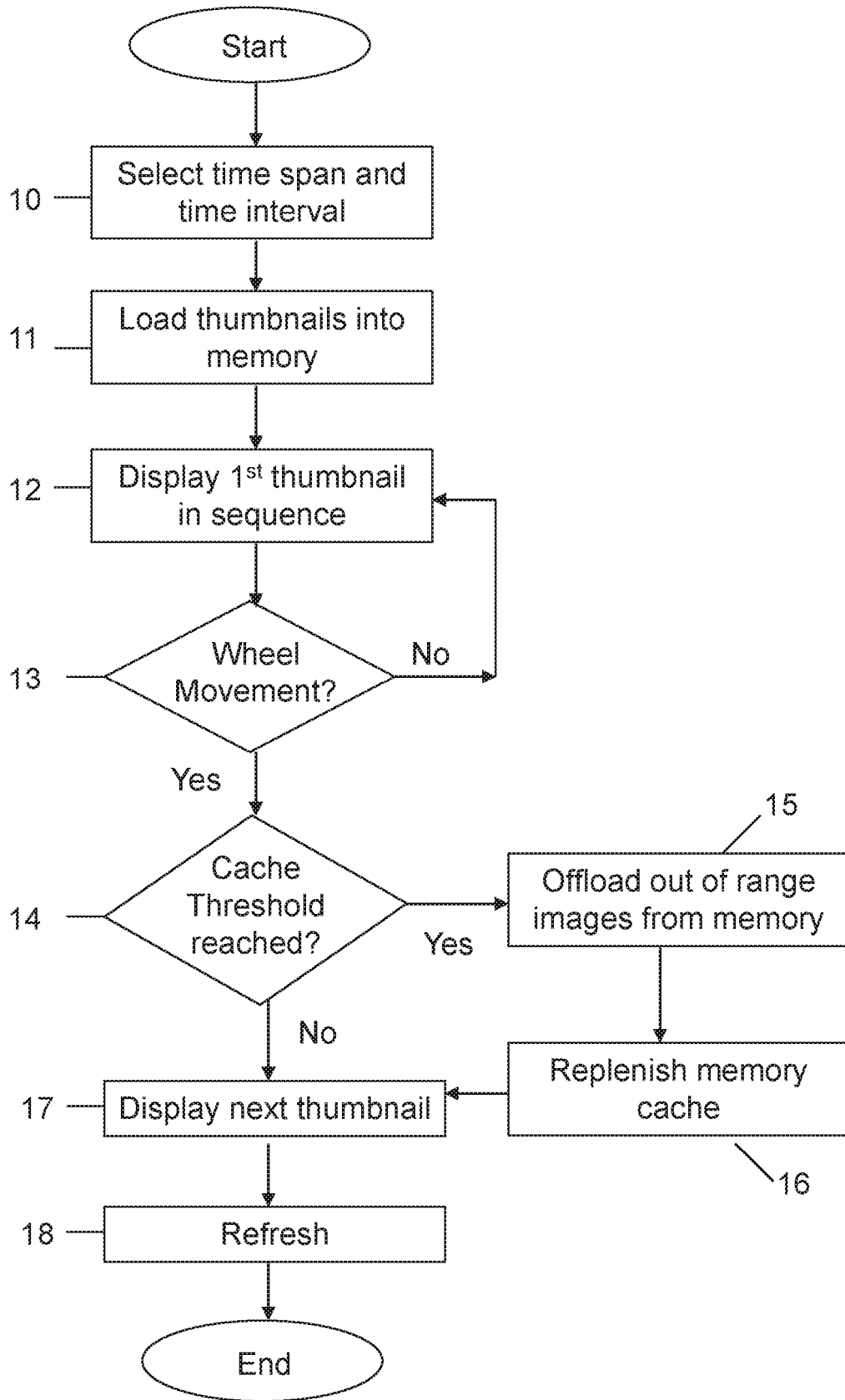


FIG. 1

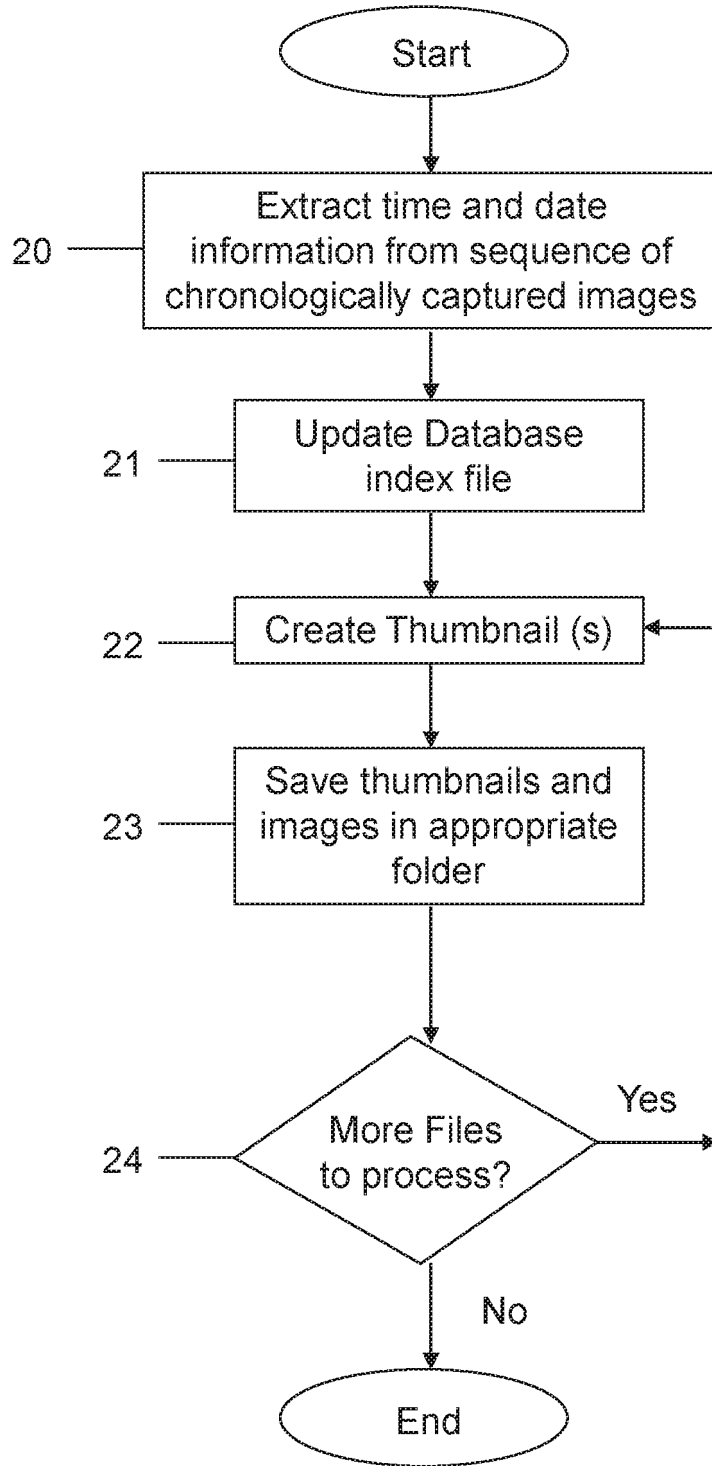


FIG. 2

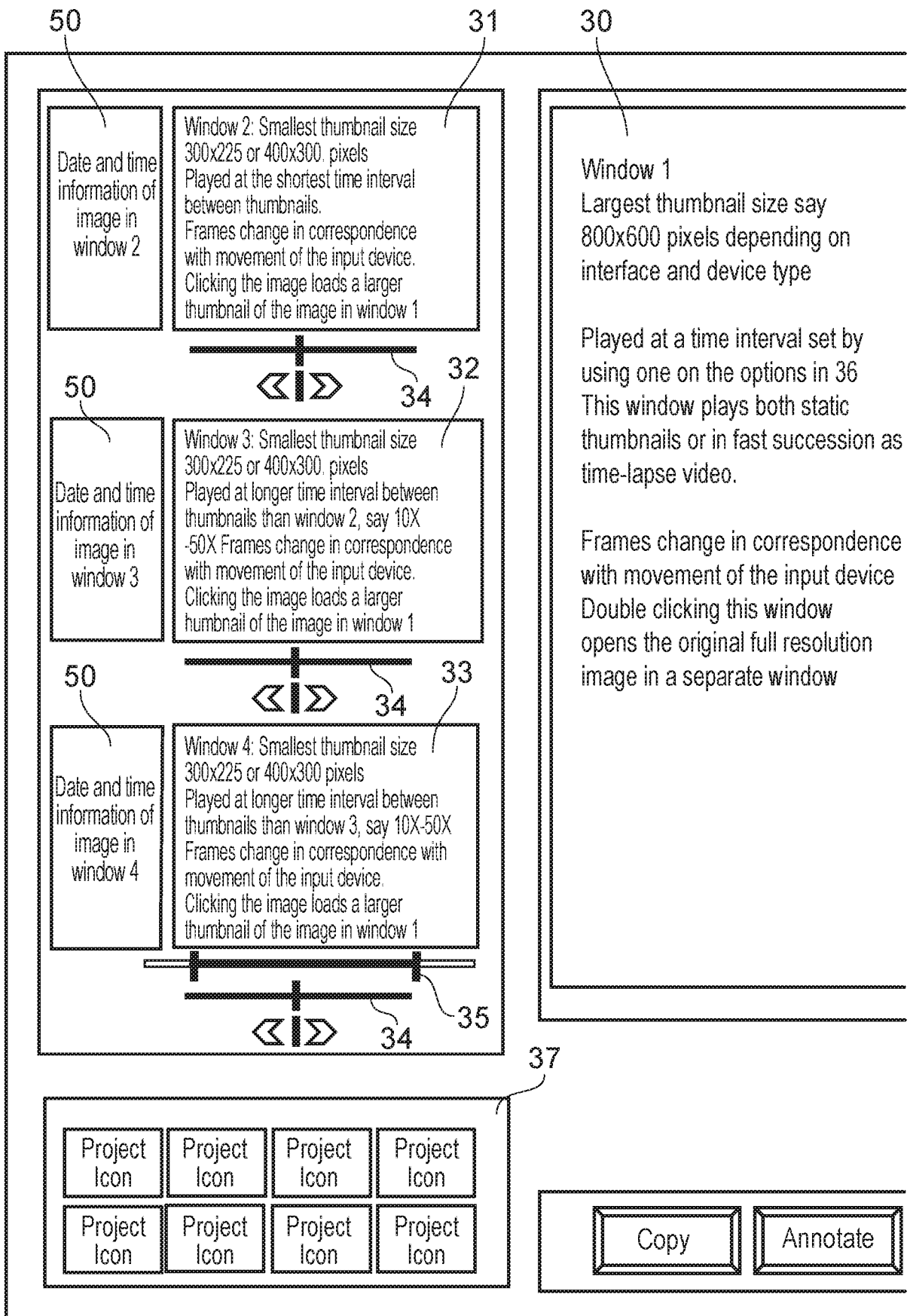


FIG. 3

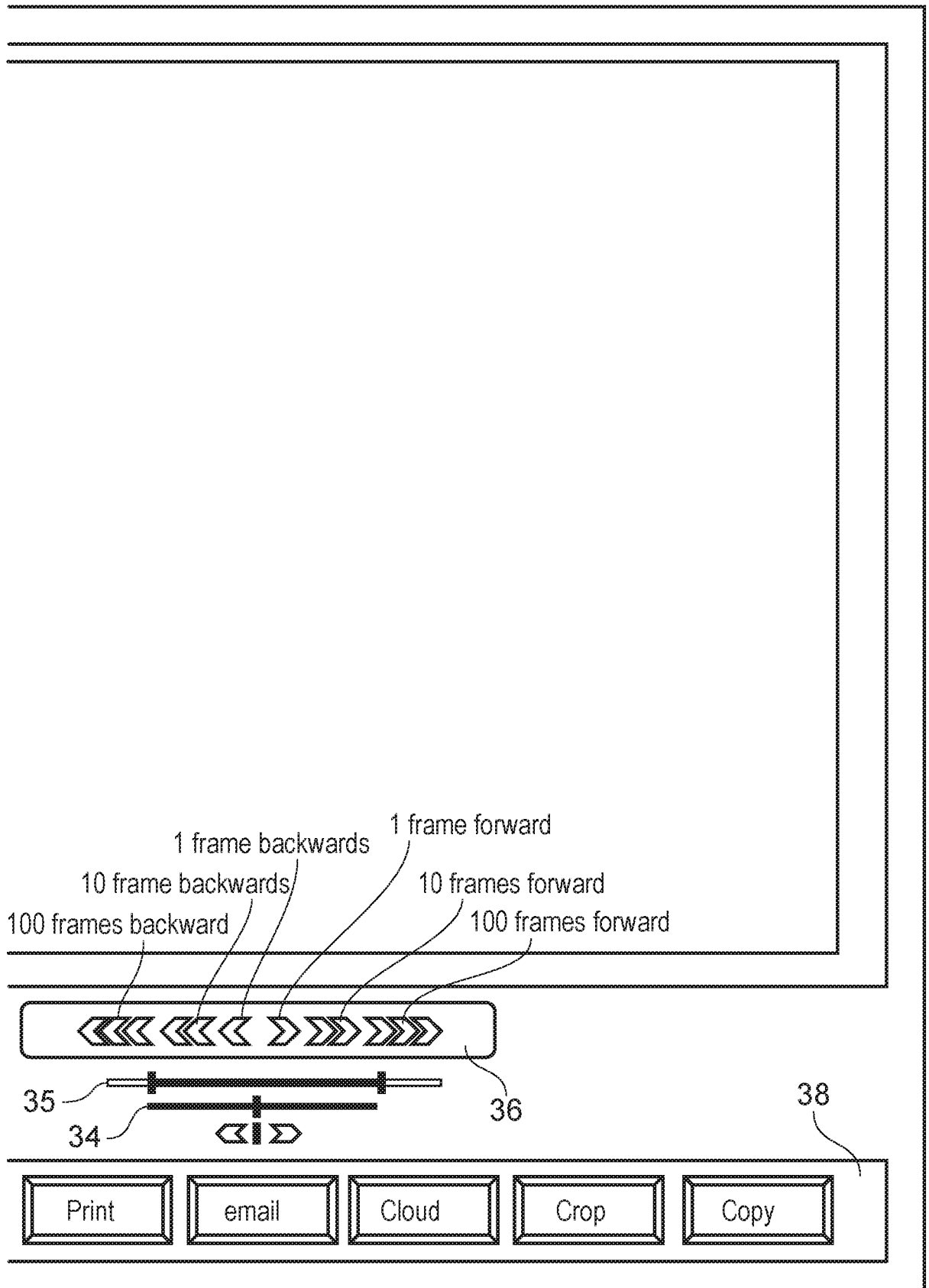


FIG. 3 (continued)

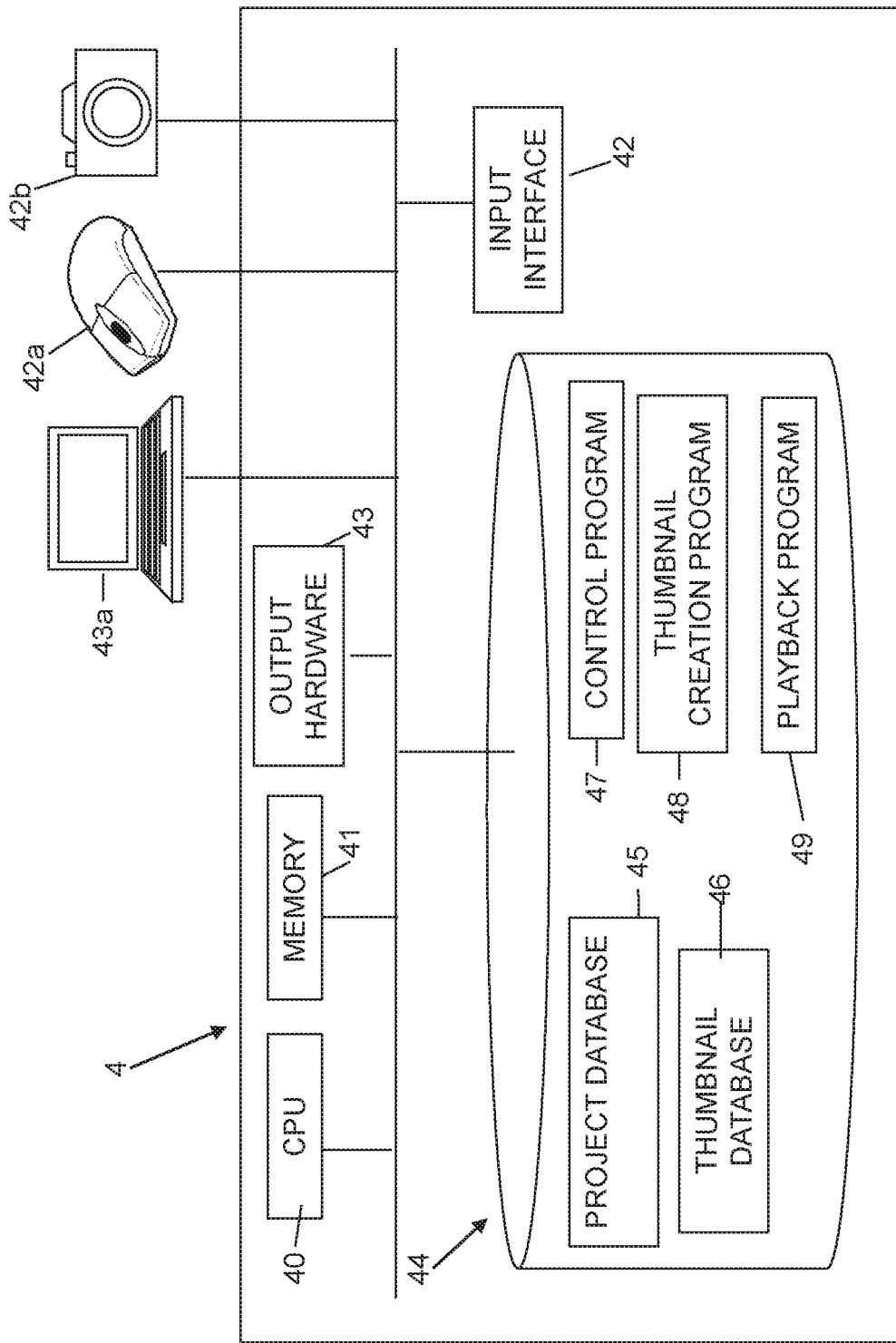


FIG. 4

Image Management System

Technical Field

The present invention relates to systems and methods of image management. In particular, the present invention relates to an algorithm used to process and manage
5 large numbers of image files.

Background to the Invention and Prior Art

Image management applications for organising digital images are a commonly known type of software application. Such software may be used to organise images into folders, albums or collections, and allow the user to perform multiple actions on the
10 images, for example, edit, resize, email, or print the images. However, such software applications are unsuited to manage very large numbers of image files, for example, tens of thousands or more of images. Typically, in order to manage and process large volumes of image files, high-powered image processing equipment and image retrieval systems are required. The systems required for such quantities of image files
15 cannot be operated on normal commercial computers such as PCs, laptops, tablets or handheld devices.

Summary of the Invention

Embodiments of the present invention address the above noted problems by providing a system and method for managing large numbers of image files that may be operated
20 on any normal computer. The present invention automatically creates a database of information and links all of the images in a format that makes retrieval, reviewing, and searching large collections of images a manageable task. The present invention may be used in a number of industries and services that regularly produce large numbers of images for purposes such as the monitoring progress, recording specific
25 events and any other application that may benefit from identifying trends and patterns of change in relation to time. For example, security services may use the system to monitor a specific location with a view to documenting any incidents that occur on the monitored premises, or a construction company may use the system to monitor the progress and events occurring on a building site.

The present invention comprises two stages; a 'Registration and Import' stage and a 'View and Search' stage. The registration and import stage extracts the data and time information relating to image files from a large number of images, wherein the time and date information may, for example, already be embedded in the image file as metadata, for example, exif (exchangeable image file format) data in the case of a still image or provided via an electronic timestamp on the image, for example, as an image timestamp overlaid on the image data in the case of a video frame. The system then automatically creates one or more thumbnails from each image, saves the thumbnails in a database and links the thumbnails with the corresponding image. In the View and Search stage, the user inputs a search criteria and the system loads blocks of thumbnails corresponding to this search criteria from the database into the computer memory. The system may then display thumbnails relevant to the search criteria on a user interface, allowing the user to view and search the images by scrolling between the thumbnails in quick succession using an input device, for example, the wheel of the computer's mouse, or any other input device. As a result, the thumbnails are displayed in harmony with the movement, speed and direction of the input device. Furthermore, the thumbnails that are displayed may cover varying periods of time with different intervals of time between successive images. For example, the system may display thumbnails corresponding to images captured over a six week period with 24 hours passing between each image, or images captured over a one day period with one hour passing between each image. The system also provides an auto playback feature which plays back sequences of thumbnails with varying time intervals and at varying speeds which may be selected by the user.

One aspect of an embodiment of the present invention provides a system for the processing and reviewing of images, comprising an input device, a visual output device, a processor, and a computer readable medium. The computer readable medium storing one or more instruction(s) is arranged such that when executed the processor is caused to receive a sequence of chronologically captured images, transform the sequence of chronologically captured images into a corresponding sequence of thumbnails, and display the sequence of thumbnails via a user interface provided by the visual output device, at a rate controlled by the input device.

Preferably, the sequence of chronologically captured images comprises a chronological sequence of images of at least part of a common scene. That is to say, the plurality of images depict one scene over a period time, capturing any changes occurring within the scene as time passes. The scene may be any area that requires monitoring, for example, a construction site, a building, a road, a monument or any other geographical location. The scene may have items, components or “actors” contained therein, which may move within the scene. For example, the scene may be of an area in which vehicles, equipment or people may move around therein. In this respect, despite there being movement within the scene, or part thereof, for the purposes of embodiments of this invention it is still the same scene that is being imaged. The sequence of chronologically captured images may then be displayed in quick succession, and any differences in the scene between subsequent images can be easily identified by the user. The differences in the scene between images may show an event or incident occurring at the monitored scene, or a trend or pattern of change. For example, the differences in the scene between images may show progress on a construction site. The time and date information associated with the image may then be used to determine when exactly the change occurred.

Preferably, the rate controlled by the input device includes the speed and the direction of the sequence of thumbnails. The input device may be the mouse of a computer comprising a wheel feature, wherein displaying the sequence of thumbnails is controlled by the motion of the wheel feature. The input device may also include, but not limited to, moving the computer mouse in any direction, using keyboard cursors or other assigned keys, tracker ball devices, or the swipe action or any other gesture when using a touch sensitive screen.

In one preferred embodiment, the sequence of chronologically captured images is a selection from a sequence of time lapsed digital photographs of a scene.

In an alternative embodiment, the sequence of chronologically captured images is a selection of video frames in a video.

In another embodiment, the received sequence of chronologically captured images represents a sample of images captured over a first period of time, wherein the

processor is further arranged to receive the first period of time via the user interface. Preferably, the first period of time is at least one of 30 seconds, a minute, an hour, a day, a week, a month, or a year.

5 In another embodiment, the processor is further arranged to select a second period of time, wherein the second period of time defines the rates at which the sample of images are captured within the first period of time. Preferably, the second period of time is at least one of 10 seconds, a minute, an hour, a day, a week, or a month.

10 In a further embodiment, the user interface includes a calendar interface arranged to permit selection of the sequence of chronologically captured images. This allows the user to view and search through the sequence of chronologically captured images via the calendar interface, wherein the calendar interface may have a resolution of minutes, days, months or years, or any other time period suitable for the type of scene that is being displayed by the sequence of chronologically captured images. For example, if the invention is used to display images of a construction environment
15 where a project takes months and years to complete, it may be suitable for the calendar to have a resolution of days. The calendar interface may then provide the user with a selection of days, wherein each selection contains all of the images taken on that day. As another example, if the invention is used to search through the frames of a surveillance video, a resolution of minutes may be more suitable, wherein the
20 calendar interface provides the user with a selection of minutes, wherein each selection contains all of the images taken during that minute.

25 In one preferred embodiment, the user interface includes a plurality of controls arranged to select the first and second period of time, wherein the plurality of controls may be further arranged to select the speed and/or direction that the sequence of thumbnails is displayed.

In another embodiment of the present invention, the transforming the sequence of chronologically captured images includes extracting date and time information from the exif information embedded in the sequence of chronologically captured images.

In a further embodiment, the transforming the sequence of chronologically captured images includes performing a JPEG compression process, wherein the sequence of thumbnails may comprise a plurality of compressed images. Preferably, the compressed images are at least one of 200x300 pixels in size, 300x400 pixels in size
5 or 600x800 pixels in size. It should be appreciated, however, that the compressed images may be any other suitable size and aspect ratio.

According to one embodiment, the sequence of chronologically captured images and the sequence of thumbnails are stored in a database folder structure.

In a preferred embodiment, the sequence of chronologically captured images are
10 received from an image capture device, and the sequence of chronologically captured images may include at least one thousand chronologically captured images.

In one embodiment, the processor is further arranged to display the sequence of thumbnails via an automatic video playback process.

According to another embodiment, a thumbnail from the sequence of thumbnails may
15 be selected by the input device and the corresponding image may be displayed on the user interface, wherein at least one of a plurality of functions are performed on the displayed image. Preferably, the plurality of functions includes at least one of copying the image, editing the image, printing the image, or sending the image by email.

20 In another embodiment, the user interface is further arranged to display chronological information pertaining to the particular image being displayed. This information is thus refreshed in harmony with the change of image displayed.

A second aspect of an embodiment of the present invention provides a method of
25 processing and reviewing images, comprising receiving a sequence of chronologically captured images, transforming the sequence of chronologically captured images into a corresponding sequence of thumbnails, and displaying the sequence of thumbnails via a user interface provided by the visual output device, at a rate controlled by an input device.

Brief Description of the Drawings

The present invention will now be described by way of example only, and with reference to the accompanying drawings in which:

5 Figure 1 is a flow diagram illustrating an algorithm according to the first stage of the present invention implemented to review and search image files that are stored in a database;

Figure 2 is a flow diagram illustrating an algorithm according to the second stage of the present invention implemented to update and maintain a database of image files;

10 Figure 3 illustrates an example of a user interface according to one embodiment of the present invention; and

Figure 4 a block diagram illustrating apparatus according to one embodiment of the present invention.

Detailed Description of the Drawings

15 The present invention provides a method and system for processing and managing large collections of image files such that they are placed in a format that makes retrieving, reviewing and searching images much more manageable and practical. The system transforms a sequence of chronologically captured images, for example, video frames in a video or a sequence of time lapsed digital photographs, into pre-
20 structured and resized thumbnails in order to display large numbers of images in almost instant succession using an input device, for example, the mouse wheel of a computer, to move forwards and backwards between thumbnails.

25 Firstly, date and time information is obtained in relation to each image. This may be done in a number of ways depending on the type of image file. For example, in the case of still images, the time and date information may be extracted from the embedded exchangeable image file format (exif) information in each image. For a video, the time and date information may be obtained from a timestamp overlaid on

the image data. Each frame of the video may have its own timestamp that the system may read or, alternatively, the system may use the timestamp for the beginning of the video or the end of the video to dynamically calculate the time and date information of a frame within the video based on how far into the video that frame is, in which
5 case the timestamp used may be stored in the file name of the video.

Once the time and date information has been obtained, the images are made into thumbnails and are uploaded into the memory of the computer performing the system to be displayed on a specific area of a user interface. Since a pre-determined amount of thumbnails, rather than the original image files are used, large numbers of images
10 may be loaded into the memory at any one time. As a result, the system may be performed on any normal computer or laptop and does not require powerful computer systems designed for data intensive applications.

The thumbnails may then be displayed in succession and in harmony with the speed and direction with which the mouse wheel or other input device is moved. By
15 selecting only the portion of the image that is of interest and refreshing this portion only, the smoothness of transition between thumbnails is further enhanced. The time difference between the images shown by each individual thumbnail (as read from the indexing files that are part of the image database created for the sequence of chronologically captured images) can be adjusted to suit the user's search needs. For
20 example, the time interval may be daily, hourly or weekly or any other time interval depending on the resolution of the specific device that captured the images. That is to say, the amount of time that passes between captured images shown by successive thumbnails can be altered.

Figure 4 illustrates an example of a general computer system 4 that may form the
25 platform for embodiments of the invention. The computer system 4 comprises a central processing unit (CPU) 40, a working memory 41, and input interface 42 arranged to receive control inputs from a user via an input device 42a such as a keyboard, mouse, or other controller, and further inputs from an image capture device 42b such as a digital camera, video camera or other device capable of capturing an
30 image. The computer system 4 also comprises output hardware 43 arranged to provide output information to the user via a user interface, as illustrated by Figure 3,

which is displayed on an output device that may include a visual display unit 43a such as a computer screen, television or other visual display.

The computer system 4 is also provided with a computer readable storage medium 44 such as hard disk drive (HDD), flash drive, solid state drive, or any other form of
5 general-purpose data storage, upon which stored data 45, 46, and various control programs are arranged to control the computer system 4 to operate in accordance with embodiments of the present invention. For example, a control program 47 may be provided and arranged to provide overall control of the system to perform the
10 receive user inputs and launch other programs to perform specific tasks. The other programs under the control of the control program 47 may include a thumbnail creation program 48 and a playback program 49.

The computer system 4 is capable of performing the method and system for processing and managing large collections of image files as described by the present
15 invention and illustrated by the steps of Figures 1 and 2, which are described below by way of example.

The present invention comprises two stages; a 'Registration and Import' stage and a 'View and Search' stage. Figure 2 illustrates the 'Registration and Import' stage that may be implemented by the computer system 4 to update and maintain the thumbnails
20 stored in the computer system 4 according to an embodiment of the present invention. This registration and import of images may start by creating a new project (for example, video footage captured by a security camera on a building site) or add new images to an existing project already stored in the computer system 4. Firstly, an image capture device 42b, for example, a security camera, may be connected to the
25 computer system 4, and the chronologically captured images uploaded to the memory 41 for selection. Once the images to be used have been selected, a database folder structure 45 which serves as the accessing database is created together with a corresponding indexing file in a searchable format. For example, simple text format (TXT) or extensible mark-up language (XML). Alternatively, if the images are to be
30 added to an existing project, the database folder structure 45 previously created for that project is chosen.

The date and time information for each image is then read from the images uploaded to the memory 41 and the time and date information for each image is extracted (step 20). A shortcut for each image is made in the database folder structure 45, and the image's time and date information along with the shortcut are registered in the database index file (step 21). The control program 47 may then launch a thumbnail creation program 48 to create a thumbnail for each image (step 22), wherein each thumbnail is linked with the corresponding shortcut and saved in the appropriate folder (step 23). The thumbnails may be a variety of sizes and aspect ratios, for example, the thumbnails may be 200x300, 300x400 or 600x800 pixels in size. The file size of a thumbnail is optimised by selecting a JPEG compression ratio, whilst downsampling the JPEG images maintains the resolution quality. This is repeated until no more image files are left to be processed (step 24), and all of the processed images have been tagged as processed and added to the database folder structure 45. Once this is completed, the user may be notified via the output device 43a and the computer system 4 may move on to the 'View and Search' stage.

Figure 1 illustrates the algorithm that may be used to implement the 'View and Search' stage according to a further aspect of an embodiment of the present invention. The user inputs the search criteria via the user interface as shown in Figure 3, indicating the time span and time interval that they wish to view and search (step 10). That is to say, the user may select the period of time over which images were captured, and the amount of time elapsed between successive images. For example, the user may wish to view thumbnails showing images taken during one specific month with one day passing between consecutive images, or thumbnails showing images taken during one specific day and sequentially showing images that were taken each hour or every 10 minutes.

The computer system 4 may then load blocks of thumbnails 46 into the computer memory (step 11), wherein the number of thumbnails in each block 46 corresponds to the search criteria and displays the first thumbnail in the sequence (step 12) on the user interface, as shown in Figure 3. Once the first thumbnail in the block 46 is being displayed, the control program 47 may launch a playback program 49 which allows the user to view and search the uploaded block of thumbnails 46. Using the input

device 42a, for example, the mouse of a computer, the cursor may be held over a designated area of the user interface, and the wheel of the mouse 42a may be used to scroll or flick successively between thumbnails (step 13). It should be noted, however, that the movement of the thumbnails may be controlled by a variety of input devices, including but not limiting to, different keys of a keyboard, touch sensitive screens, other movements of a computer mouse and any other device capable of providing user inputs. Preferably, the designated area of the user interface is the portion displaying the image thumbnail. The user interface displays the thumbnails in quick succession (step 17) in relation to the movement of the mouse wheel 42a (forwards or backwards). Since the blocks of thumbnails 46 are already in the memory 41, they can be displayed almost instantaneously and refreshed in very quick succession (step 18). As a result, when the mouse wheel 42a is rotated, the thumbnails are displayed in a way that simulates a time lapse movie, wherein such time lapse movie has a variable playback speed controlled by the movement of the mouse wheel 42a. For example, the thumbnails may be played back (refreshed) at ten frames per second maintaining fully proportional and synchronous harmony with the rotation of the mouse wheel 42a.

Before exhausting the cached thumbnails loaded in the computers memory 41, that is, before a cache threshold has been reached (step 14), thumbnails that have become out of range are cleared from the memory 41 (step 15) to keep the application running smoothly and without the need to cache to a Hard Disk Drive (HDD). As the threshold is approached, more thumbnails are read from the database folder 45 in controlled bursts in order to replenish the memory cache (step 16). By managing the memory cache in this way, as the user scrolls through the thumbnails, the computer system 4 appears to display an apparently unlimited number thumbnails over the selected time span.

When a thumbnail of interest is found, the user can double click on it with the cursor of the mouse 42a, and the corresponding image file in its original full size version may be opened from the project database folder 45 and displayed via the user interface. This allows further analysis of the image, for example, by zooming into portions of the image to view particular details. Depending on which section of the

display is selected, the user interface may also perform a number of different functions, as described in further detail below. For example, the computer system 4 may load a sequence of every 10th thumbnail for playback, thus stretching time in and out to allow the user to easily cover variable time spans.

5 Figure 3 illustrates by way of example a user interface 3 that may be used in accordance with embodiments of the present invention. The user interface 3 may comprise four windows for displaying thumbnails, wherein window 1 (30) acts as the main viewing window and windows 2, 3 and 4 (31-33) operate as course search windows showing different thumbnail sequencing. That is, the windows display
10 thumbnails over varying time spans and time intervals. When the user turns the mouse wheel 42a with the cursor over any of the windows, thumbnails are displayed in harmony with the speed and direction of the mouse wheel under the user's control.

For example, window 2 (31) may show a sequence of chronologically captured images taken on a specific day, for example, the day upon which the system is being
15 used, such that when the user turns the mouse wheel 42a, window 2 (31) scrolls between successive thumbnails showing images that were taken during the specified day. Window 3 (32) may display thumbnails showing one image taken each day over a specified time span such that, as the mouse wheel 42a is turned, window 3 (32) displays a sequence of chronologically captured images that were taken 24 hours
20 apart. Window 4 (33) may then display thumbnails showing chronologically captured images in any other intervals of time, for example, images captured weekly over a twelve month period. Below window 4 (33), a control bar 35 may be provided in order to set the time span or time interval over which the thumbnails are displayed. For example, weekly images captured over a four month period, or hourly images
25 captured over a two day period.

A further feature of the system is an auto video playback feature, wherein the control program 47 launches the playback program 49 which is further arranged to automatically playback a sequence of thumbnails such that the user is able to view a
30 sequence of thumbnails without using the input device 42a to view successive thumbnails. Each of the windows 2, 3 and 4 (31-33) may be provided with a speed control bar 34 to allow the user to control how fast the auto playback feature runs,

wherein the control bar 34 may allow the sequence of thumbnails to be played forwards or backwards in time and with varying speeds.

The user may click on a thumbnail in any of windows 2, 3 or 4 (31-33), and a larger version of the thumbnail will be loaded and displayed in window 1 (30). As described previously, the user may turn the mouse wheel 42a with the cursor over the window and the thumbnails will be displayed in harmony with the speed and direction of the mouse wheel 42a. Once a thumbnail of interest has been found, the user may select on the thumbnail in window 1 (30), and the original full resolution image is read from the memory 41 and opened for closer inspection by the user, wherein the user may zoom in on areas of interest within the image. Window 1 (30) may also be provided with a slider bar 35 to control the time span and time interval 35 of the thumbnails being displayed and a slider bar 34 to control the speed of the auto playback feature. Furthermore, a collection of video playback buttons 36 may be provided as an alternative way of controlling the interval at which a sequence is playing, for example, intervals of 10 minutes, one hour, one day, or one week being played forwards or backwards in time.

The user interface may also be provided with a number of other features. A project selection window 37 may be provided to display the projects that are saved in the system 4. The user may select the project to be searched, and the thumbnails for images relating to the chosen project will be loaded from the memory 41 from the database 45 and displayed by windows 1-4 (31-33). Additionally, a collection of buttons 38 may be included that allow different functions to be applied to an image of interest. For example, the buttons 38 may allow the user to make a copy of the image, annotate the image, print the image, send the image by email, crop the image or copy the image to a clipboard in order to incorporate image with another document.

It should be appreciated that various other components and systems would of course be known to the person skilled in the art to permit the computer system 4 to operate.

Claims

1. A system for the processing and reviewing of images, comprising:
 - an input device;
 - a visual output device;
 - 5 a processor; and
 - a computer readable medium, the computer readable medium storing one or more instruction(s) arranged such that when executed the processor is caused to:
 - (i) receive a sequence of chronologically captured images;
 - (ii) transform the sequence of chronologically captured images into a
 - 10 corresponding sequence of thumbnails; and
 - (iii) display the sequence of thumbnails via a user interface provided by the visual output device, at a rate controlled by the input device.

2. A system according to claim 1, wherein the sequence of chronologically captured images comprises a chronological sequence of images of at least part of a common
- 15 scene.

3. A system according to claims 1 or 2, wherein the rate controlled by the input device includes the speed and the direction of the sequence of thumbnails.

4. A system according to any preceding claim, wherein the input device is the mouse of a computer comprising a wheel feature, and wherein displaying the sequence of
- 20 thumbnails is controlled by the motion of the wheel feature.

5. A system according to any preceding claim, wherein the sequence of chronologically captured images is a selection from a sequence of time lapsed digital photographs of a scene.

6. A system according to any of claims 1 to 4, wherein the sequence of
- 25 chronologically captured images is a selection of video frames in a video.

7. A system according to any preceding claim, wherein the received sequence of chronologically captured images represents a sample of images captured over a first

period of time, wherein the processor is further arranged to receive the first period of time via the user interface.

8. A system according to claim 7, wherein the first period of time is at least one of 30 seconds, a minute, an hour, a day, a week, a month or a year.

5 9. A system according to claims 7 or 8, wherein the processor is further arranged to receive a second period of time via the user interface, wherein the second period of time defines the rate at which the sample of images are captured within the first period of time.

10 10. A system according to claim 9, wherein the second period of time is at least one of 10 seconds, a minute, an hour, a day, a week or a month.

11. A system according to any of claims 7 to 10, wherein the user interface includes a plurality of controls arranged to receive the first and second period of time.

15 12. A system according to claim 11, wherein the plurality of controls are further arranged to select the speed and/or direction that the sequence of thumbnails is displayed.

13. A system according to any preceding claim, wherein the user interface includes a calendar interface arranged to permit selection of the sequence of chronologically captured images.

20 14. A system according to any preceding claim, wherein the transforming the sequence of chronologically captured images includes extracting date and time information from the exif information embedded in the sequence of chronologically captured images.

25 15. A system according to any preceding claim, wherein the transforming the sequence of chronologically captured images includes performing a JPEG compression process.

16. A system according to claim 15, wherein the sequence of thumbnails comprise a plurality of compressed images.

17. A system according to claim 16, wherein the plurality of compressed images are at least one of 200x300 pixels in size, 300x400 pixels in size or 600x800 pixels in size.
18. A system according to any preceding claim, wherein the sequence of chronologically captured images and the sequence of thumbnails are stored in a database folder structure.
19. A system according to any preceding claim, wherein the sequence of chronologically captured images are received from an image capture device.
20. A system according to any preceding claim, wherein the sequence of chronologically captured images include at least one thousand images.
21. A system according to any preceding claim, wherein the processor is further arranged to display the sequence of thumbnails via an automatic video playback process.
22. A system according to any preceding claim, wherein a thumbnail from the sequence of thumbnails is selected by the input device and the corresponding image is displayed on the user interface, wherein at least one of a plurality of functions are performed on the displayed image.
23. A system according to claim 22, wherein the plurality of functions includes at least one of copying the image, editing the image, printing the image, or sending the image by email.
24. A system according to any preceding claim, wherein the user interface is further arranged to display chronological information pertaining to the particular image being displayed.
25. A method of processing and reviewing images, comprising:
- (i) receiving a sequence of chronologically captured images;
 - (ii) transforming the sequence of chronologically captured images into a corresponding sequence of thumbnails; and
 - (iii) displaying the sequence of thumbnails via a user interface provided by the visual output device, at a rate controlled by an input device.

26. A method according to claim 25, wherein the sequence of chronologically captured images comprises a chronological sequence of images of at least part of a common scene.
27. A method according to claims 25 or 26, wherein the rate controlled by the input device includes the speed and the direction of the sequence of thumbnails.
28. A method according to any of claims 25 to 27, wherein the input device is the mouse of a computer comprising a wheel feature, and wherein displaying the sequence of thumbnails is controlled by the motion of the wheel feature.
29. A method according to any of claims 25 to 28, wherein the sequence of chronologically captured images is a selection from a sequence of time lapsed digital photographs of a scene.
30. A method according to any of claims 25 to 28, wherein the sequence of chronologically captured images is a selection of video frames in a video.
31. A method according to any of claims 25 to 30, wherein the received sequence of chronologically captured images represents a sample of images captured over a first period of time, wherein the method includes receiving the first period of time via the user interface.
32. A method according to claim 31, wherein the first period of time is at least one of 30 seconds, a minute, an hour, a day, a week, a month, or a year.
33. A method according to claims 31 or 32, wherein the method further includes receiving a second period of time via the user interface, wherein the second period of time defines the rate at which the sample of images are captured over the first period of time.
34. A method according to claim 33, wherein the second period of time is at least one of 10 seconds, a minute, an hour, a day, a week or a month.
35. A method according to any of claims 31 to 34, wherein the user interface includes a plurality of controls arranged to select the first and second period of time.

36. A method according to claim 35, wherein the plurality of controls are further arranged to select the speed and/or direction that the sequence of thumbnails is displayed.
37. A method according to any of claims 25 to 36, wherein the user interface includes
5 a calendar interface arranged to permit selection of the sequence of chronologically captured images.
38. A method according to any of claims 25 to 37, wherein the transforming the sequence of chronologically captured images includes extracting date and time information from the exif information embedded in the sequence of video frames.
- 10 39. A method according to any of claims 25 to 38, wherein the transforming the sequence of chronologically captured images includes performing a JPEG compression process.
40. A method according to claim 39, wherein the sequence of thumbnails comprise a plurality of compressed images.
- 15 41. A method according to claim 40, wherein the plurality of compressed images are at least one of 200x300 pixels in size, 300x400 pixels in size or 600x800 pixels in size.
42. A method according to any of claims 25 to 41, wherein the sequence of chronologically captured images and the sequence of thumbnails are stored in a
20 database folder structure.
43. A method according to any of claims 25 to 42, wherein the sequence of chronologically captured images are received from an image capture device.
44. A method according to any of claims 25 to 43, wherein the sequence of chronologically captured images include at least one thousand images.
- 25 45. A method according to any of claims 25 to 44, wherein displaying the sequence of thumbnails includes an automatic video playback process.

46. A method according to any of claims 25 to 45, wherein a thumbnail from the sequence of thumbnails is selected by the input device and the corresponding image is displayed on the user interface, wherein at least one of a plurality of functions are performed on the displayed image.
- 5 47. A method according to claim 46, wherein the plurality of functions includes at least one of copying the image, editing the image, printing the image, or sending the image by email.
48. A method according to any of claims 25 to 47, wherein the user interface is further arranged to display chronological information pertaining to the particular image being
10 displayed.



Application No: GB1321721.1

Examiner: Mr Tristan Ballard

Claims searched: 1-48

Date of search: 15 May 2014

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-48	EP 2083564 A2 (CANON) See especially paragraphs [0065], [0071], [0073] and figure 4
X	1-48	EP 2073110 A1 (RICOH COMPANY) See especially paragraphs [0012], [0040] and figures 5-7
X	1-48	KR 1020070083026 A (SAMSUNG) See WPI Abstract Accession No. 2008-B09799
X	1-48	WO 2008/112759 A1 (APPLE INC) See especially paragraphs [0096]-[0098]
X	1-48	US 2008/0301584 A1 (AKAGI ET AL) See especially paragraphs [0007] and [0034]
X	1-48	US 2009/0164944 A1 (WEBSTER ET AL) See especially paragraphs [0053]-[0059] and figures 1 & 2

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

Worldwide search of patent documents classified in the following areas of the IPC

G06F; G11B; H04N

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI



International Classification:

Subclass	Subgroup	Valid From
G06F	0017/30	01/01/2006
H04N	0001/00	01/01/2006