

Organizing photos geographically

LOCATION SEARCH

Thanks to affordable digital cameras and smartphones, many vacation photoshoots end up on memory cards. Unfortunately, only a few camera models actually record the location where the photos were taken. We look at three specialized programs that do the job. **BY TIM SCHÜRMANN**

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When you've just returned from vacation, recalling where each of your photos was taken is easy. Years later, however, you might be wondering where you were when you posed for that picture. But, if you have a camera with a built-in Global Positioning System (GPS), the image records the location, acting as a kind of georeferencing or geotagging. Some cameras even record the vantage point or view direction of the photo, but others don't have these features. Smartphone photo apps must be able to evaluate GPS input and store it with each snapshot to add geotagging functionality.

Fortunately, a few programs can help you pinpoint the photo location or add it

after the fact. Two conditions apply: The photos must be in JPEG or TIFF format (see the "Exif" box), and you need to know where the photo was taken. So, you will want to add this information while your memory of the event is still fresh.

Exiftool

The fastest way to tag the photo location is through the *exiftool* CLI tool that you can install on Ubuntu 12.04 from Software Center. The package bears the cryptic

name *libimage-exiftool-perl*. To make best use of it, first determine the geographic coordinates of your photo location. To do this, you can open Google Maps [1] in your browser and navigate to your photo location. In *Map* view, right-click the location and select *What's here?*. The Google search field will display the location's comma-separated lati-

Exif

Each JPEG or TIFF image file contains not only the photo itself but also includes metadata. The metadata can include the camera model, exposure and aperture settings, and, most importantly, the geographic coordinates of the location. How the camera handles this information is determined by the Exchangeable Image File Format (Exif) standard.

The kind of Exif data that the photo files contain depends on the camera and its capabilities. The better image editing programs can parse this information, but so can the image preview feature of Ubuntu: Double-click the photo for its preview, then click *Image | Properties* and switch to *Details* (Figure 1). This is where you can tell whether your particular camera creates (and stores) geolocation data.

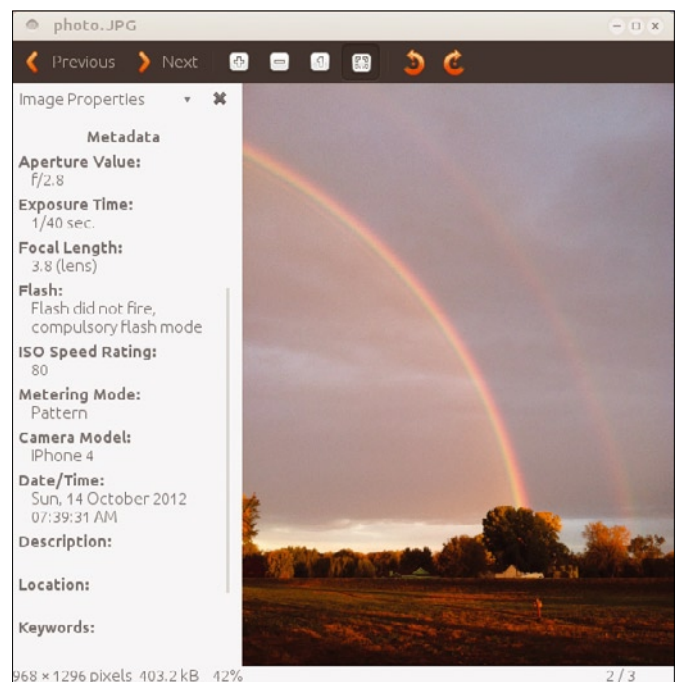


Figure 1: Ubuntu's image preview feature provides an insight into the metadata of a photo, provided the camera stores this information.

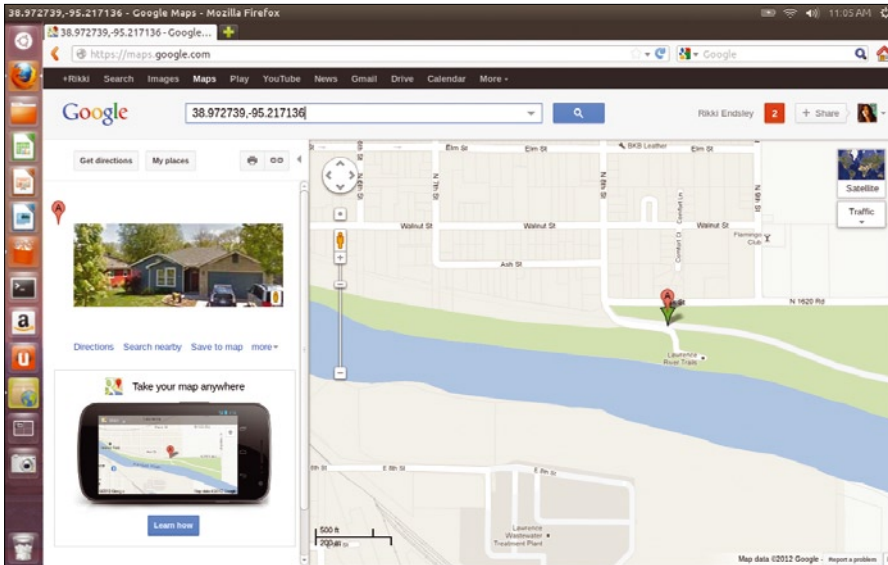


Figure 2: Use Google Maps to get the coordinates for your photo location.

tude [2] and longitude [3] coordinates (Figure 2).

If you want to use the free OpenStreetMap [4] project instead, find the location in the View menu, then click *Export* in the menus at the top. The location coordinates appear under *Area to Export*. Select the *Embeddable HTML* option under *Format to Export* and click *Add a marker to the map* under *Options* (which then changes to *Change marker position*).

On the map, click the exact location, and the coordinates appear in *Lat:* and *Lon:* under *Options* (Figure 3). You then pass the values on to *exiftool* via the command line (in Terminal) as follows:

```
$ exiftool \
  -GPSLatitudeRef="N" \
  -GPSLatitude="38.968529" \
  -GPSLongitudeRef="W" \
  -GPSLongitude="-95.21536" \
  photo.tiff
```

The quoted (*-GPSLatitude*) and (*-GPSLongitude*) parameters get the comma-separated values in Google Maps and the *Lat:* and *Lon:* values in OpenStreetMap; however, the parameter values need to be unsigned and then modified by the *-GPSLatitudeRef=* and *-GPSLongitudeRef=* parameters in relation to the Equator and Greenwich Mean Time.

Positive (unsigned) coordinates get "N" latitude and "E" longitude reference values, and negative coordinates get "S" latitude and "W" longitude reference values, respectively. (Table 1 provides a quick summary of how to enter these

values in the *exiftool* parameters.) The last value in the command is the filename of the photo. After you execute the command, *exiftool* updates the file (Figure 4). You can check the file to ensure that the location coordinates are there:

```
$ exiftool photo.tiff
```

Geotag

Granted, juggling the coordinate parameters can be confusing and error-prone.

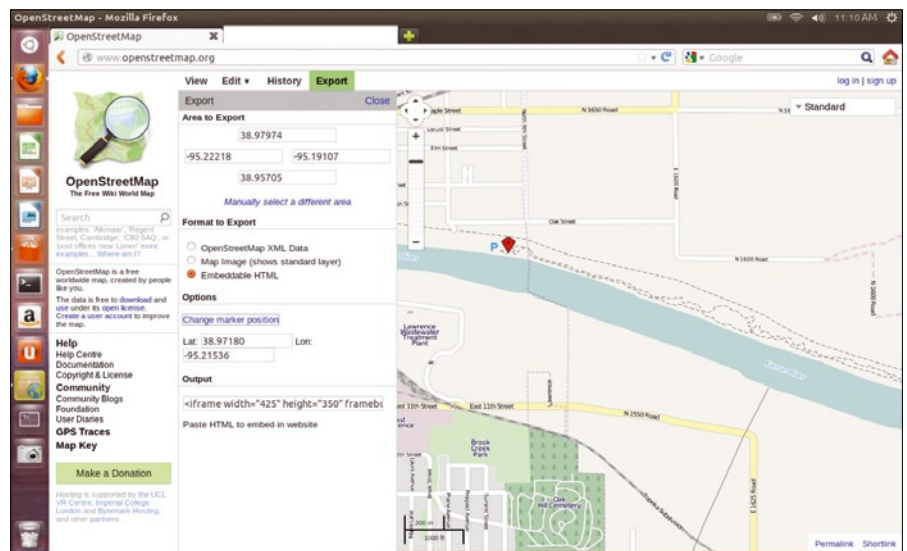


Figure 3: Find the coordinates with OpenStreetMap and add a marker to the map.

Table 1: Exiftool Map Values

Map Values	Positive	Negative (-)
Google Maps before comma	-GPSLatitudeRef="N"	-GPSLatitudeRef="S"
Google Maps after comma	-GPSLongitudeRef="E"	-GPSLongitudeRef="W"
OpenStreetMap <i>Lat</i>	-GPSLatitudeRef="N"	-GPSLatitudeRef="S"
OpenStreetMap <i>Lon</i>	-GPSLongitudeRef="E"	-GPSLongitudeRef="W"

Simply clicking a map location and automatically transferring the photo's exact coordinates to the photo metadata would be easier, which is exactly what the Java program Geotag [5] does.

Before you use Geotag, be sure that *OpenJDK Java 6 Runtime* (located in the *openjdk-6-jre* package) is installed. Then, launch Geotag from its SourceForge page or download the current version [6] and open the tool in a terminal window:

```
$ java -Xmx256M -jar geotag-0.082.jar
```

Note that if you download the program into your Downloads folder, for example, you'll first need to navigate to that directory before launching the program:

```
$ cd ./Downloads
```

Substitute the actual download filename for *geotag-0.082.jar*.

Whether you install the program or run it from its SourceForge page, the next steps are the same. Upon first startup, click *File | Settings* in the window that opens on top of your map in Geotag. Then, click the small plus signs to open *External Programs* and *Browser*, and click *Browser Path*. In the entry field, type */usr/bin/firefox* and click *OK*.


```

rikki@rikki-VGN-CR120E: ~/Desktop
File Modification Date/Time: 2012 10 25 11 46 55-05 00
File Permissions: rw-----
File Type: TIFF
MIME Type: image/tiff
Exif Byte Order: Little-endian (Intel, II)
Image Width: 968
Image Height: 1296
Bits Per Sample: 8 8 8
Compression: Uncompressed
Photometric Interpretation: RGB
Fill Order: Normal
Strip Offsets: 278
Samples Per Pixel: 3
Rows Per Strip: 1296
Strip Byte Counts: 3763584
Planar Configuration: Chunky
GPS Version ID: 2 3 0 0
GPS Latitude Ref: North
GPS Longitude Ref: West
GPS Latitude: 38 deg 58' 18.48" N
GPS Longitude: 95 deg 12' 55.30" W
GPS Position: 38 deg 58' 18.48" N, 95 deg 12' 55.30" W
Image Size: 968x1296
rikki@rikki-VGN-CR120E: ~/Desktop$

```

Figure 4: The coordinates are now part of the image file.

Next, Click *File | Add Image* and select one or more images from your photos. Right-click the photo and select *Show on Map | This Image*, which opens a Firefox browser with Google Maps. Drag the pointer on the map to the exact photo location, which can be a bit tricky in that location names keep disappearing and reappearing. As soon as you move the pointer to the desired location, Geotag updates the coordinates. So, close the browser window right away. To save the coordinates, select *File | Save New Location | All Images* (Figure 5).

Apart from the location coordinates, Geotag also allows you to set the view di-

rection, or vantage point, of the photo (Figure 6). Right-click the image and select *Show on Map (with Direction) | This Image*. This step re-opens Google Maps and the map now includes two icons: a camera icon that sets the location, and a red thumbtack icon that sets the vantage point. You can drag and drop each icon independently. You can also mark the positions of all photos with coordinate values on the map. Simply load all images by using *File | Add Image* and right-click *Show on Map | All Images*. Be careful not to move any of the icons or you'll upset the coordinates.

DigiKam

A good alternative to Geotag is the digiKam KDE photo management tool, which also runs under Ubuntu. DigiKam not only gives you a slightly easier search capability, but it adds OpenStreet-Map to Google Maps as an option.

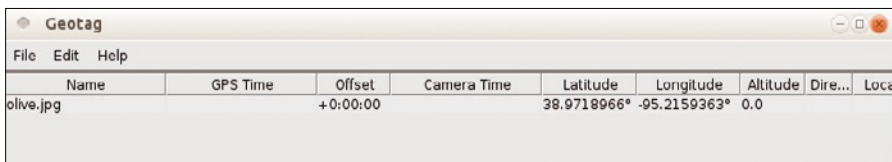


Figure 5: Save the new location coordinates in Geotag.

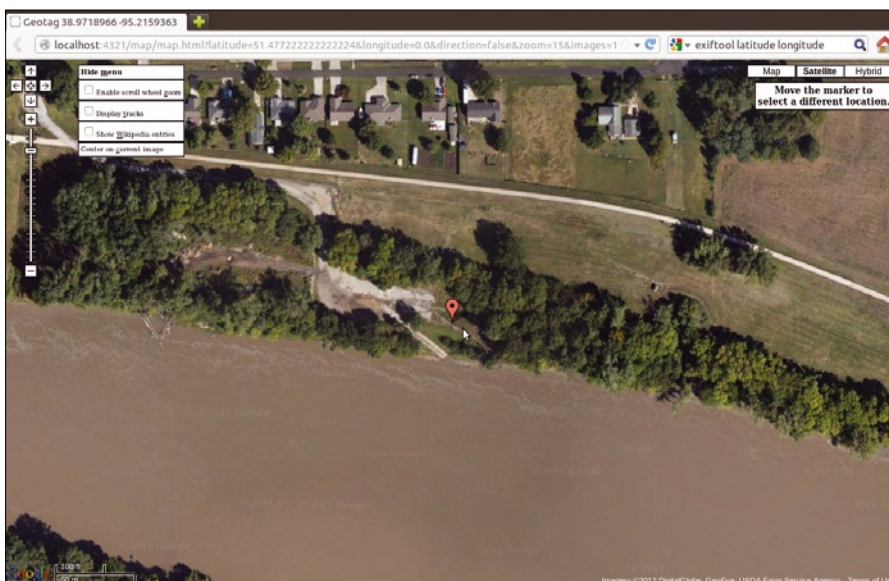


Figure 6: Geotag allows you to set the vantage point of the photo.

DigiKam can be installed from Software Center. Because of its extended functions, the program takes up more than 205MB of hard drive and is a bit more complicated to use.

After you start the program, the digiKam wizard will open. Click *Next* and enter in the two fields the folder locations to store the images and metadata, respectively. DigiKam will automatically import your photos from this location. Accept the defaults for all remaining wizard pages by clicking *Next*. After you click *Finish*, the large window in Figure 7 appears. On the left of the window is a list of all your virtual albums. At first, only the path that you set in the wizard will appear. Click it to open all the images. Add more images by clicking *Import* in the menu bar.

To tag the photo with a location, first click the thumbnail of the image, which digiKam outlines in blue. Select *Image | Geo-Location* and the Geolocation window appears. The upper part of the window shows a globe where you set the photo location. With the little magnifier icon, zoom in and out, rotate the globe, and move the image thumbnail. Once you zoom in as far as you want to go, click the blue ball icon at the far left below the map. Select *OpenStreetMap* and digiKam opens the maps of that project (Figure 8).

If you've captured a famous site or are searching for a small village and can't find it, click the *Search* tab on the far right bottom and enter the name of the site or village. Before you initiate the search, be sure that *OSM* (OpenStreet-Map) is selected in the drop-down list. DigiKam marks the location with a thumbtack, similar to Google Maps. To get the location coordinates, either right-click an icon or the map itself and select *Copy Coordinates*. Repeat this on the image itself, but use *Add Coordinates* instead. End the search by clicking the *Search* tab again.

Alternatively, drag the photo from the bottom of the window and paste it to the location on the map, although this method is a bit less accurate than the right-click one. In any case, the thumbnail of the photo appears on the map. If the position is off, change the coordinates. If the map thumbnail bothers you, right-click the thumbnail at the bottom of the window and select *Remove coordi-*

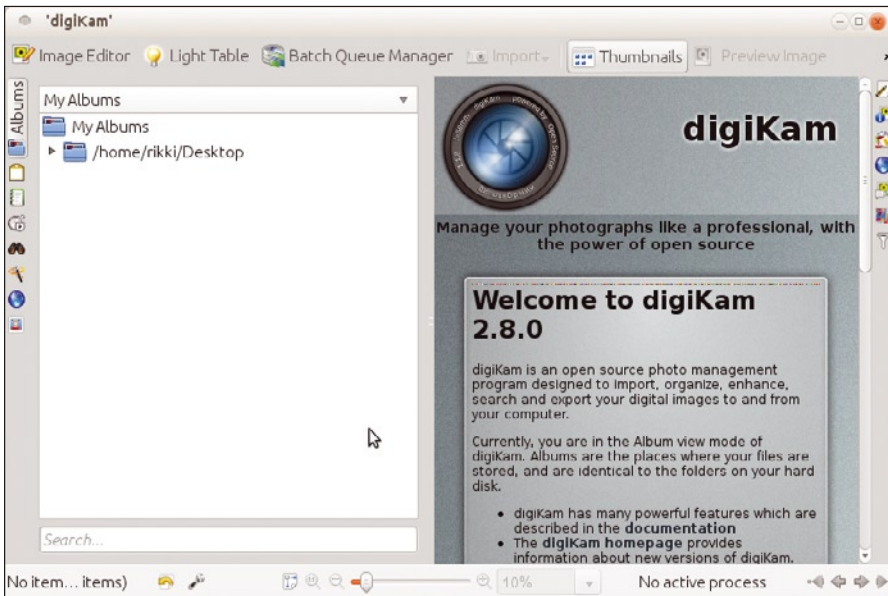


Figure 7: The digiKam wizard helps you set up your photo library quickly.

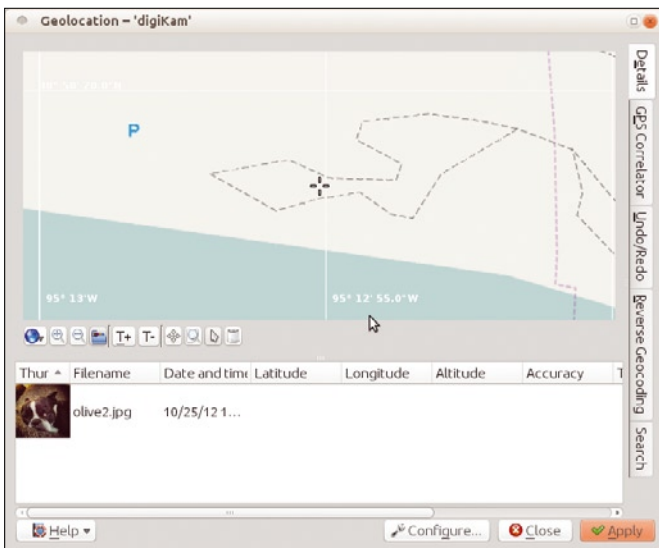


Figure 8: The resulting photo location in digiKam shows the geographic coordinates at the bottom.

After confirming the position, click *Apply* and close the window.

If OpenStreetMap doesn't do it for you, click the blue ball icon and select *Google Maps*. Another click of the blue ball toggles *Satellite View*. With Google Maps, drag-and-drop works, but unfortunately not *Copy coordinates*.

You can test the new coordinates by clicking the thumbnail and selecting the *Metadata* tab on the right (Figure 9). This opens a new right pane. The *Exif* tab in the pane shows two icons at the top, a human figure and a listing. Click the listing icon (identified by the *Complete List* tooltip) and find the coordinates under *Global Positioning System (GPS)*. DigiKam's *Geolocalizing* feature

is also ideal for viewing and comparing already established snapshot locations. Simply mark all the thumbnails while pressing *Ctrl* and click *Image | Geolocation*. To find a map position, double-click the entry in the lower list.

Conclusion

All three geotagging tools rely on Google Maps or OpenStreetMap,

which determines how quickly you can get to the location and how current the map information is. Of course, maps could have changed since you took the picture, especially if your photoshoot took place in a remote location.

The CLI *exiftool* provides quick results. Geotag has the added vantage point feature, although finding the desired location can be tedious with the lack of a search capability. DigiKam provides a complete photo management capability tapping into Google Maps or OpenStreetMap.

If you can afford one, using a separate GPS receiver can be the best way to determine position coordinates. Of course, you must have the receiver on hand during the photo shoot. This approach is certainly more accurate than manipulating the coordinates over a map. Additionally, GPS data can be applied en masse to a whole series of photos by using tools such as *GPSCorrelate* and *Geotag*. ■

INFO

- [1] Google Maps: <http://maps.google.com/maps>
- [2] Wikipedia for "latitude": <http://en.wikipedia.org/wiki/Latitude>
- [3] Wikipedia for "longitude": <http://en.wikipedia.org/wiki/Longitude>
- [4] OpenStreetMap: <http://www.openstreetmap.org>
- [5] Geotag: <http://geotag.sourceforge.net>
- [6] Geotag download: <http://sourceforge.net/projects/geotag/files/>

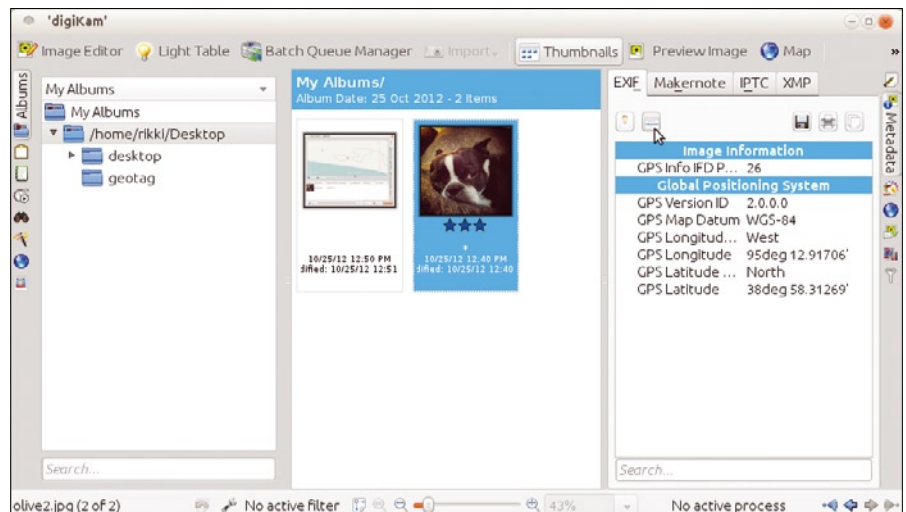


Figure 9: Check the Metadata tab in DigiKam to see the coordinates on the thumbnail.