Meta data in images: what we upload on social media?

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Outline

- What metadata can be stored in image?
- Basic structure of an image file
- How does it look like? IFD Tags.
- How to access metadata
- Metadata after uploading an image
- How difficult is to extract metadata?
- How metadata can be used?
- How to wipe metadata?
- Questions to discuss
- Read more...

What metadata can be stored in image?

Technical details:

- EXIF version
- Image size
- Pixel composition
- Orientation of image
- Compression scheme
- Image resolution
- Image data location
- etc...

What metadata can be stored in image?

Other information:

- Timestamps
- Image title
- Image input equipment manufacturer and model
- Software used
- Camera settings (40 settings – focus, flash, exposure bias, aperturre etc)
- Person who created the image (artist)
- Copyright holder
- GPS info (30+ settings)

Basic structure of an image file

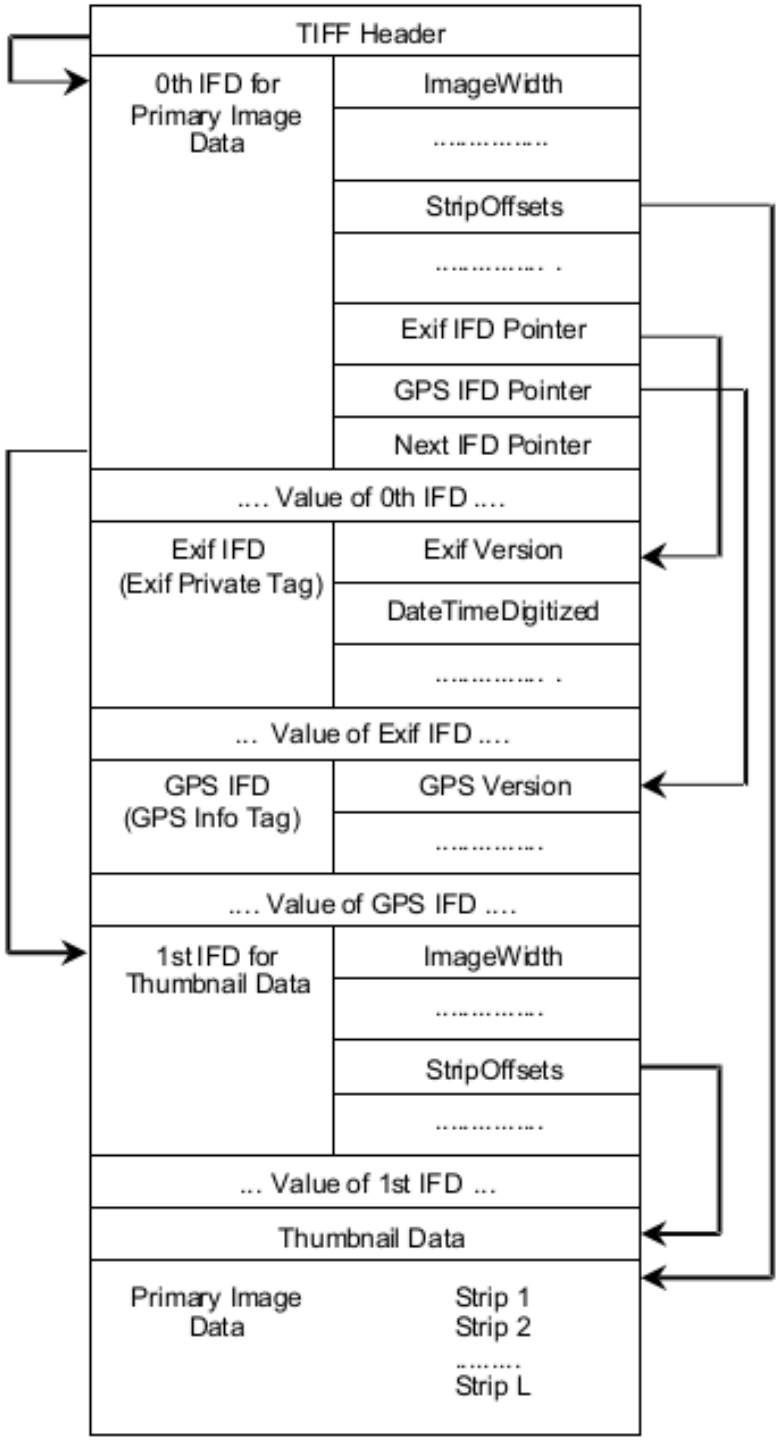


Figure 5 Basic Structure of Uncompressed Data Files

*Taken from EXIF specification

Table 16 Tag Support Levels (3) - 0th IFD GPS Info Tags -

Tag Name	Field Name	Tag ID		Uncompressed			Comp-r essed
		Dec	Hex	Chunky	Planar	YCC	
GPS tag version	GPSVersionID	0	0	O	O	O	O
North or South Latitude	GPSLatitudeRef	1	1	O	O	O	O
Latitude	GPSLatitude	2	2	O	O	O	O
East or West Longitude	GPSLongitudeRef	3	3	O	O	O	O
Longitude	GPSLongitude	4	4	O	O	O	O
Altitude reference	GPSAltitudeRef	5	5	O	O	O	O
Altitude	GPSAltitude	6	6	O	O	O	O
GPS time (atomic clock)	GPSTimeStamp	7	7	O	O	O	O
GPS satellites used for measurement	GPSSatellites	8	8	O	O	O	O
GPS receiver status	GPSStatus	9	9	O	O	O	O
GPS measurement mode	GPSMeasureMode	10	A	O	O	O	O
Measurement precision	GPSDOP	11	B	O	O	O	O
Speed unit	GPSSpeedRef	12	C	O	O	O	O
Speed of GPS receiver	GPSSpeed	13	D	O	O	O	O
Reference for direction of movement	GPSTrackRef	14	E	O	O	O	O
Direction of movement	GPSTrack	15	F	O	O	O	O
Reference for direction of image	GPSImgDirectionRef	16	10	O	O	O	O
Direction of image	GPSImgDirection	17	11	O	O	O	O
Geodetic survey data used	GPSMapDatum	18	12	O	O	O	O
Reference for latitude of destination	GPSDestLatitudeRef	19	13	O	O	O	O
Latitude of destination	GPSDestLatitude	20	14	O	O	O	O
Reference for longitude of destination	GPSDestLongitudeRef	21	15	O	O	O	O
Longitude of destination	GPSDestLongitude	22	16	O	O	O	O
Reference for bearing of destination	GPSDestBearingRef	23	17	O	O	O	O
Bearing of destination	GPSDestBearing	24	18	O	O	O	O
Reference for distance to destination	GPSDestDistanceRef	25	19	O	O	O	O
Distance to destination	GPSDestDistance	26	1A	O	O	O	O
Name of GPS processing method	GPSProcessingMethod	27	1B	O	O	O	O
Name of GPS area	GPSAreaInformation	28	1C	O	O	O	O
GPS date	GPSDateStamp	29	1D	O	O	O	O
GPS differential correction	GPSDifferential	30	1E	O	O	O	O

*Taken from EXIF specification

Image file in hex

tatiana-san@tatianasan-eME732G: ~/Documents/Digital Forensics/Mastodon

```
00000000  FF D8 FF E0  00 10 4A 46  49 46 00 01  02 01 00 48  00 48 00 00  FF E1 19 7E  45 78 69 66  ......JFIF.....H.H.....~Exif
0000001C  00 00 4D 4D  00 2A 00 00  00 08 00 0B  01 0F 00 02  00 00 00 04  48 54 43 00  01 10 00 02  ..MM.*.............HTC.....
00000038  00 00 00 0A  00 00 00 92  01 12 00 03  00 00 00 01  00 01 00 00  01 1A 00 05  00 00 00 01  ................................
00000054  00 00 00 9C  01 1B 00 05  00 00 00 01  00 00 00 A4  01 28 00 03  00 00 00 01  00 02 00 00  .................(..........
00000070  01 31 00 02  00 00 00 1C  00 00 00 AC  01 32 00 02  00 00 00 14  00 00 00 C8  02 13 00 03  .1...........2..............
0000008C  00 00 00 01  00 01 00 00  87 69 00 04  00 00 00 01  00 00 00 DC  88 25 00 04  00 00 00 01  .........i...........%......
000000A8  00 00 01 B8  00 00 02 B4  44 65 73 69  72 65 20 48  44 00 00 0A  FC 80 00 00  27 10 00 0A  ........Desire HD.......'...
000000C4  FC 80 00 00  27 10 41 64  6F 62 65 20  50 68 6F 74  6F 73 68 6F  70 20 43 53  34 20 57 69  ....'.Adobe Photoshop CS4 Wi
000000E0  6E 64 6F 77  73 00 32 30  31 32 3A 30  37 3A 32 35  20 30 38 3A  33 38 3A 32  39 00 00 0B  ndows.2012:07:25 08:38:29...
000000FC  88 27 00 03  00 00 00 01  00 6D 00 00  90 00 00 07  00 00 00 04  30 32 32 30  90 03 00 02  .'.......m..........0220....
00000118  00 00 00 14  00 00 01 66  90 04 00 02  00 00 00 14  00 00 01 7A  91 01 00 07  00 00 00 04  .......f...........z........
00000134  01 02 03 00  92 0A 00 05  00 00 00 01  00 00 01 8E  A0 00 00 07  00 00 00 04  30 31 30 30  ............................0100
00000150  A0 01 00 03  00 00 00 01  00 01 00 00  A0 02 00 04  00 00 00 01  00 00 01 F4  A0 03 00 04  ................................
0000016C  00 00 00 01  00 00 01 2B  A0 05 00 04  00 00 00 01  00 00 01 98  00 00 00 00  32 30 31 32  .......+.................2012
00000188  3A 30 37 3A  31 39 20 31  39 3A 32 39  3A 34 30 00  32 30 31 32  3A 30 37 3A  31 39 20 31  :07:19 19:29:40.2012:07:19 1
000001A4  39 3A 32 39  3A 34 30 00  00 00 01 EC  00 00 00 64  00 00 00 02  00 01 00 02  00 00 00 04  9:29:40........d............
000001C0  52 39 38 00  00 02 00 07  00 00 00 04  30 31 30 30  00 00 00 00  00 00 00 0B  00 00 00 01  R98.........0100............
000001DC  00 00 00 03  02 02 00 00  00 01 00 02  00 00 00 02  4E 00 00 00  00 02 00 05  00 00 00 03  ................N...........
000001F8  00 00 02 42  00 03 00 02  00 00 00 02  57 00 00 00  00 04 00 05  00 00 00 03  00 00 02 5A  ...B........W..............Z
00000214  00 05 00 01  00 00 00 01  00 00 00 00  00 06 00 05  00 00 00 01  00 00 02 72  00 07 00 05  .......................r....
00000230  00 00 00 03  00 00 02 7A  00 12 00 02  00 00 00 07  00 00 02 92  00 1B 00 07  00 00 00 0F  .......z....................
0000024C  00 00 02 99  00 1D 00 02  00 00 00 0B  00 00 02 A8  00 00 00 00  00 00 00 2A  00 00 00 01  .......................*....
00000268  00 00 00 1C  00 00 00 01  00 00 14 1B  00 00 00 64  00 00 00 49  00 00 00 01  00 00 00 28  ...............d...I.......(
00000284  00 00 00 01  00 00 06 9E  00 00 00 64  00 00 00 00  00 00 00 01  00 00 00 17  00 00 00 01  ...........d................
000002A0  00 00 00 1D  00 00 00 01  00 00 00 28  00 00 00 01  57 47 53 2D  38 34 00 41  53 43 49 49  ...........(....WGS-84.ASCII
000002BC  00 00 00 4E  45 54 57 4F  52 4B 32 30  31 32 3A 30  37 3A 31 39  00 00 00 06  01 03 00 03  ...NETWORK2012:07:19........
000002D8  00 00 00 01  00 06 00 00  01 1A 00 05  00 00 00 01  00 00 03 02  01 1B 00 05  00 00 00 01  ................................
000002F4  00 00 03 0A  01 28 00 03  00 00 00 01  00 02 00 00  02 01 00 04  00 00 00 01  00 00 03 12  .....(......................
00000310  02 02 00 04  00 00 00 01  00 00 16 64  00 00 00 00  00 00 00 48  00 00 00 01  00 00 00 48  ...........d.......H.......H
0000032C  00 00 00 01  FF D8 FF E0  00 10 4A 46  49 46 00 01  02 00 00 48  00 48 00 00  FF ED 00 0C  ..........JFIF.....H.H......
00000348  41 64 6F 62  65 5F 43 4D  00 01 FF EE  00 0E 41 64  6F 62 65 00  64 80 00 00  00 01 FF DB  Adobe_CM......Adobe.d.......
00000364  00 84 00 0C  08 08 08 09  08 0C 09 09  0C 11 0B 0A  0B 11 15 0F  0C 0C 0F 15  18 13 13 15  ................................
00000380  13 13 18 11  0C 0C 0C 0C  0C 0C 11 0C  0C 0C 0C 0C  0C 0C 0C 0C  0C 0C 0C 0C  0C 0C 0C 0C  ................................
0000039C  0C 0C 0C 0C  0C 0C 0C 0C  0C 0C 0C 01  0D 0B 0B 0D  0E 0D 10 0E  0E 10 14 0E  0E 0E 14 14  ................................
000003B8  0E 0E 0E 0E  14 11 0C 0C  0C 0C 0C 11  11 0C 0C 0C  0C 0C 0C 11  0C 0C 0C 0C  0C 0C 0C 0C  ................................
000003D4  0C 0C 0C 0C  0C 0C 0C 0C  0C 0C 0C 0C  0C 0C 0C 0C  0C 0C 0C 0C  FF C0 00 11  08 00 60 00  ..........................`.
000003F0  A0 03 01 22  00 02 11 01  03 11 01 FF  DD 00 04 00  0A FF C4 01  3F 00 00 01  05 01 01 01  ...".................?.......
0000040C  01 01 01 00  00 00 00 00  00 00 03 00  01 02 04 05  06 07 08 09  0A 0B 01 00  01 05 01 01  ................................
00000428  01 01 01 01  00 00 00 00  00 00 00 01  00 02 03 04  05 06 07 08  09 0A 0B 10  00 01 04 01  ................................
00000444  03 02 04 02  05 07 06 08  05 03 0C 33  01 00 02 11  03 04 21 12  31 05 41 51  61 13 22 71  ...........3......!.1.AQa."q
00000460  81 32 06 14  91 A1 B1 42  23 24 15 52  C1 62 33 34  72 82 D1 43  07 25 92 53  F0 E1 F1 63  .2.....B#$.R.b34r..C.%.S...c
0000047C  73 35 16 A2  B2 83 26 44  93 54 64 45  C2 A3 74 36  17 D2 55 E2  65 F2 B3 84  C3 D3 75 E3  s5....&D.TdE..t6..U.e.....u.
---  IMAG0741Sml.jpg       --0x0/0xA01E--------------------------------------------------------------
```

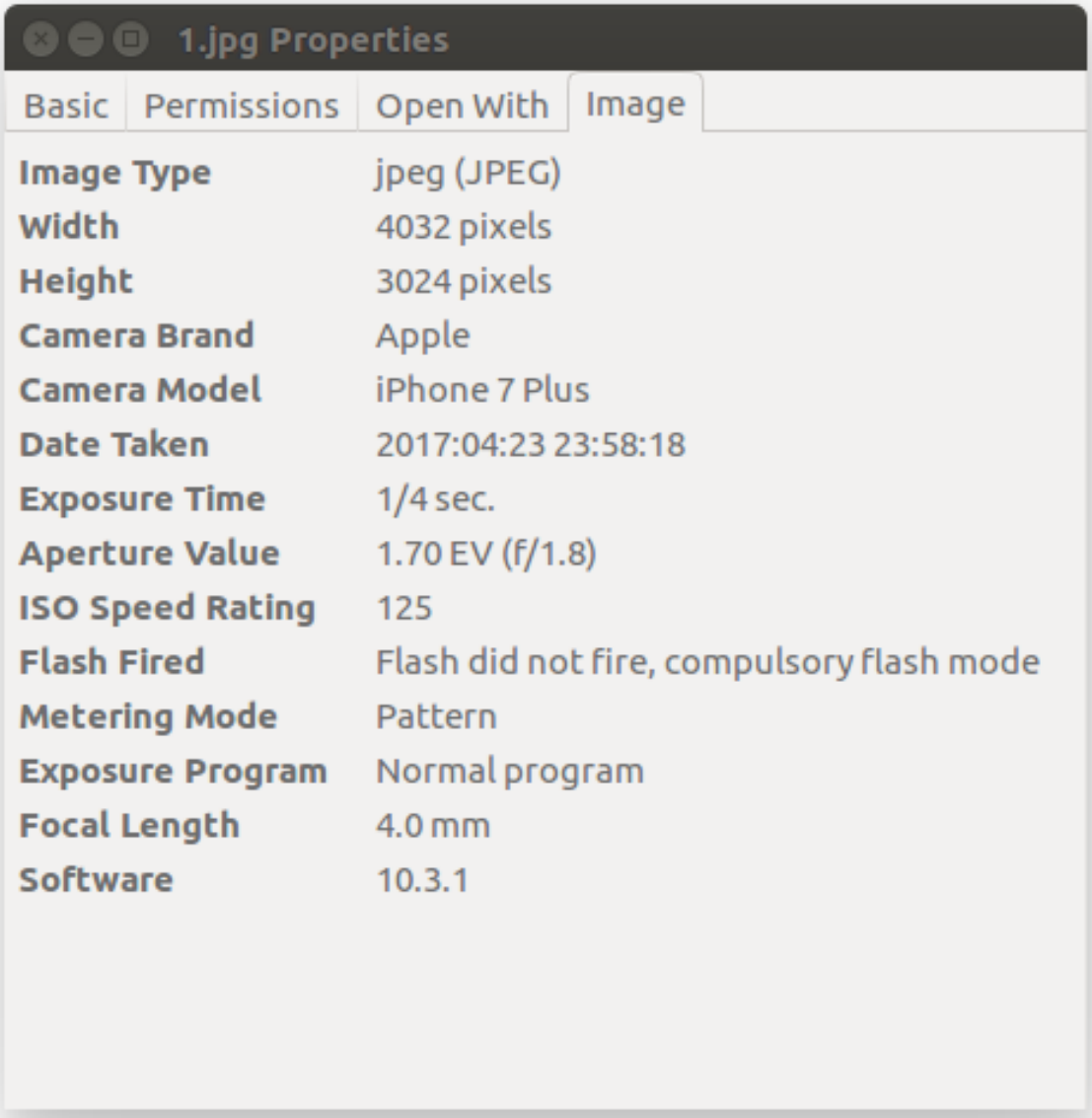
IFD TAGs

Metadata within IFD (Image File Directories) is store in 12-byte tags:

- Tag ID (2 bytes)
- Type (2 bytes)
- Count (4 bytes)
- Value or value offset (4 bytes)

```
00000010   00 48 00 00   FF E1 19 7E   45 78 69 66   00 00 4D 4D   .H.....~Exif..MM
00000020   00 2A 00 00   00 08 00 0B   01 0F 00 02   00 00 00 04   .*..............
00000030   48 54 43 00   01 10 00 02   00 00 00 0A   00 00 00 92   HTC.............
00000040   01 12 00 03   00 00 00 01   00 01 00 00   01 1A 00 05   ................
```

How to access metadata



How to access metadata

Terminal File Edit View Search Terminal Help

```
tatiana-san@tatianasan-eME732G:~/Documents/Digital Forensics/Mastodon$ exiftool 1.jpg
ExifTool Version Number         : 10.10
File Name                       : 1.jpg
Directory                       : .
File Size                       : 2.5 MB
File Modification Date/Time     : 2017:04:26 13:44:48+02:00
File Access Date/Time           : 2017:05:02 15:34:14+02:00
File Inode Change Date/Time     : 2017:05:02 15:33:57+02:00
File Permissions                : rwxrwxrwx
File Type                       : JPEG
File Type Extension             : jpg
MIME Type                       : image/jpeg
Exif Byte Order                 : Big-endian (Motorola, MM)
Make                            : Apple
Camera Model Name               : iPhone 7 Plus
Orientation                     : Rotate 90 CW
X Resolution                    : 72
Y Resolution                    : 72
Resolution Unit                 : inches
Software                        : 10.3.1
Modify Date                     : 2017:04:23 23:58:18
Y Cb Cr Positioning             : Centered
Exposure Time                   : 1/4
F Number                        : 1.8
Exposure Program                : Program AE
ISO                             : 125
Exif Version                    : 0221
Date/Time Original              : 2017:04:23 23:58:18
Create Date                     : 2017:04:23 23:58:18
Components Configuration        : Y, Cb, Cr, -
Shutter Speed Value             : 1/4
Aperture Value                  : 1.8
Brightness Value                : -1.935382685
Exposure Compensation           : 0
Metering Mode                   : Multi-segment
Flash                           : Off, Did not fire
Focal Length                    : 4.0 mm
Subject Area                    : 2015 1511 2217 1330
Run Time Flags                  : Valid
Run Time Value                  : 88952417741666
Run Time Epoch                  : 0
Run Time Scale                  : 1000000000
Sub Sec Time Original           : 164
```

How to access metadata

Terminal File Edit View Search Terminal Help

```
CMM Flags                       : Not Embedded, Independent
Device Manufacturer             : APPL
Device Model                    :
Device Attributes               : Reflective, Glossy, Positive, Color
Rendering Intent                : Perceptual
Connection Space Illuminant     : 0.9642 1 0.82491
Profile Creator                 : appl
Profile ID                      : e5bb0e9867bd46cd4bbe446ebd1b7598
Profile Description             : Display P3
Profile Copyright               : Copyright Apple Inc., 2015
Media White Point               : 0.95045 1 1.08905
Red Matrix Column               : 0.51512 0.2412 -0.00105
Green Matrix Column             : 0.29198 0.69225 0.04189
Blue Matrix Column              : 0.1571 0.06657 0.78407
Red Tone Reproduction Curve     : (Binary data 32 bytes, use -b option to extract)
Chromatic Adaptation            : 1.04788 0.02292 -0.0502 0.02959 0.99048 -0.01706 -0.00923 0.01508 0.75168
Blue Tone Reproduction Curve    : (Binary data 32 bytes, use -b option to extract)
Green Tone Reproduction Curve   : (Binary data 32 bytes, use -b option to extract)
Image Width                     : 4032
Image Height                    : 3024
Encoding Process                : Baseline DCT, Huffman coding
Bits Per Sample                 : 8
Color Components                : 3
Y Cb Cr Sub Sampling            : YCbCr4:2:0 (2 2)
Aperture                        : 1.8
GPS Altitude                    : 321 m Above Sea Level
GPS Date/Time                   : 2017:04:23 21:58:16.99Z
GPS Latitude                    : 49 deg 36' 36.62" N
GPS Longitude                   : 6 deg 7' 35.22" E
GPS Position                    : 49 deg 36' 36.62" N, 6 deg 7' 35.22" E
Image Size                      : 4032x3024
Megapixels                      : 12.2
Run Time Since Power Up         : 24:42:32
Scale Factor To 35 mm Equivalent: 7.0
Shutter Speed                   : 1/4
Create Date                     : 2017:04:23 23:58:18.164
Date/Time Original              : 2017:04:23 23:58:18.164
Thumbnail Image                 : (Binary data 11182 bytes, use -b option to extract)
Circle Of Confusion             : 0.004 mm
Field Of View                   : 65.5 deg
Focal Length                    : 4.0 mm (35 mm equivalent: 28.0 mm)
Hyperfocal Distance             : 2.07 m
Light Value                     : 3.4
```

Metadata after uploading an image

```
Terminal  File  Edit  View  Search  Terminal  Help
tatiana-san@tatianasan-eME732G:~/Documents/Digital Forensics/Mastodon$ exiftool 1ec3b94c77af992e
ExifTool Version Number         : 10.10
File Name                       : 1ec3b94c77af992e
Directory                       : .
File Size                       : 204 kB
File Modification Date/Time     : 2017:05:01 15:19:25+02:00
File Access Date/Time           : 2017:05:03 13:15:26+02:00
File Inode Change Date/Time     : 2017:05:01 15:19:32+02:00
File Permissions                : rw-rw-r--
File Type                       : JPEG
File Type Extension             : jpg
MIME Type                       : image/jpeg
JFIF Version                    : 1.01
Resolution Unit                 : inches
X Resolution                    : 72
Y Resolution                    : 72
Image Width                     : 1280
Image Height                    : 960
Encoding Process                : Baseline DCT, Huffman coding
Bits Per Sample                 : 8
Color Components                : 3
Y Cb Cr Sub Sampling            : YCbCr4:2:0 (2 2)
Image Size                      : 1280x960
Megapixels                      : 1.2
tatiana-san@tatianasan-eME732G:~/Documents/Digital Forensics/Mastodon$
```

(uploaded on Mastodon)

Metadata after uploading an image

```
tatiana-san@tatianasan-eME732G: ~/Documents/Digital Forensics/Mastodon
tatiana-san@tatianasan-eME732G:~/Documents/Digital Forensics/Mastodon$ exiftool sakura_flickr.jpg
ExifTool Version Number         : 10.10
File Name                       : sakura_flickr.jpg
Directory                       : .
File Size                       : 139 kB
File Modification Date/Time     : 2017:05:02 16:05:20+02:00
File Access Date/Time           : 2017:05:04 11:04:00+02:00
File Inode Change Date/Time     : 2017:05:02 16:05:20+02:00
File Permissions                : rw-rw-r--
File Type                       : JPEG
File Type Extension             : jpg
MIME Type                       : image/jpeg
JFIF Version                    : 1.01
Resolution Unit                 : None
X Resolution                    : 1
Y Resolution                    : 1
Image Width                     : 500
Image Height                    : 375
Encoding Process                : Baseline DCT, Huffman coding
Bits Per Sample                 : 8
Color Components                : 3
Y Cb Cr Sub Sampling            : YCbCr4:4:4 (1 1)
Image Size                      : 500x375
Megapixels                      : 0.188
tatiana-san@tatianasan-eME732G:~/Documents/Digital Forensics/Mastodon$
```

(uploaded on flickr)

Metadata after uploading an image

```
tatiana-san@tatianasan-eME732G:~/Documents/Digital Forensics/Mastodon$ exiftool e\ Bild\ vu\ Facebook.jpg
ExifTool Version Number         : 10.10
File Name                       : e Bild vu Facebook.jpg
Directory                       : .
File Size                       : 64 kB
File Modification Date/Time     : 2017:05:04 10:37:10+02:00
File Access Date/Time           : 2017:05:04 10:37:23+02:00
File Inode Change Date/Time     : 2017:05:04 10:37:11+02:00
File Permissions                : rw-rw-r--
File Type                       : JPEG
File Type Extension             : jpg
MIME Type                       : image/jpeg
JFIF Version                    : 1.02
Resolution Unit                 : None
X Resolution                    : 1
Y Resolution                    : 1
Current IPTC Digest             : d3619f9ee07de79a0f5086f4eaef2577
Original Transmission Reference : TC9T9-Y3A47wDSO2qG7S
Special Instructions            : FBMD01000ac2030000331b0000663c000001440000b14a00001f65000046950000c499000020a3000001ac0000c6010100
Profile CMM Type                : lcms
Profile Version                 : 2.1.0
Profile Class                   : Display Device Profile
Color Space Data                : RGB
Profile Connection Space        : XYZ
Profile Date Time               : 2012:01:25 03:41:57
Profile File Signature          : acsp
Primary Platform                : Apple Computer Inc.
CMM Flags                       : Not Embedded, Independent
Device Manufacturer             :
Device Model                    :
Device Attributes               : Reflective, Glossy, Positive, Color
Rendering Intent                : Perceptual
Connection Space Illuminant     : 0.9642 1 0.82491
Profile Creator                 : lcms
Profile ID                      : 0
Profile Description             : c2
Profile Copyright               : FB
Media White Point               : 0.9642 1 0.82491
Media Black Point               : 0.01205 0.0125 0.01031
Red Matrix Column               : 0.43607 0.22249 0.01392
Green Matrix Column             : 0.38515 0.71687 0.09708
Blue Matrix Column              : 0.14307 0.06061 0.7141
Red Tone Reproduction Curve     : (Binary data 64 bytes, use -b option to extract)
```

(uploaded on facebook)

Metadata after uploading an image

```
tatiana-san@tatianasan-eME732G: ~/Documents/Digital Forensics/Mastodon
tatiana-san@tatianasan-eME732G:~/Documents/Digital Forensics/Mastodon$ exiftool e\ Bild\ vu\ Gmail.jpeg
ExifTool Version Number         : 10.10
File Name                       : e Bild vu Gmail.jpeg
Directory                       : .
File Size                       : 128 kB
File Modification Date/Time     : 2017:05:04 11:02:47+02:00
File Access Date/Time           : 2017:05:04 11:58:51+02:00
File Inode Change Date/Time     : 2017:05:04 11:58:35+02:00
File Permissions                : rw-rw-r--
File Type                       : JPEG
File Type Extension             : jpg
MIME Type                       : image/jpeg
JFIF Version                    : 1.01
Resolution Unit                 : None
X Resolution                    : 1
Y Resolution                    : 1
Image Width                     : 904
Image Height                    : 678
Encoding Process                : Baseline DCT, Huffman coding
Bits Per Sample                 : 8
Color Components                : 3
Y Cb Cr Sub Sampling            : YCbCr4:2:0 (2 2)
Image Size                      : 904x678
Megapixels                      : 0.613
tatiana-san@tatianasan-eME732G:~/Documents/Digital Forensics/Mastodon$
```

(attached to Gmail message)

Metadata after uploading an image

```
tatiana-san@tatianasan-eME732G: ~/Documents/Digital Forensics/Mastodon
tatiana-san@tatianasan-eME732G:~/Documents/Digital Forensics/Mastodon$ exiftool e\ Bild\ vun\ Twitter.jpeg
ExifTool Version Number         : 10.10
File Name                       : e Bild vun Twitter.jpeg
Directory                       : .
File Size                       : 615 kB
File Modification Date/Time     : 2017:05:04 10:49:53+02:00
File Access Date/Time           : 2017:05:04 10:49:56+02:00
File Inode Change Date/Time     : 2017:05:04 10:49:53+02:00
File Permissions                : rw-rw-r--
File Type                       : JPEG
File Type Extension             : jpg
MIME Type                       : image/jpeg
JFIF Version                    : 1.01
Resolution Unit                 : None
X Resolution                    : 1
Y Resolution                    : 1
Image Width                     : 2048
Image Height                    : 1536
Encoding Process                : Progressive DCT, Huffman coding
Bits Per Sample                 : 8
Color Components                : 3
Y Cb Cr Sub Sampling            : YCbCr4:2:0 (2 2)
Image Size                      : 2048x1536
Megapixels                      : 3.1
tatiana-san@tatianasan-eME732G:~/Documents/Digital Forensics/Mastodon$
```

(uploaded on twitter)

Metadata after uploading an image

tatiana-san@tatianasan-eME732G: ~/Documents/Digital Forensics/Mastodon

```
Derived From Document ID        : xmp.did:EB7CEC52CC53E111B39D9C552667CA7D
Derived From Instance ID        : xmp.iid:6831D237D87BE111A1929F5D9F7200AB
Document ID                     : xmp.did:EB7CEC52CC53E111B39D9C552667CA7D
History Action                  : created, saved, saved, saved, saved, saved, saved, saved, saved, saved, saved, saved, saved, saved, saved, sa
ved, saved, saved, converted, derived, saved
History Changed                 : /, /, /, /, /, /, /, /, /, /, /, /, /, /, /, /, /, /, /, /
History Instance ID             : xmp.iid:EB7CEC52CC53E111B39D9C552667CA7D, xmp.iid:CB6A29AEDD53E11182E2974D2E5029C8, xmp.iid:CC6A29AEDD53E1118
2E2974D2E5029C8, xmp.iid:018665725A66E111BA11A2B42AE587B9, xmp.iid:028665725A66E111BA11A2B42AE587B9, xmp.iid:D71A1D001567E111B2E1DD89D0E983C9,
xmp.iid:D81A1D001567E111B2E1DD89D0E983C9, xmp.iid:D91A1D001567E111B2E1DD89D0E983C9, xmp.iid:DA1A1D001567E111B2E1DD89D0E983C9, xmp.iid:DB1A1D001
567E111B2E1DD89D0E983C9, xmp.iid:DC1A1D001567E111B2E1DD89D0E983C9, xmp.iid:56CCB7383B67E11192D7B4FA3A4CFEEA, xmp.iid:57CCB7383B67E11192D7B4FA3A
4CFEEA, xmp.iid:ADAF56AAA27BE11185D68345D25386EE, xmp.iid:AEAF56AAA27BE11185D68345D25386EE, xmp.iid:AFAF56AAA27BE11185D68345D25386EE, xmp.iid:B
0AF56AAA27BE11185D68345D25386EE, xmp.iid:B1AF56AAA27BE11185D68345D25386EE, xmp.iid:6831D237D87BE111A1929F5D9F7200AB, xmp.iid:6931D237D87BE111A1
929F5D9F7200AB
History Parameters              : from application/vnd.adobe.photoshop to image/jpeg, converted from application/vnd.adobe.photoshop to image/j
peg
History Software Agent          : Adobe Photoshop CS5.1 Windows, Adobe Photoshop CS5.1 Windows, Adobe Photoshop CS5.1 Windows, Adobe Photoshop
CS5.1 Windows, Adobe Photoshop CS5.1 Windows, Adobe Photoshop CS5.1 Windows, Adobe Photoshop CS5.1 Windows, Adobe Photoshop CS5.1 Windows, Adob
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shop CS5.1 Windows, Adobe Photoshop CS5 Windows, Adobe Photoshop CS5 Windows
History When                    : 2012:02:10 15:48:02+06:00, 2012:02:10 18:03:48+06:00, 2012:02:10 18:03:48+06:00, 2012:03:05 06:30:45+06:00, 2
012:03:05 06:30:45+06:00, 2012:03:06 04:48:32+06:00, 2012:03:06 04:48:32+06:00, 2012:03:06 04:50:27+06:00, 2012:03:06 04:50:27+06:00, 2012:03:0
6 04:54:07+06:00, 2012:03:06 04:54:07+06:00, 2012:03:06 09:31:18+06:00, 2012:03:06 09:31:18+06:00, 2012:04:01 08:30:37+06:00, 2012:04:01 08:30:
37+06:00, 2012:04:01 08:34:23+06:00, 2012:04:01 08:34:23+06:00, 2012:04:01 08:36:52+06:00, 2012:04:01 13:55:03+05:00, 2012:04:01 13:55:03+05:00
Instance ID                     : xmp.iid:6931D237D87BE111A1929F5D9F7200AB
Original Document ID            : xmp.did:EB7CEC52CC53E111B39D9C552667CA7D
History                         : 2012-02-10T15:05:46+06:00.File Untitled-1 opened..2012-02-10T15:48:02+06:00.File H:\Photoshopwork\Febrary\Cor
ridor\1.psd saved..2012-02-10T18:02:18+06:00.File 1.psd opened..2012-02-10T18:03:48+06:00.File H:\Photoshopwork\Febrary\Corridor\15.psd saved..
2012-03-05T06:23:22+06:00.File 15.psd opened..2012-03-05T06:30:45+06:00.File H:\Photoshopwork\March\Internet_notebook\11.psd saved..2012-03-06T
04:46:31+06:00.File 11.psd opened..2012-03-06T04:48:32+06:00.File H:\Photoshopwork\March\Globe_internet\18.psd saved..2012-03-06T04:50:27+06:00
.File H:\Photoshopwork\March\Globe_internet\19.psd saved..2012-03-06T04:54:07+06:00.File H:\Photoshopwork\March\Globe_internet\20.psd saved..20
12-03-06T09:28:20+06:00.File 20.psd opened..2012-03-06T09:31:18+06:00.File H:\Photoshopwork\March\Web_business\9.psd saved..2012-04-01T08:22:05
+06:00.File 9.psd opened..2012-04-01T08:30:37+06:00.File H:\Photoshopwork\March\Intrnet_adstract\1.psd saved..2012-04-01T08:34:23+06:00.File H:
\Photoshopwork\March\Intrnet_adstract\2.psd saved..2012-04-01T08:36:52+06:00.File H:\Photoshopwork\March\Intrnet_adstract\2.psd saved
Image Width                     : 894
Image Height                    : 537
Encoding Process                : Baseline DCT, Huffman coding
Bits Per Sample                 : 8
Color Components                : 3
Y Cb Cr Sub Sampling            : YCbCr4:4:4 (1 1)
Image Size                      : 894x537
Megapixels                      : 0.480
Thumbnail Image                 : (Binary data 4375 bytes, use -b option to extract)
```

(uploaded on Fotolia)

How difficult is to extract metadata?

```
from PIL import Image

image=Image.open("1.jpg")
info = image._getexif()
print (info)
```

```
tatiana-san@tatianasan-eME732G: ~/Python/PIL - parcing jpg metadata
tatiana-san@tatianasan-eME732G:~/Python/PIL - parcing jpg metadata$ python extract_metadata.py

{36864: b'0220', 37121: b'\x01\x02\x03\x00', 40962: 500, 36867: '2012:07:19 19:29:40', 36868:
'2012:07:19 19:29:40', 40965: 408, 40960: b'0100', 40961: 1, 37386: (492, 100), 271: 'HTC', 27
2: 'Desire HD', 274: 1, 40963: 299, 282: (720000, 10000), 283: (720000, 10000), 34853: {0: b'\
x02\x02\x00', 1: 'N', 2: ((42, 1), (28, 1), (5147, 100)), 3: 'W', 4: ((73, 1), (40, 1), (1694,
 100)), 5: b'\x00', 6: (0, 1), 7: ((23, 1), (29, 1), (40, 1)), 27: b'ASCII\x00\x00\x00NETWORK'
, 18: 'WGS-84', 29: '2012:07:19'}, 34855: 109, 296: 2, 34665: 220, 305: 'Adobe Photoshop CS4 W
indows', 306: '2012:07:25 08:38:29', 531: 1}
tatiana-san@tatianasan-eME732G:~/Python/PIL - parcing jpg metadata$
```

How metadata can be used?

- Law enforcement
- Advertising
- Selling info to other companies
- Social engineering
- Tracking your location
- Stealing images (wiping metadata)

How to wipe metadata?

- exiftool -all= foo.jpg

  or

- exiftool -geotag= foo.jpg

“exiftool -all foo.jpg” without “=”

will just list the metadata, but won’t remove it!

Questions to discuss

- Do you need to wipe metadata before posting an image?
- Do social networks have right to collect metadata?
- Should they notify users about it?
- Is metadata considered as private data by law?

Read more...

- Anatomy of a JPG image
- ExifTool (sourceforge)
- EXIF specification (download pdf)