Title: METHOD OF STORING LOCATION METADATA

Abstract: A method of storing metadata comprising information enabling identification of a location of creation of a media object. The method comprises assigning a globally unique identifier to the object; storing the identifier and the object to a memory; submitting the identifier to a database; and submitting the metadata to the database. The database is then interrogable using the identifier to access the metadata and the identifier itself is obtainable from the memory.
DESCRIPTION

METHOD OF STORING LOCATION METADATA

This invention relates to methods for adding location information to media objects, such as images and videos. More particularly, it relates to methods and apparatus for storing and accessing location metadata in a database, remotely from a media object itself.

Images and videos can now be created with a wide range of portable consumer electronic devices, from digital cameras and camcorders to mobile phones and personal digital assistants (PDAs). With the combination of creation and communication functions in these devices and especially the advent of ubiquitous wireless connectivity, it is also becoming much easier to distribute or share these media objects.

It is well known that media is enriched by the inclusion of metadata (literally data “about” the media data itself) with the object. For example, in the field of digital photography, the Exchangeable image file format (Exif) defines a standard for including metadata in JPEG image files. The metadata tags defined by Exif cover a wide range of information about the capture parameters and other properties of the image. For example, dates, times, camera settings, text annotations and locations are all catered for.

“Geotagging” or “geocoding”, in particular, is a topic of growing interest. These terms refer to the addition of location metadata to an image (or other media object). Typically, the location of interest is the place of capture. The association with location may be by means of geographic coordinates (such as latitude and longitude, as supported by Exif) or by an actual place name. In either case, the addition of such information can provide an intuitive structure to a collection of images, enabling a more effective and enjoyable searching and browsing experience.

Although the widespread adoption of geotagging has, in the past, been slowed by the need to manually (and tediously) annotate each image with location metadata, recent developments in automatic positioning technology
have reduced the burden significantly. For example, cameras are already available which incorporate Global Positioning System (GPS) technology.

A GPS receiver can derive a position fix anywhere on the earth’s surface, based on received signals from a number of orbiting satellites. By integrating this technology into a camera, the position metadata (latitude, longitude, and altitude, as well as precise time) can be embedded in the image file automatically at the time of capture of the photograph. However, GPS receivers remain relatively complex and expensive, so that integration into a camera increases both the overall cost and the power consumption of the device.

One solution to this is to implement a “light” GPS receiver, which operates on a so-called “capture and process later” basis (referred to hereinafter as “capture-and-process”). In this approach, the receiver merely records data samples received from the satellites and defers processing (that is, decoding of the samples to derive position data) until some later time. An advantage is that a capture-and-process receiver can be simpler than an equivalent full GPS implementation, largely because many of the signal processing functions can be eliminated. Even if not eliminated, the computationally- (and power-) intensive functions can at least be deactivated until the device is connected to a power outlet. Of course, under the capture-and-process paradigm, actual position data is not available immediately upon creation of the object. Indeed, it may not ever be available to the device that captured (created) the media object, if the processing is carried out elsewhere.

According to an aspect of the current invention there is provided a method of storing metadata comprising information enabling identification of a location of creation of a media object, the method comprising: assigning a globally unique identifier to the object; storing the identifier and the object in a memory; submitting the identifier to a database; and submitting the metadata to the database, wherein the database is interrogable using the identifier to access the metadata and the identifier is obtainable from the memory.
Under this method, a unique identifier is assigned to and stored with the media object (for example, an image). The metadata of the image – in particular the location metadata – can then be stored independently of the image itself, in a database. The unique identifier serves as a permanent link between the image data content and the remote metadata. In this context, globally unique means that assigned identifier is unique, or at least very highly probably to be unique among all identifiers which have been, or could in future be, submitted to the database. This ensures that the identifier need never be updated. The method has several advantages over conventional approaches. The storage of the metadata independently of the image provides a degree of flexibility not possible when the metadata is embedded in the image file itself. The unique identifier will typically comprise a small amount of data which is fixed in size. The volume of metadata has no impact on the storage and/or transmission of the image, since it is located externally. Thus, the identifier is a small key to a potentially large amount of information (metadata). Moreover, since the identifier is assigned to the object and submitted to the database (as distinct from being assigned by the database upon submission of the object, in some registration process, for example) the image (and embedded identifier) can be distributed before any submission has been made to the database. The communication of the submission to the database can also be uni-directional, with no response required from the database. Since the identifier never changes, the metadata can be generated, submitted and modified without modifying the image data container in the memory. A benefit related to this is that multiple copies of the image can be created which will always remain synchronized to common metadata in the database, since they share the same unique identifier. Access to and management of the metadata can be controlled separately to that of the image. Thus the owner of the image can make some data accessible to a wider audience without disclosing other data. An owner may wish to protect either some or all of the metadata, or reveal the metadata but protect the image. In the context of capture-and-process of satellite positioning signals, the method is particularly beneficial, since the identifier is a proxy for the location metadata, which may or may not yet have
been decoded into a useable position estimate. In this sense, capture-and-process is a prime example of the circumstances in which belated generation or subsequent amendment of metadata is a practical necessity.

Preferably, the unique identifier is assigned and stored with the media object to the memory upon creation of the object.

Assigning the identifier immediately (when the object is created or recorded) means that every copy of the media object will be automatically provided with the identifier.

The step of submitting the metadata to the database may be carried out at a different time to the step of submitting the identifier to the database.

With this variation, a record of the media asset can be entered in the database before location metadata (for example, post-processed capture-and-process metadata) is available or complete. The database can then be queried with the identifier and give a meaningful response, even though no metadata is available as yet.

The method may further comprise submitting revised metadata to the database.

This will be particularly beneficial if the metadata is to be amended or refined subsequent to the initial submission. This could arise, for example, if location metadata is being provided from multiple sources, such as GPS and manual tagging. It may also be relevant where an error in GPS position data needs to be corrected posthumously.

The metadata may comprise observations of a signal from at least one fixed transmitter observed at the approximate location of creation of the media object.

Signal observations taken of nearby fixed transmitters or base-stations can be used to identify the location at which the observations were taken. That is, by recording which transmitters are “seen” at a given place and linking that information with a geographical database of transmitter locations, a position estimate can be calculated. This estimate can be computed immediately, if access to the database is always available, or retrospectively, if the database
is accessed later. The use of such sightings can therefore take full advantage of the flexibility provided by the metadata storage method.

The metadata may also comprise recorded blocks of data samples of a satellite broadcast including blocks recorded at the approximate location of creation of the media object.

In this implementation of the method, satellite capture-and-process methods are combined with independent metadata storage. As for fixed-transmitter sighting, this type of location metadata harnesses and complements the potential of the external-database approach to storage of metadata.

According to another aspect of the invention, there is provided a method of maintaining a database of metadata comprising information enabling identification of a location of creation of a media object, the method comprising: receiving a globally unique identifier of the media object; receiving the metadata; and storing the metadata and the identifier in the database, wherein the metadata is stored associated with the identifier.

This method works with the first method described above to provide the database functionality.

The method may further comprise receiving and storing revised metadata.

The metadata may comprise observations of a signal from at least one fixed transmitter observed at the approximate location of creation of the media object.

The metadata may also comprise recorded blocks of data samples of a satellite broadcast including blocks recorded at the approximate location of creation of the media object.

In either case, the method may further comprise processing the observed or recorded metadata to derive position information approximating the location of creation of the object.

According to this implementation of the method, the database has more advanced processing capabilities which allow it to decode the metadata and extract position information from it. This is particularly beneficial, since the
decoding is likely to be computationally intensive and/or to require access to additional data sources (e.g. a table of wireless base-station locations, or satellite trajectory data, known as ephemeris). In each case, centralisation of the decoding process avoids duplication of effort.

The method may further comprise: receiving a query comprising the globally unique identifier; and providing the position information in response to the query.

The decoded metadata (that is, actual position information, such as coordinate data) is available immediately to any client which queries the metadata database with the unique identifier of the media object. That is, instead of merely returning the encoded location metadata (such as satellite signal samples or radio-frequency (RF) signal observations) the database can respond to requests with the decoded metadata.

The provision of the position information may be conditional upon predetermined access rights associated with the query.

The use of access rights to control provision of the position data secures the position information and allows only authorised clients/queries to gain access to the information. For example, the metadata could be controlled to protect the media owner’s privacy or to give access only to users who have paid a fee.

According to a further aspect of the invention, there is provided media object recording apparatus comprising: an identifier generator adapted to assign a globally unique identifier to the object; a memory for storing the identifier and the object; first submission means for submitting the identifier to a database; and second submission means for submitting metadata comprising information enabling identification of a location of creation of the object to the database, wherein the database is interrogable using the identifier to access the metadata and the identifier is obtainable from the memory.

According to still another aspect of the invention, there is provided metadata database management apparatus comprising: first receiving means for receiving a globally unique identifier of a media object; second receiving means for receiving metadata comprising information enabling identification of
a location of creation of the object; and storage means for storing the metadata and the identifier, wherein the metadata is stored associated with the identifier.

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

Figure 1 is a diagram of a system operating according to an embodiment;

Figure 2 is a flow chart showing a method of storing metadata according to an embodiment; and

Figure 3 is a flow chart showing a method of maintaining a database of metadata according to an embodiment.

Most geotagging approaches to date operate on the assumption that the location information will be stored together with the image or video that is tagged. This is a natural starting point, based on conventional metadata annotation technologies such as Exif, in which metadata is embedded in tags in the image file. The current inventors have recognised that a more powerful and flexible model is to store the metadata independently of the media data itself. Provided a reliable and permanent link can be established between the media (image) and metadata (location information), this supports all the functionality offered by the traditional approach and also enables new services.

Fig. 1 provides an overview of an example embodiment of the invention. A camera 200 is connected to a radio frequency (RF) receiver 210. The receiver receives transmitted signals via an antenna 220. The signals contain information which is specific to location, so that position information can be extracted from them. The camera 200 records these signals as location metadata at the same time and place that a picture is taken. The camera assigns an Id to each image. Subsequently, the picture and its associated Id are uploaded to a personal computer 230. Meanwhile, the Id and metadata associated with the image are uploaded to a database (maintained by a networked server 240). It is then possible for a user of the personal computer 230 to make a request to the server 240 using the Id of the image, to retrieve
the metadata from the server 240 and thus obtain the location of capture of the photograph.

Fig. 2 shows a flowchart of a method of storing location metadata to a database according to an embodiment of the invention.

At step 10, the image is captured. This step could be performed by any device, such as a digital camera or camera-phone.

At step 20, location metadata is obtained. The location metadata can be any information which contains sufficient data to identify – whether explicitly or implicitly – the location of capture of the image. Explicit identifying information includes geographic coordinates or a place name. Location can be captured implicitly by, for example, recording signals which can be identified as being associated with a specific location. In one embodiment, implicit location metadata, in the form of blocks of intermediate frequency (IF) samples of satellite signals, is obtained. As described above, these samples can be used according to capture and process satellite positioning methods to derive a position estimate. The signal samples can be obtained from a capture and process GPS receiver integrated in the camera or from an external GPS receiver. In both implicit and explicit cases, the location metadata may comprise information identifying a region or area rather than a point position.

In step 30, a globally unique identifier (Id) is assigned to the image. “Global” uniqueness must be defined with respect to the database to which the Id and metadata will be submitted. The criterion is that no two uploaded Ids should ever be the same – this must apply for all Ids uploaded to the database both in the past and in the future. Conventionally, Ids (especially image Ids) are only unique within the given device that is assigning them. So, for example, a camera assigns a filename that will be unique among images generated by that camera. However, when the images are uploaded to a broader collection, there may be another image with the same name from a different camera. This Id “collision” can be avoided by reassigning a unique Id each time the image is submitted to a broader collection. However, this would lead to the image having many different Ids. Furthermore, each assigned Id is only available to the system which assigned it.
In the current invention, it is preferable to assign a unique identifier immediately upon creation of the image, so that the resulting Id is available to all subsequent consumers of the image (including copies of it). This will typically mean that reference to the database will not be possible at the time the Id is assigned. Methods for generating such Ids without reference to any centralised record (such as a registration authority) have been developed in other technical fields. For example, the Universally Unique Identifier (UUID) has been defined in INTERNATIONAL STANDARD ISO/IEC 9834-8 / ITU-T RECOMMENDATION X.667. The UUID is a 128-bit string which is designed to be highly likely to be globally unique. Recommended methods for generating UUIDs locally are provided in the standard. These enable quick and easy generation of the unique identifier. Alternatively, for an embodiment using GPS capture and process technology, the unique identifier could be derived from the captured GPS signal samples. For example, a sequence of sign-bits from a GPS receiver front-end is effectively random, so a unique identifier could be generated by reading bits from the front-end or re-using bits already captured as location metadata. Regardless of how it is generated the identifier represents a unique key referencing both the image and its location-of-capture metadata. The Id can therefore be thought of as a “Geographic Resource Locator” (GRL).

In step 40, the image and Id are stored together in a memory. This will typically be the on-board memory in the camera and the association between the Id and image will typically be guaranteed by storing the Id internally in the image-file metadata (for example, Exif metadata). Thus, once assigned and stored, the Id will be carried with every copy of the image.

In step 50, the Id is submitted to a database. The database will usually be a network connected server, accessible to a large number of users, typically via the internet. Some connection must be established with the database in order to upload the Id information. This can be a direct connection or may be indirect. For example, a wireless-enabled device, such as a camera-phone, may connect directly to the database via a wireless internet connection. A device with more limited communication capability, such as a conventional
digital camera, may use an intermediary. For example, a user can upload photos (containing their assigned Ilds) from the camera to a personal computer. The Ilds will then be submitted to the online database via the computer's internet connection.

In step 60, the metadata is submitted to the database. In the current example, where the metadata has been captured or obtained at the point of creation of the image, the metadata will typically be submitted to the database at the same time as the Ild. However, this is not essential and the metadata can be instead be uploaded at any later time. The communications connection used for submitting the metadata may, likewise, be the same or different to that used for submitting the Ild. Later submission of the metadata can be advantageous if the metadata is not available or ready for upload. For example, capture and process metadata may need to be processed to decode the position information before submitting this to the database. If the Ild has been registered, then queries to the database can at least be answered (even if the desired information cannot be provided, the response may be “please wait”). Once the metadata becomes available and is submitted, the database can automate the delivery of requested metadata in response to these previously received queries.

Various alternatives to the steps described above may be considered. The step 20 of obtaining location metadata can be carried out in a variety of ways without relying on satellite positioning technology. One alternative is to use a beacon-based positioning approach. This approach relies on observing (or interrogating) a wireless transmitter at the location of capture of the image.

In a sense, the beacon approach is similar to that of satellite positioning, with the difference that the reference points are fixed terrestrial stations, rather than orbiting satellites. Of course, the signals from the terrestrial transmitter will not generally be adapted to support a positioning function and so the implementation of this embodiment is somewhat different. The beacons in question may be, for example, wireless network base-stations (WiFi access points). Each such base-station transmits signals in a limited local area. Thus, the visibility of the signal at the point of capture of the image implies that the
camera is within the service area of that access point. Signal strength can be measured to derive an indication of how far the camera observing the signals is located from the access point. If several access points can be seen (as will commonly be the case in urban and/or indoor environments) this information can be used to constrain the location estimate still further – the camera must lie in the intersection of the service areas of the visible access points. In order to convert the implicit signal-visibility data into an actual position estimate, information about the geographical location of the wireless access points is required. However, it is not necessary that this information is available to the camera at the time of creating the image (and observing the signals). Instead, the camera can simply record the identities of the wireless access points and cross-referencing with a database of locations can be carried out later (as for satellite capture and process). Wireless access points are uniquely identified by their Basic Service Set Identifier (BSSID). The BSSID is a 48-bit number. In infrastructure wireless networks, the BSSID is the MAC (Medium Access Control) address of the access point. Several access points in the same local area network may share a common Service Set Identifier (SSID); however, this will still constitute useful metadata from which to deduce a position estimate.

Naturally, WiFi access points are not the only beacons which could be used in the beacon-positioning system described above. For example, cellular communication (mobile telephony) base stations are equally applicable.

As a further alternative, manual location metadata may be provided by the camera user, either at the time of taking the picture or later (for example after upload to a personal computer). This manually input location metadata could be in the form of a place name or in geographic coordinates (the latter being easily input, for example, by selecting the location of capture on a map). Since there is no requirement that the metadata is available at the time of capture of the image, the method of the invention supports conventional cameras which have no positioning capability as well more advanced cameras which incorporate GPS or WiFi functions. In every case, there is never a requirement to modify the image when metadata becomes available –
provided the Id has been embedded, the link to the metadata will be established.

Note also that it is not essential that the step 30 of assigning an identifier be carried out upon creation of the media object. Instead, the unique Id can be assigned to the object at any stage after its creation. For example, the identifier could be assigned when an image is edited, when it is uploaded from a camera to a personal computer, or when content is distributed, shared or otherwise included into the scope of a different storage system and/or collection.

Additional steps can also be appended to the method. For example, revised metadata can be submitted to the database some time after the original metadata was submitted. This may involve the replacement of implicit metadata with explicit metadata: in the capture and process scenario, for example, the original metadata may be the raw signal samples and the revised metadata may be the decoded geographic coordinates. On the other hand, the revised metadata may augment existing explicit metadata. Geographic coordinates could be added to a place name, or vice versa.

As a further alternative, the revised metadata can refine or correct a previous position estimate. In a GPS-based system, accurate computation of the position estimate depends on precise knowledge of the timing, positions and trajectories of the orbiting satellites (known as the satellite ephemeris). A GPS receiver (particularly a capture and process device) may have incomplete or incorrect ephemeris data when the position estimate is first calculated, leading to inaccuracy in the estimate. Up to date ephemeris could be downloaded from an independent source, such as a web server, and used to generate a more accurate revised position estimate.

In each case, the revised metadata can be instantly available to any user who queries the database. Thus there is no requirement, for example, for a photographer who has distributed images to forward updated copies of the metadata to multiple recipients. This would have been the case with conventional technology such as embedded Exif metadata.
A method of managing a metadata database according to another aspect of the invention will now be described, with reference to Fig. 3.

At step 70, an Id for an image is received. This will be a globally unique identifier as discussed above; therefore, it does not need to be updated or mapped in any way to a different indexing system. It is stored in the database in step 80.

At step 90, metadata is received. This may happen either concurrently with the upload of the Id or subsequently, as described above. In either case, the metadata is stored associated with the Id. This association means that the Id is an index to the database — that is, the database is designed so that a query with the index will retrieve the associated metadata.

In one embodiment, the metadata is implicit location metadata — for example, either beacon-observations or satellite signal samples as described above. The database management method can then take responsibility for decoding the implicit information to derive an explicit position estimate. In practice, this may be advantageous since the database will typically be well placed to obtain any additional information needed to perform the decoding and position calculation.

In the case of capture and process satellite signal samples, the decoding method may require access to an independent source of satellite ephemeris data. Although the ephemeris is transmitted by each satellite, a receiver would be required to capture a relatively long (and noise-free) block of data in order to record enough of the ephemeris data to accurately compute position. On the contrary if complete data is available from an independent (and reliable) source, a relatively short (or noisy) sequence of samples can be used together with a coarse estimate of the time of capture to derive position. The additional data can also add constraints that allow the solution to be calculated with less computational effort. Thus, decoding of the position by a central server (such as that maintaining the metadata database) can be more accurate and more efficient than a full conventional GPS receiver.

In the case beacon-based positioning, the independent information needed to decode the signal sightings (such as wireless access point
identities) is a geographical database cross referencing the transmitter/base-station identities with locations. This will again be likely to be maintained centrally and shared among all users. The database management method can therefore combine roles beneficially and implement the beacon look-up function as well.

Decoding of implicit metadata may happen immediately on upload to the database, or it may be postponed in order to manage the computational burden. For example, decoding could be carried out in a relatively “quiet” period, when few new submissions of IDs or metadata are being received.

As mentioned earlier, new, corrected or revised metadata can be uploaded to the database at any time. In this case, the database management method can replace, augment or correct the previous metadata as appropriate. If the new metadata is implicit metadata, it can be decoded as described above.

The centralised collection of location metadata in the database represents a valuable and useful asset. The information can be exploited in a wide variety of ways. The most straightforward use of the data is to provide it in response to queries from users. These requests will correspond to users (including the owner of the photograph) who wish to obtain the location metadata. The photograph may have been distributed through private channels, such as email or may be publicly available on a website. Since the metadata is, like the photograph itself, a piece of valuable personal property, the database preferably implements some access control functions to protect the information. This might be through a conventional method, such as password protection, but more advanced embodiments are also possible. For example, the owner of the media asset (photograph) may provide the database with a list of “friends” who are permitted to access private information including the precise location of capture of the image. Queries from users not on the “friend” list might receive only an approximate location in response. In other words, the location information can be obfuscated as an alternative to outright barring to the general public. Non-trusted parties may receive, for example, a country or city name, or a position estimate with a predefined
(artificially large) uncertainty. Trusted parties may receive a precise address, or precise geographic coordinates. Alternatively, the obfuscation may include an element of deliberate misinformation. An untrusted party may receive location metadata that is apparently accurate, but which builds in a deliberate error, so that the actual location information is protected. This may be of interest to media owners where information about a site is militarily, commercially or personally sensitive. For example, a wildlife photographer may wish to distort the locations of capture reported for his photographs in order to protect rare species from exploitation or to maintain exclusivity.

The metadata database will also be a channel for other useful location-based services. Each query received by the database represents an implied expression of interest by a user in a photograph’s setting. This can be used, for example, to target location-based advertising. In one such scenario, the photograph may have been taken at a restaurant and the user making the query to the database may be interested in dining at the same restaurant. The metadata database might provide the contact details for the restaurant in response to the query, in addition to the location metadata itself. Provision of such services requires the linking of the database of position metadata with additional Geographic Information Systems (GIS) databases.

In another variation of the method, further unique identifiers can be assigned (either by the database, or by a camera user) to groups of photographs. These groups may correspond, for example, to a cluster of locations or to a set of photos which have some other semantic connection, such as representing a record (track) of a journey. All the operations described above in relation to metadata records for individual images then become possible for the group of images as a unit.

The invention has been described with reference to the application of geotagging photos, by way of example. However, as will be apparent to those skilled in the art, it is not limited in application to this kind of media. It is equally applicable to other visual media, such as videos, to audio media, including sound files and to the various types of multimedia that are now common.
Likewise, the storage in the database of metadata associated with the media is not limited to location metadata. Other metadata of the media objects may also be stored in the database. Indeed, one of the advantages of the method is that the practical limit on the amount of metadata associable with a media object will be vastly increased by storage of the metadata in a central database, rather than embedded in a file with the media data itself. Other metadata related to the location metadata may include velocity or time metadata, or information about the expected accuracy of the location metadata. Metadata unrelated to location may also be stored, including a record of the device and or person responsible for creating and/or editing the media object or the metadata. In the case of satellite or beacon-based positioning approaches, specific technical parameters relevant to the position calculation might be stored, such as a local oscillator frequency offset or detected signal strength value.

Various other modifications will be apparent to those skilled in the art.
CLAIMS

1. A method of storing metadata comprising information enabling identification of a location of creation of a media object, the method comprising:
   assigning a globally unique identifier to the object;
   storing the identifier and the object in a memory;
   submitting the identifier to a database; and
   submitting the metadata to the database,
   wherein the database is interrogable using the identifier to access the metadata and the identifier is obtainable from the memory.

2. The method of claim 1, wherein the unique identifier is assigned and stored with the media object to the memory upon creation of the object.

3. The method of claim 1 or claim 2, wherein the step of submitting the metadata to the database is carried out at a different time to the step of submitting the identifier to the database.

4. The method of any of claims 1 to 3, further comprising submitting revised metadata to the database.

5. The method of any preceding claim, wherein the metadata comprises observations of a signal from at least one fixed transmitter observed at the approximate location of creation of the media object.

6. The method of any preceding claim, wherein the metadata comprises recorded blocks of data samples of a satellite broadcast including blocks recorded at the approximate location of creation of the media object.
7. A method of maintaining a database of metadata comprising information enabling identification of a location of creation of a media object, the method comprising:

receiving a globally unique identifier of the media object;

receiving the metadata; and

storing the metadata and the identifier in the database, wherein the metadata is stored associated with the identifier.

8. The method of claim 7, further comprising receiving and storing revised metadata.

9. The method of claim 7 or claim 8, wherein the metadata comprises observations of a signal from at least one fixed transmitter observed at the approximate location of creation of the media object.

10. The method of any of claims 7 to 9, wherein the metadata comprises recorded blocks of data samples of a satellite broadcast including blocks recorded at the approximate location of creation of the media object.

11. The method of claim 9 or claim 10, further comprising processing the metadata to derive position information approximating the location of creation of the object.

12. The method of claim 11, further comprising:

receiving a query comprising the globally unique identifier; and

providing the position information in response to the query.

13. The method of claim 12, wherein the provision of the position information is conditional upon predetermined access rights associated with the query.
14. A computer program comprising computer program code means adapted to perform all the steps of any preceding claim when said program is run on a computer.

15. A computer program as claimed in claim 14 embodied on a computer-readable medium.

16. Media object recording apparatus comprising:
   an identifier generator adapted to assign a globally unique identifier to the object;
   a memory for storing the identifier and the object;
   first submission means for submitting the identifier to a database; and
   second submission means for submitting metadata comprising information enabling identification of a location of creation of the object to the database,
   wherein the database is interrogable using the identifier to access the metadata and the identifier is obtainable from the memory.

17. Metadata database management apparatus comprising:
   first receiving means for receiving a globally unique identifier of a media object;
   second receiving means for receiving metadata comprising information enabling identification of a location of creation of the object; and
   storage means for storing the metadata and the identifier,
   wherein the metadata is stored associated with the identifier.
10 Capture image

20 Obtain location metadata

30 Assign Id

40 Store image and Id

50 Submit Id to database

60 Submit metadata to database

FIG 2
70 Receive Id
80 Store Id
90 Receive location metadata
100 Store location metadata
110 Decode location metadata
120 Store position

FIG 3
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

INV. G06F17/30

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)

G06F

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

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
</table>

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
  - "A" document defining the general state of the art which is not considered to be of particular relevance
  - "E" earlier document but published on or after the international filing date
  - "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
  - "O" document referring to an oral disclosure, use, exhibition or other means
  - "P" document published prior to the international filing date but later than the priority date claimed

**Date of the actual completion of the international search**

21 September 2009

**Date of mailing of the international search report**

29/09/2009

**Name and mailing address of the ISA/European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk**

Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016

**Authorized officer**

Abbing, Ralf
<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patent document cited in search report</td>
<td>Publication date</td>
<td>Patent family member(s)</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>-----------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>US 2007156726 A1</td>
<td>05-07-2007</td>
<td>NONE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 4232774 B2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 2007129434 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KR 20070047697 A</td>
</tr>
</tbody>
</table>