THE HIDDEN DATA IN YOUR IMAGES

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What is Image Metadata?

- Text information pertaining to the image that is either embedded in the file or contained in a separate file that is associated with it.
- Metadata is often generated automatically at image capture time.
- Some metadata may be added manually after capture.
- Metadata can be changed and removed.

Types of Image Metadata

- Technical metadata (mostly automatically generated)
  - Camera make & model
  - Camera settings (aperture, shutter speed, ISO etc)
  - Date & time
  - GPS location coordinates
- Varies by device type and model
- Sometimes controlled by device settings

Types of Image Metadata

- Descriptive metadata (mostly added manually post capture)
  - Caption/Title
  - Location names
  - Names of people
  - Content descriptions
  - Keywords/Tags
- Effective descriptive data makes images:
  - Searchable
  - Meaningful to people who were not present at time of capture

Types of Image Metadata

- Administrative metadata
  - Name/Contact Details of image creator
  - Name/Contact Details of the Copyright holder
  - Licencing and Usage rights
  - Model details
- Caution! This information can easily be removed so additional measures may be required e.g watermarking

Physical Storage of Metadata

- Most common image file types can store metadata (JPEG, TIFF, DNG, PNG etc)
- The few file formats without embedded metadata (usually old raw images) can be associated with a separate "sidecar" file e.g. `image0100.kdc` and `image0100.xmp`

Physical Storage of Metadata

- Two methods used to store metadata within the image file:
  - 1.Image Resource Block IRB
    - Data is in fixed length, fixed position blocks within the file
    - Inflexible – difficult to update
    - Inefficient use of storage space
    - Older method that has largely been superseded by…
  - 2. Extensible Metadata Platform XMP
    - Uses Extensible Markup Language XML to encode data

XMP Metadata: Wildflower.jpg

Editor | XMP Dump | RDF Source | Options

```
<?xpacket begin="" id="W5M0MpCehiHzreSzNTczkc9d"?>
<x:xmpmeta xmlns:x="adobe:ns:meta/" x:xmptk="XMP Core 5.6.0">
   <rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#">
      <rdf:Description rdf:about=""
            xmlns:tiff="http://ns.adobe.com/tiff/1.0/"
            xmlns:xmp="http://ns.adobe.com/xap/1.0/"
            xmlns:exif="http://ns.adobe.com/exif/1.0/"
            xmlns:photoshop="http://ns.adobe.com/photoshop/1.0/">
         <tiff:Orientation>1</tiff:Orientation>
         <tiff:XResolution>4718592/65536</tiff:XResolution>
         <tiff:YResolution>4718592/65536</tiff:YResolution>
         <tiff:ResolutionUnit>2</tiff:ResolutionUnit>
         <tiff:YCbCrPositioning>1</tiff:YCbCrPositioning>
         <tiff:Make>Panasonic</tiff:Make>
         <tiff:Model>DMC-FZ35</tiff:Model>
         <xmp:CreatorTool>QuickTime 7.7.3</xmp:CreatorTool>
         <xmp:ModifyDate>2015-11-16T16:25:40</xmp:ModifyDate>
         <xmp:CreateDate>2010-06-06T14:22:51</xmp:CreateDate>
         <exif:ColorSpace>1</exif:ColorSpace>
         <exif:CompressedBitsPerPixel>4/1</exif:CompressedBitsPerPixel>
```

Add Property... | Cancel | OK

Physical Storage of Metadata

- Two methods used to store metadata within the image file:
  - 2. Extensible Metadata Platform XMP
    - Uses Extensible Markup Language XML to encode data
    - More flexible - easy to add new data items
    - Supports Unicode (can handle special characters e.g. ä é θ ∞ ¥)

Image Metadata Standards

- The standard defines the Schema – What data is recorded and how.
- List of field names and values
- Defines type of value e.g. free text, numeric
- Where appropriate defines meaning of each value

Image Metadata Standards - example

- EXIF standard:
- TAG (field name): MeteringMode
- Value type: Short number (0-255)
- Values:
  - 0 = Unknown
  - 1 = Average
  - 2 = Centre Weighted Average
  - 3 = Spot
  - 4 = Multi-spot
  - 5 = Pattern
  - 6 = Partial
  - 255 = Other

Image Metadata Standards

- EXIF (Exchangeable Image File format)
  - Defined by the Camera & Imaging Products Association (CIPA)
  - Widely used for camera generated metadata
- IPTC (International Press and Telecommunications Council)
  - IPTC-IIM (Information Exchange Model) original schema only IRB
  - IPTC-Core and Extensions later versions for XMP
  - Used mostly for embedding administrative data for legal purposes
- PLUS (Picture Licensing Universal System)
  - Also focussed on rights and ownership information

Image Metadata Standards

- Dublin Core
  - Named after Dublin, Ohio
  - Set up/maintained by an organisation of librarians
  - ISO recognised standard
  - Largely inter-operable with IPTC Core
- XMP
  - Not only a physical storage method but also a set of standards
  - Defined and implemented by Adobe
  - Very flexible – users can define their own fields

Changing/Deleting Image Metadata

- Windows File Explorer
  - Right click image file name
  - Select Properties then Details
  - Shows many of the EXIF/IPTC metadata fields
  - Varies according to file type (JPEG = good, RAW = poor)
  - Many of these are “click to update”
  - Click “Remove Properties and Personal Information”
  - Options to create a clean copy or remove properties from this file

Changing/Deleting Image Metadata

- Any number of specialised “apps”
- ExifTool by Phil Harvey is the Rolls Royce
- Download from https://exiftool.org
- Command line tool but Windows friendly version is available

Why Bother Changing Metadata?

- Date/Time Image Created
  - When scanning old prints/negatives this is set to date of scanning
  - If you know when the original image was taken it is useful to be able to record this in the proper metadata field
- Legacy Lenses
  - If you use old film camera lenses on a new camera they will not communicate their identity but it can be recorded in post processing.
- Spoofing the Model of Camera
  - Why do this?

Fujifilm Camera Issue

- Fujifilm X100S camera
- Film Simulation modes
- Velvia, Astia, Provia and several B&W modes
- Next model X100T
- Adds Classic Chrome mode
- Not available on X100S…
- … or is it?

Adobe Camera Matching RAW Profiles

- Adobe Lightroom, Photoshop, Camera RAW can reproduce the “creative presets” used by most cameras.
- These are what Fujifilm calls “Film Simulations”
- Adobe will offer only those profiles appropriate to the camera model as shown in the EXIF metadata
- Does this mean that if you change the camera model value from X100S to X100T Adobe will then offer the “Classic Chrome” profile for that image?

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