Geotagging and Geospatial Data

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Introduction

What is Geotagging

- Geotagging is the process of adding geographical information (latitude, longitude, and altitude) to content such as photos, videos, Audios and social media posts.

- Geotagging used the geographical location data which consists of latitude/longitude coordinate system used to describe any location on the earth, this technique can be done by using GPS (Global Positioning System).
- GPS technology is embedded into many devices in machine-readable format (not clear to humans) to get locations.

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Usage of Geotagging

- Geotagging can be used to find **news**, **websites**, and **resources** based on location.

- Also it is a common characteristic of various **social media platforms**, such as Twitter, Facebook, and Instagram. Facebook allows its users to geotag photos, which can be added to specific page of tagging location.
- Moreover, **users** can benefit from the **location tracker** on their mobile devices to find nearby Facebook friends. Instagram gives its users the ability to geotag photos by using a map feature, the mapping pin indicates specific photos the user has taken on the world map.

- geotagging used in several fields such as, in **smart tourism**, it is very useful for travelers, by discovering worth visited places, location of airport, a famous restaurant and much more important information.

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Geotagging Security Issues

- Geotagging is a very useful technology can be used for good reasons and makes innovations in several fields. Nevertheless, the open and public nature of this technology brings many security issues. It is allowing **cybercriminals** to make attacks easily.
- Your post gives the burglars and stalkers the ability to determine your location and then link it with other information.

- According to this the major key to avoid the misuse of geotagging and limit cybercriminals attacks, by educating users about the risks of widespread misuse of geotagging.

Here are **secure solutions** users can follow to avoid these risks:

1. users who realize that sharing location information will affect their privacy, thus, device makers give the ability to control with whom you want to share your information, also take permission from users when any application wants to access the GPS coordinates.

2. Users have the choice to disable the GPS coordinates for any application they don’t want it to access their location.

3. Do not post photos immediately from your phone (use only the camera without a GPS unit).

4. you can transfer the photos taken by your phone to PNG file format and post them from your desktop computer.

5. Applying privacy policies when files are transmitted to public repositories, instead of when they are captured or recorded.

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Geotagging Features

Geotagging technology has many **features** makes it common and easy to use, as mentioned below:

1)**Portable**: Java used to write geotag and works on the most common operating systems.

2)**Graphical user interface**: the user interface easily add the location to photos

3)**Intelligent matching**: geotag using algorithms to enable automatically matching the GPS data to photos.

4)**Allocate location names to photos**: geotag can search for the name of a location near the taken photo and save it with the photo

5)S**upport various file formats**: JPEG/JPG files are supported and RAW file types such as ARW (Sony), CR2 (Canon), DCR (Kodak), RAW (Panasonic), SR2 (Sony) and SRF (Sony), DNG (Adobe), ERF (Epson), MEF (Mamiya), MRW (Minolata), NEF (Nikon), NRW (Nikon), ORF (Olympus), PEF (Pentax), RAF (Fuji).

6)**Open source**: It is issued under the GPL (GNU General Public License). You can use it for free in order to take the source code and making changes over it then distribute a new version.

7)**Easily translatable**: Geotags can simply be translated into several languages

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Geotagging In Multimedia

Text, image, audio, video, and animation are the five **multimedia elements**.

In this presentation we will focus on Geotagging **Photos**,**Videos** and **Audio Files**.

- Every single part of any picture is connected to a geographic location, however in the most common application, the photographer’s position only is tied to the digital image.

- Geotagging photos or Geotagging photographs; include assigning at least one latitude and longitude to the entire image, and may also include positions comes from compass bearing

Two main **options** can be used to geotag photos:

1. capturing GPS information at the time the photo is taken .

2. Attaching geo coordinates to the photograph after the picture is taken.

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Methods of Geotagging photographs

1. **Automatic** using **built in GPS receiver** method that is easy and accurate.

2. **Synchronizing with an external GPS.**

A separate location-aware device, such as **GPS logger,** can be used along with **a digital camera** and the **coordinates or the location** of the image will be processed and **added later** to the information of the image using software in conjunction with GPS data

3. **Manual geotagging**

location information in this method can be added by manually **entering the coordinates** where the photograph was taken or **by manual dragging and dropping of a pin onto a map using software** tools .

Today most of the cell phones have a built-in GPS chips along with the mobile cameras that gives the user the ability to automatically geotag any photo by capturing the image while GPS option is turned on.

Nowadays we can find images in any location just by entering latitude and longitude coordinates into a **geotagging-enabled image search engine**, or just by searching on the location using **google maps** , unlike the old way that is basically focus on writing the date ,and place that the picture was taken on the back of the image **manually**

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Geotagging Audio and Video

Geotagging Videos and Audios files can be done using:

- Metadata.
- Overlay.
- Companion files that found in the .KML and .GPX files formats.

- Metadata records the geospatial data in the video/Audio files.

  Exif *metadata include technical information about an image/video file and its capture method, such as exposure settings, capture time, GPS location information and camera models.*

- Overlay includes overlaying GPS data as text on the recorded video.

- Companion files are separate data files which correspond to respective audio/video files.

- Companion files are typically found in the .KML and .GPX data formats.

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