



About Exif 3.0

~ Overview of the latest revision ~

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Camera and Imaging Products Association

History of Exif

- ❑ The Exif standard was established in 1995 as a standard image format for cameras that can record metadata*. Currently, it is used worldwide in the majority of consumer imaging devices, including not only digital cameras but also smartphones, and is known as a successful example of the international standards originating from Japanese industries.
(* Additional data attached to a data which are separate from the data itself. For example, For image data of a digital camera, information such as the shooting date and time and shutter speed are metadata.)

- ❑ The history of the revision, mainly related to other information tags that are highly related to this revision, is shown below.

- ◆ **Ver.1.0: 1995** (28 years ago: the 1st edition published)

- ◆ **Ver.2.0: 1997**

- Added GPS Info IFD provisions that record GPS (location) information

- ◆ **Ver.2.2: 2002**

- Added ImageUniqueID tag to prove the uniqueness of the captured image
- Supported to **Exif Print** 

- ◆ **Ver.2.3: 2010**

- Added a group of tags that can describe the camera owner, serial number, etc. to prove the history (origin)

- ◆ **Ver.2.31: 2018**

- Enabled description of time difference with UTC
- Added tags related to shooting conditions such as temperature, humidity, pressure, etc. that are obtained from sources other than image sensors

- ◆ **Ver.3.0: 2023** Revision focused on "other information" other than image structure and shooting conditions

- Added a scheme that enables arbitrary annotation description (AI learning data, inference results, etc.)
- Added an original preservation image that records the shooting scene and keep them even to post-processing
- Added guidelines for usage of information metadata for post-processing (after shooting)
- Added a group of tags that can describe the name of the work person and the name of the used software in each post-process

Classification of Exif tags (metadata)
(in Annex H)

1. Image structure related metadata
2. Shooting condition related metadata
3. **Metadata storing other information**
 - Image capture date and time, image capture location
 - Name of camera, lens, software, etc.
 - Name of owner, photographer, image editor, etc.
 - Description of the image itself

Background and aim of revision into Exif 3.0

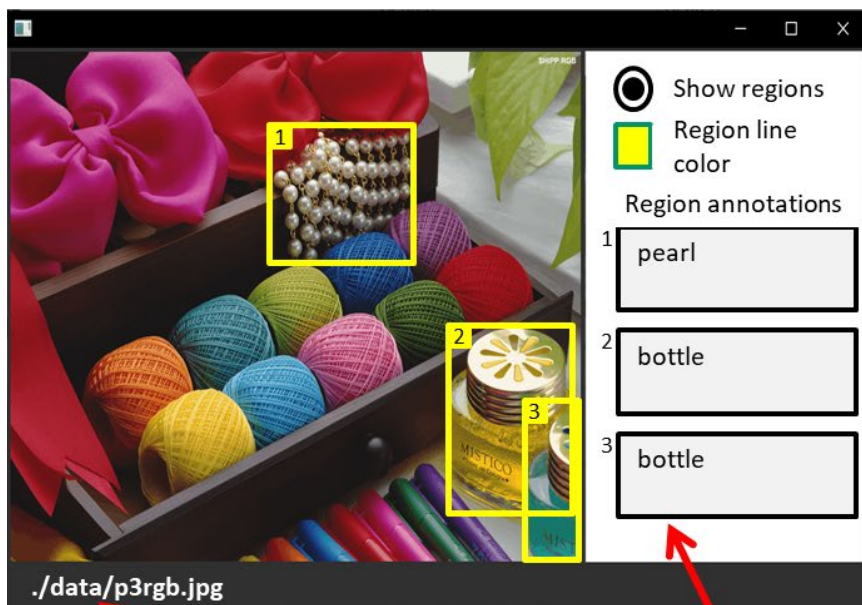
- As the use of AI and IoT advances in industry, images and videos from various cameras and image sensors are being used as important information in various fields. Then the importance of comprehensive management of various types of metadata together with information from other sensors, etc. is increasing.
 - Thus, decided to revise Exif, which is used worldwide as a common platform for consumer imaging equipment, so that it can be used as the basis for next-generation image metadata management.
- ⇒ Specifically, in addition to conventional Exif imaging information, by **making possible to record newly (1) annotation descriptions* and (2) images and metadata that contribute to authenticity verification integrally in an Exif image file**, to improve convenience when using images for AI.
- (* "Annotation" is an annotation, and an annotation description in Exif3.0 is a description of annotation data related to Exif images in a highly versatile text format suitable for AI utilization.)

Points of the revision (1)

(1) Annotation description for AI utilization

- Recently while the use of image recognition using AI (image AI) has been increasing, image AI requires annotation information such as the location of objects as learning data, and also often the case to record image AI recognition results as new annotation information.
 - Traditionally usually, images and annotations were managed as separate files and the formats differed depending on the system. Thus, it made operations such as copying and moving and to manage multiple annotations for one image complicated, then could cause confusion, that was a problem.
- ⇒ Decided to solve the above problems by unifying the format and integrating the image and annotation information. Specifically, added specifications for annotation description to Exif, which is used worldwide in the majority of consumer imaging devices.

Example of annotation description



File name

Region 3 annotation

Read



Write



```
<?xml version="1.0" encoding="UTF-8" ?>
<exifEX:ExifAN
  xmlns:exifEX="http://cipa.jp/exif/3.00/"
  xmlns:exifEX="http://cipa.jp/exif/2.32/"
  xmlns:exif="http://ns.adobe.com/exif/1.0/"
  xmlns:dc="http://purl.org/dc/elements/1.1/"
  xmlns:tiff="http://ns.adobe.com/tiff/1.0/">
  <exifEX:ANW>3000</exifEX:ANW>
  <exifEX:ANH>2000</exifEX:ANH>
  <region>
    <exifEX:rectangle>
      <UX>1200</UX>
      <UY>800</UY>
      <BX>1800</BX>
      <BY>1200</BY>
    </exifEX:rectangle>
    <dc:description>"comment"</dc:description>
    . . . . .
  </region>
</exifEX:ExifAN>
```

Annotation description

Describe a caption for the item in area 1 (rectangular frame) with "pearl" and for the item in areas 2 and 3 with "bottle" along with the position information of the rectangular frame* as an annotation.

* Not limited to rectangles, polygons (no restrictions on the number of vertices) and ellipses can also be described.

⇒ Added annotation description scheme to Exif APP11

Points of the revision (2)

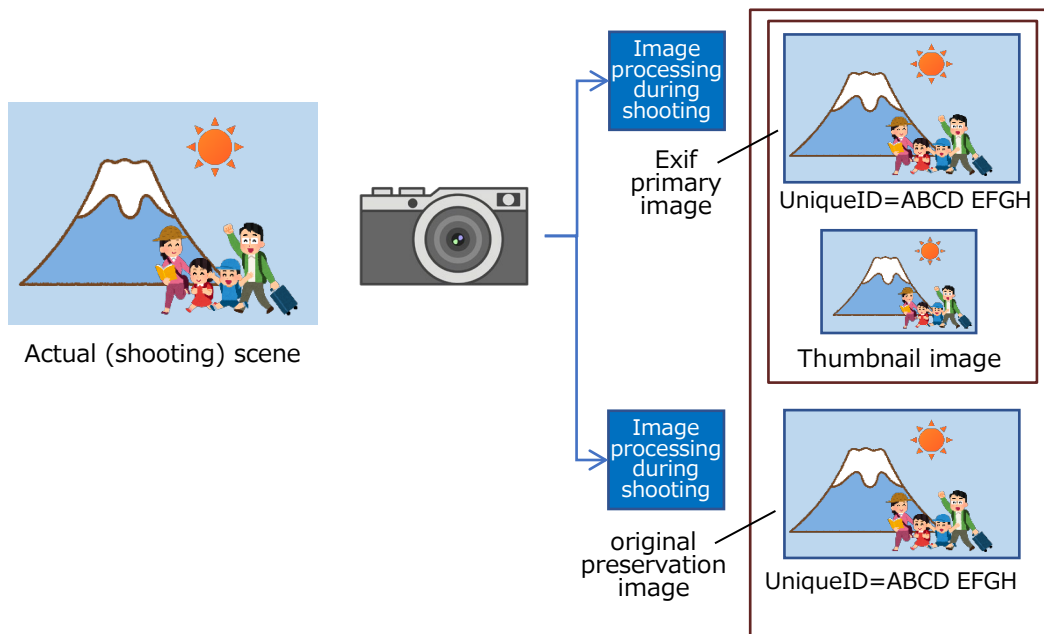
(2) Authenticity support

- Recently the problem of fake images has become an international issue, and standards are being developed by various standardizing organizations in the world to ensure the authenticity of information and certify the provenance of data.
 - While these standards mainly target the authenticity based on the image completed through post-processing (editing) using a software after shooting, differently, from the perspective to contribute to ensure the authenticity based on the original image taken and recorded by a camera, revised on the following points.
 - ✓ Added the definition of "Original Preservation Image," which is a scheme that preserves the unedited image that records the scene at the time of shooting even when the image is edited, and specified in "Annex K. "
 - ✓ Clarified the description rule for the existing tag "ImageUniqueID". (Mandatory to be described when adopting "original preservation image")
- ⇒ By that, in combination with said standards relating provenance certification, it is expected to contribute to ensure the authenticity of images from the time when they are taken and recorded.

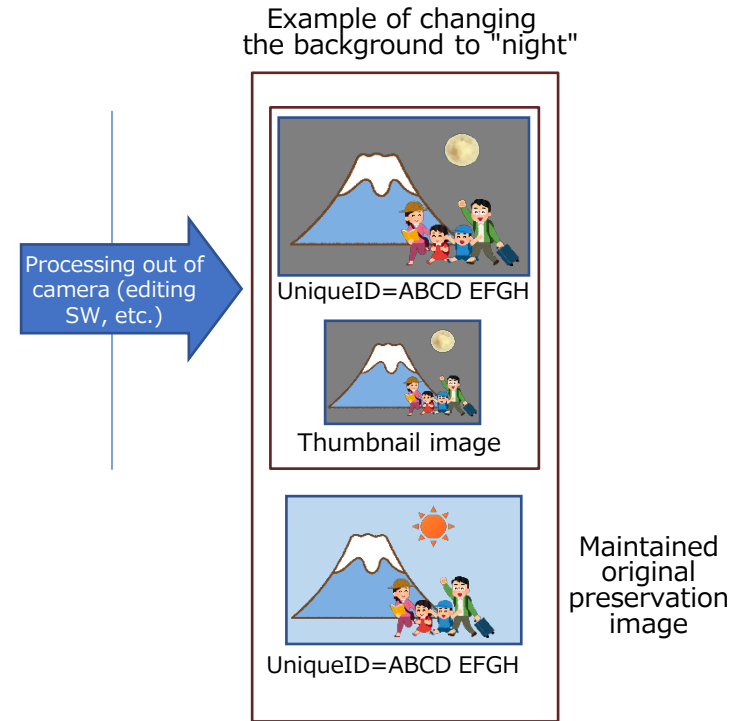
Idea of authenticity support in Exif3.0

(Original preservation image and ImageUniqueID)

When taking by a camera



Case of edited by a post-processing application



Record an original preservation image that is the same* as the primary image
(*The number of pixels may be reduced within the specified range)

Original preservation image (+ImageUniqueID) is retained without change and passed on to subsequent stages

Other revisions

- Added and reviewed Exif recording information, including improving the uniqueness of interpretation of existing tags and clarifying operations.
- ◆ Text description has been changed from the previous ASCII format to UTF-8, which can handle many character sets not only English.
- ◆ Tags has been added and revised.
 - "Artist (main person who created the image)" tag could be written multiple names previously, but since this would make interpretation difficult in subsequent applications, etc., a single name description is adopted to increase the uniqueness of interpretation.
 - In addition to the existing tag "CameraOwnerName", new tags such as "Photographer" and "ImageEditor" are added, making it possible to describe the (main) person in charge at each stage of work.
 - "ImageDescription" tag could be written including the image title previously, but a new "ImageTitle" tag is added to separate it to increase uniqueness of interpretation.
- Annex H has been newly added as guidelines regarding the subsequent use of tags.
 - Categorizing each tag according to its positioning, rules has been decided for whether or not it shall be updated (+ whether it may be deleted) when editing the image (+ metadata) in a subsequent application. This intends to prevent Exif metadata from being accidentally changed or deleted during post-processing.

Reference: List of revised items

- ◆ Enabled APP11 Marker Segment to store a Box-structured data compliant with the JPEG System standard
- ◆ Added definition of Box-structured Annotation Data
- ◆ Added Annex I and J for supplemental information of Annotation Data
- ◆ Added Tag Type of UTF-8 as Exif specific tag type
 - Enabled to select UTF-8 character string in existing ASCII-type tags
- ◆ Added and changed the following tags
 - Added ImageTitle Tag
 - Added Photographer Information related Tags (Photographer and ImageEditor)
 - Added Software Information related Tags (CameraFirmware, RAWDevelopingSoftware, ImageEditingSoftware, and MetadataEditingSoftware)
 - Changed Software, Artist, and ImageUniqueID
 - Corrected incorrect definition of GPSAltitudeRef
 - GPSTimeStamp tag became to support positioning information obtained from GNSS in addition to GPS
- ◆ Added Annex H to specify Guidelines for Handling Tag Information in Post-processing by Application Software
- ◆ Added Annex K to specify Original Preservation Image
- ◆ Changed the description support levels of the following tags:
 - XResolution
 - YResolution
 - ResolutionUnit
 - FlashpixVersion
- ◆ Discarded Annex E.3 to specify Application Software Guidelines
- ◆ Corrected errors, typos and omissions accumulated up to this edition
- ◆ Restructured and revised the entire document structure and style