

Annotation in Digital Image Files

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ABSTRACT

Many digital image files accommodate metadata items we may describe as *annotation*, human-oriented information about the image or its circumstances. In this article we describe three classes of such annotation data items. We also discuss the way several image-manipulation software packages allow us to view, add, or change annotation data.

INTRODUCTION

Metadata

Many image file formats include, or have provision for, various items of *metadata*, a term which, in this context, can be taken as meaning “data about data”. In this case, the second “data” refers to the image itself.

We can arbitrarily divide this metadata into two broad categories, *technical metadata* and *annotation metadata*, as follows:

Technical metadata—This includes:

- Information about the image itself, such as pixel dimensions
- Information about the scanner, camera, or other device which captured the image, such as its make and model
- Information about the technical details of the image capture, such as aperture, shutter speed, and so forth

Annotation metadata—This is “human-oriented” information about the image and its circumstances, as for example the name of the photographer or a copyright notice.

File formats

In this paper, we will concentrate on image files we usually describe as *JPEG files*, as the image data in them is encoded and compressed in using the JPEG technique. These are often recognized as having filetype extensions of JPG (sometimes JPE or JPEG).

However, there are at least four separate file formats encountered among such files:

Basic JPEG file—This format is defined by Annex B of the JPEG specification. It provides for a minimal repertoire of metadata items.

JFIF file—This is the JPEG File Interchange Format. It adds provisions for additional metadata items. It also makes more specific such vital matters as the color model under which the image data is represented (about which the JPEG specification itself is silent).

Exif file—This is the Exchange Image Format standard. This format may in fact have the image data itself represented in any of three forms: uncompressed RGB, TIFF, or JPEG. One of the hallmarks of this file format is its provisions for a rich set of both technical and annotation metadata. The technical metadata has become of great importance to digital photographers, so much so that many believe the designation “Exif” refers only to that metadata, whereas in fact it describes this entire file format. The format specification covers many features beyond the provisions for metadata.

DCF file—This is the Design Rule for Camera Format standard, an extension of the Exif file format developed by a consortium of Japanese digital camera makers. This format is used for JPEG output by most contemporary digital still cameras.

Software applications

Many software applications include provision for doing some or all of the following with respect to annotation metadata in an image file:

- Display the annotation metadata that is present
- Change existing annotation items
- Add annotation items to an existing “block” of annotation items
- Add a “block” of annotation data to a file not previously having any

Later we will discuss the particular capabilities of the following “image file viewers” software packages in that regard:

- ViewPrint
- Exifer
- IrfanView

- BreezeBrowser
- Canon EOS Viewer Utility (EVU)

Several of Adobe Systems' *Photoshop* image editor packages have extensive capabilities for managing various types of annotation metadata. However, we do not use those packages here and have no information on their specific capabilities. Thus they will not be reported on in this article.

ANNOTATION METADATA

We will be concerned with three types of annotation metadata. In some cases, there is a very rich repertoire of data items defined by the pertinent specification. In this article, we will generally limit our outlook to those data items which can be viewed or edited by at least one of the listed software packages.

The JPEG *Comment*

This item can appear in any of the three JPEG file types. It is a free text field. I am not aware of any length limitation.

Exif annotation metadata

The metadata structure of the Exif file format includes four annotation data items which we can access with one or more of the software packages listed. There is no length imitation specified for any of these items (although an application may impose a length limit):

ImageDescription—This would typically carry a caption for the image.

Artist—This is intended to record the name of the camera owner, photographer, and/or image creator (perhaps multiple names).

Copyright—This is intended to carry a copyright notice. Although a single data item, it actually carries two sub-fields, arranged in a specified syntax. The first is the copyright notice on behalf of the *photographer* and the second the copyright notice on behalf of the *editor* (as applicable).

UserComment—For use as desired.

IPTC data

A rich structure of annotation metadata, applicable to files carrying photographic images, other graphic images, video, audio, or text has been standardized by the International Press Telecommunications

Council (IPTC) in conjunction with the Newspaper Association of America (NAA). As we might guess, its emphasis is on the journalistic sphere.

The IPTC structure provides for the data items (called there, formally, *data sets*) to be gathered into various *records*, of which there are several types. The two record types of greatest interest here are:

- Application record (record 2)—This provides data items describing the *object* itself: the image, audio clip, text item, etc.
- Envelope record (record 1)—This provides data items pertaining to the conveyance (transmission) of the object.

As we stated earlier, we will only deal here with IPTC data items that can be dealt with by at least one of the software applications listed above.

Table 1 gives a list of those IPTC data items. The names given are those of the IPTC standard, and the definitions generally follow the standard verbatim, although I have paraphrased a few of them in the interest of clarity.

The standard names are in some case rather curious, unique creatures of the argot of journalism. Many applications that provide support for this kind of data describes the items with other names, presumably chosen to help users outside the journalistic sphere make reasonable use of them.

SOFTWARE APPLICATIONS

In this section, for each of the software applications listed above, we will describe the scope of their support of the three types of annotation metadata described above.

Note that most of these applications have various provisions for manipulating this annotation data beyond direct editing, such as saving it to a special file, copying it from one file to another, the use of templates for repeating annotation, etc. These facilities are beyond the scope of this article.

ViewPrint

ViewPrint is a convenient graphic file viewer published by Hamrick Software.

ViewPrint provides for viewing the *JPEG Comment*. To do so, press “N” with the image in view. A “Comments” window opens displaying the JPEG Comment, if present. Pressing “N” again will dismiss this window.

The JPEG Comment will be included if the image is saved to a new file. Note that whether or not any modification is made to the image, the image data in the new file is freshly encoded and compressed from the image in memory. Thus, if we use this facility to add a JPEG Comment to a file, the image in the file suffers one more generation of “JPEG encoding error”.

The existing JPEG Comment may be edited, or a comment added where none was present (Ctrl-E opens the Comment editing window), before the file is saved.

A wrinkle is that when the Comments window is opened, a number of Exif metadata items (of the “technical” sort), if present, are presented in the window, ViewPrint’s homey way of dealing with Exif information. If there is in fact a JPEG Comment, it appears at the bottom of this litany, without benefit of any identifying label.

BreezeBrowser

BreezeBrowser is a capable image viewer and manager published by Breeze Systems. It provides for the viewing, editing, or addition of these types of annotation metadata:

- Exif annotation

Comment (“User comments”)—Read/edit/add*

Image description—Read only

*Note that you cannot add the Exif Comment item to other than an Exif file.

- IPTC data

Selected items (see Appendix)

BreezeBrowser does not provide support for the JPEG Comment.

To read the Exif annotation items, click on Full Details (above the Summary).

To add or edit the Exif Comment, right click on the image and select Edit Comments (or press Ctrl-E).

To view, add, or edit the IPTC items, right click on the image and select Edit IPTC Data (or press Shift-Ctrl-I).

If the image proper has not been modified, annotation metadata does not affect the JPEG image data itself when the file is updated—that is, these operations are “lossless” with respect to the JPEG image data.

Exifer

Exifer is a very nice Exif metadata manipulation tool published by Friedemann Schmidt. It provides for the viewing, editing, or addition of these types of annotation metadata:

- JPEG Comment—read/edit/add
- Exif annotation metadata—read/edit/add*

Description

Artist

Copyright: Photographer; Editor

Comment

*Note that you only add Exif annotation items to an Exif file.

- IPTC data—read/edit/add for all

Selected items (see Appendix)

To access any of this metadata, select the file of interest from the file list (or have the file of interest open) and press Ctrl-E.

If the image proper has not been modified, annotation metadata does not affect the JPEG image data itself when the file is updated—that is, these operations are “lossless” with respect to the JPEG image data

IrfanView

IrfanView is a convenient image file viewer published by Irfan Skiljan. It provides for the viewing, editing, or addition of these types of annotation metadata:

- Exif annotation metadata—read only for all

ImageDescription

Artist

Copyright

UserComment

- IPTC data—read/edit/add for all

Selected items (see Appendix)

To access any of this metadata, have the file of interest open and click on the “circle i” (Info) button on the toolbar.

If the image proper has not been modified, annotation metadata does not affect the JPEG image data itself when the file is updated —that is, these operations are “lossless” with respect to the JPEG image data

Canon EOS Viewer Utility (EVU)

This package is provided by Canon, Inc. for use with images generated by the Canon EOS line of digital SLR cameras. It is not intended to be a general-purpose file viewer/manipulator, and will only work with the Canon proprietary “RAW” format file pairs and with JPG files in the DCF format. It provides for the viewing, editing, or addition of these types of annotation metadata:

- Exif annotation metadata—read/edit/add

UserComment

- IPTC data—read/edit/add for all

Selected items (see Appendix)

Note that if a JPG file has already had IPTC data added by another application (*e.g.*, BreezeBrowser), FVU may not recognize the IPTC “block”, and accordingly will not display the IPTC data, allow it to be modified, or allow the addition of further data items. We suspect this is the result of the metadata engine in the program having taken some “shortcuts” with respect to the offset/pointer data structure used for the IPTC data.

Although EVU supports various different types of Canon “RAW” format image file pairs, it only supports IPTC data on certain of them (as well, of course, on JPG files of the type EVU will handle at all).

TABLES

Table 1, attached, lists the JPEG and Exif annotation data items supported by at least one of the mentioned applications, indicating the applications by which each is supported. Also shown are the names by which each item is known in each of the applications.

Tables 2.1 and 2.2 lists the IPTC annotation data items that are supported by at least one of the mentioned applications, indicating the applications by which each is supported. Also shown are the names by which each item is known in each of the applications.

Table 3 lists the IPTC annotation data items that are supported by at least one of the mentioned applications with detailed descriptions. The descriptions are generally taken verbatim from the IPTC specification, although in a few cases I have paraphrased them for clarity.

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Table 1

JPEG and Exif annotation metadata—Data items supported by various applications

JPEG metadata

JPEG name	ViewPrint name	Exifer name
Comment	Comment	Comment

Exif annotation metadata

Exif name	Canon EVU name	BreezeBrowser name	IrfanView name	Exifer name
ImageDescription		Image Description	ImageDescription	Image Description
Artist			Artist	Artist
Copyright			Copyright	Copyright
UserComment	Comment	Comment	UserComment	Comment

Note that Exif annotation metadata may only be applied to Exif files.



Read-only



Item not supported by that application

Table 2.1**IPTC annotation metadata – Data items supported by various applications**

Ref.	IPTC name	BreezeBrowser name	IrfanView name	Exifer name
2:5	Object Name	Object name	Object name	Object name
2:120	Caption/Abstract	Caption	Caption	Description
2:122	Writer/Editor	Caption writer	Caption writer	Author
2:80	By-line	Byline	Byline	Author name
2:85	By-line title	Byline title	Byline title	Author title
2:105	Headline	Headline	Headline	Headline
2:110	Credit	Credit	Credits	Credit
2:115	Source	Source	Source	Source
2:116	Copyright Notice	Copyright	Copyright	Copyright notice
2:40	Special Instructions	Special instructions	Special instructions	Special instructions
2:25	Keywords	Keywords	Keywords	Keywords
2:15	Category	Category	Category	Category
2:20	Supplemental category	Supplemental categories	Supplemental categories	Supplemental categories
2:55	Date Created	Date created	Date created	Creation date
2:19	Time Created	Time created		Creation time
2:30	Release Date	Release date		Distribution date
2:35	Release Time	Release time		Distribution time
2:10	Urgency	Priority	Urgency	Urgency

Ref.	IPTC name	BreezeBrowser name	IrfanView name	Exifer name
2:90	City	City	City	City
2:92	Sub-location	Sublocation		
2:95	Province/State	State/Province	Province-State	State
2:101	Country/Primary Location Name	Country	Country	Country
2:100	Country/Primary Location Code	Country code	Country code	Country code
2:103	Original Transmission Reference	Original Transmission Reference	Original transmission reference	Transmission reference
2:75	Object Cycle	Object cycle		Cycle
2:7	Edit Status	Edit status		Edit state
2:45	Reference Service			Reference Service
2:47	Reference Date			Reference Date
2:50	Reference Number			Reference Number
2:22	Fixture ID	Job ID		Job state
2:65	Originating Program	Program		Software
2:70	Program Version			Software version
1:30	Service Identifier			Service-ID
1:70	Date Sent			Sent date
1:80	Time Sent			Sent time


 Item not supported by that application

Table 2,2**IPTC annotation metadata—Data items supported by various applications**

Ref.	IPTC name	Canon EVU name
2:5	Object Name	Title
2:120	Caption/Abstract	Caption
2:122	Writer/Editor	Caption Creator
2:80	By-line	Photographer
2:85	By-line title	Photographer's Title
2:105	Headline	Subtitle
2:110	Credit	Credits
2:115	Source	Original Owner
2:116	Copyright Notice	
2:40	Special Instructions	Special Instructions
2:25	Keywords	KeyWord
2:15	Category	Category
2:20	Supplemental category	Sub-Category
2:55	Date Created	Shooting Data
2:19	Time Created	Shooting Time
2:30	Release Date	
2:35	Release Time	
2:10	Urgency	

Ref.	IPTC name	Canon EVU name
2:90	City	Sender's City
2:92	Sub-location	
2:95	Province/State	
2:101	Country/Primary Location Name	
2:100	Country/Primary Location Code	
2:103	Original Transmission Reference	Photo No.
2:75	Object Cycle	
2:7	Edit Status	
2:45	Reference Service	
2:47	Reference Date	
2:50	Reference Number	
2:22	Fixture ID	
2:65	Originating Program	Media
2:70	Program Version	
1:30	Service Identifier	
1:70	Date Sent	
1:80	Time Sent	


 Item not supported by that application

Table 3
Selected IPTC Data Items

The IPTC data items listed are only those supported by one or more of the file-manipulation software packages discussed in the body of the paper. There are numerous additional data items defined by the IPTC specification.

The descriptions of the data items are generally taken verbatim from the IPTC specification, but have in some cases been paraphrased for clarity.

The formal term for a “data item” in the IPTC specification is “Data Set”. The introductory numeric group comprises the Record Number, a colon, and the Data Set Number.

The figure in square brackets indicates the maximum number of characters for the item. An “R” in square brackets indicates that the item may repeat; that is, may appear multiple times.

Note that the IPTC notation may be used in connection not only with still photographic images as the “object” but also with other graphic images, audio files, video files, and files representing text.

Items in the “envelope” record (these pertain to the “envelope” by which the actual object (image, etc.) is transmitted, not the object itself)

- 1:30 Service Identifier—[10] Identifies the provider and product.
- 1:70 Date Sent—[8]
- 1:80 Time Sent—[8]

Items in the “application” record (these pertain to the object itself)

- 2:5 Object Name—[64] Identifies the type of program used to originate the object data. Examples: “Wall St.”, “Ferry Sinks”
- 2:7 Edit Status—[64] Status of the object data, according to the practice of the provider. Examples: “Lead”, “Correction”.
- 2:10 Urgency—[1] Specifies the editorial urgency of content. The '1' is most urgent, '5' normal and '8' denotes the least-urgent material. The numerals '9' and '0' are reserved for future use.
- 2:15 Category—[3] Identifies the subject of the object data in the opinion of the provider, using a code system maintained by the provider. (Deprecated—expected to be deleted from the standard.)

- 2:20 Supplemental category—[32] [R] Supplemental category description that further refines the subject of the object data. (Deprecated—expected to be deleted from the standard.)
- 2:22 Fixture ID—[32] Identifies object data that recurs often and predictably. Enables users to immediately find or recall such an object. Example: "EUROWEATHER"*
- 2:25 Keywords—[64] [R] Used to indicate specific information retrieval words.
- 2:30 Release Date—[8] The earliest date the provider intends the object to be used
- 2:35 Release Time—[11] Goes with *Release Date*
- 2:40 Special Instructions—[256] Other editorial instructions concerning the use of the object data, such as embargoes and warnings. Examples: "SECOND OF FOUR STORIES", "3 Pictures follow", "Argentina OUT", "No magazine use".
- 2:45 Reference Service—[10] [R] Identifies the Service Identifier of a prior envelope to which the current object refers. [See item 1:30]
- 2:47 Reference Date—[8] [R] Identifies the date of a prior envelope to which the current object refers. [See item 1:70]
- 2:50 Reference Number—[8] [R] Identifies the Envelope Number of a prior envelope to which the current object refers.
- 2:55 Date Created—[8] The date of creation of the intellectual content (not necessarily of the present physical representation)
- 2:60 Time Created—[11] Goes with *Date Created*
- 2:65 Originating Program—[32] Identifies the software program used to originate the object data.
- 2:70 Program Version—[10] Goes with *Originating Program*
- 2:75 Object Cycle—[1] 'a' = am, 'p' = pm, 'b' = both
- 2:80 By-line—[32] [R] Contains name of the creator of the object data, e.g. writer, photographer or graphic artist.
- 2:85 By-line title—[32] [R] The title of the creator. Examples: "Staff Photographer", "Special Correspondent"
- 2:90 City—[32] The city in which the object data originates
- 2:92 Sub-location—[32] The location (within a city) in which the object data originates. Example: "Capital Hill"
- 2:95 Province/State—[32]

* I have no idea what that means!

- 2:100 Country/Primary Location Code [3] [3-letter Country code]
- 2:101 Country/Primary Location Name—[32]
- 2:103 Original Transmission Reference—[64] A code representing the location of original transmission according to practices of the provider.
- 2:105 Headline—[256] A publishable entry providing a synopsis of the contents of the object data. Example: “Lindbergh Lands in Paris”
- 2:110 Credit—[32] Identifies the provider of the object data, not necessarily the owner/creator.
- 2:115 Source—[32] Identifies the original owner of the intellectual content of the object data. This could be an agency, a member of an agency or an individual.
- 2:116 Copyright Notice—[128]
- 2:120 Caption/Abstract—[2000] A textual description of the object data. [Note that for a photographic image object, the caption in some cases will in fact be the “accompanying story”.]
- 2:122 Writer/Editor—[32] [R] Identification of the name of the person involved in the writing or editing of the caption/abstract, or [especially for a text object] the object data itself.

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