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Information technology — JPSearch —

Part 4: File format for metadata embedded in image data (JPEG and JPEG 2000)

Technologies de l'information — JPSearch —

Partie 4: Format de fichier de métadonnées incorporées dans des données d'image (JPEG et JPEG 2000)

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Foreword

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The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

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ISO/IEC 24800-4 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

ISO/IEC 24800 consists of the following parts, under the general title *Information technology — JPSearch*:

— *Part 1: System framework and components*

— *Part 2: Registration, identification and management of schema and ontology*

— *Part 3: Query format*

— *Part 4: File format for metadata embedded in image data (JPEG and JPEG 2000)*

— *Part 5: Data interchange format between image repositories*

— *Part 6: Reference software*

Introduction

ISO/IEC 24800 (JPSearch) was developed to provide an interoperable mechanism to handle metadata among compliant systems including repository, search engine, and file entities. This part of ISO/IEC 24800 aims to provide a compatible mechanism exchange image data and its associate metadata using existing file formats.

Information technology — JPSearch —

Part 4:
File format for metadata embedded in image data (JPEG and JPEG 2000)

1 Scope

This part of ISO/IEC 24800, JPSearch, provides an interoperable data exchange format between various devices and platforms. It includes extensions of several existing file formats and file-format-independent metadata formats.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 10918-1, *Information technology — Digital compression and coding of continuous-tone still images: Requirements and guidelines*

ISO/IEC 15444-1, *Information technology — JPEG 2000 image coding system: Core coding system*

ISO/IEC 24800-2, *Information technology — JPSearch — Part 2: Registration, identification and management of schema and ontology*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
metadata
entity of data describing image resource

3.2
JPSearch metadata schema
metadata schema registered according to the Metadata Registration Authority defined in ISO/IEC 24800-2

3.3
elementary metadata
set of metadata entity compliant to one of the JPSearch metadata schema

3.4
JPEG
JPEG-1
entity of code stream specification defined in ISO/IEC 10918-1

3.5
JPEG 2000
entity of code stream specification defined in ISO/IEC 15444-1

3.6
big endian
byte ordering in a file used to represent integer value from the most significant byte

NOTE The hexadecimal value '0x01234567' is stored as [0x01][0x23][0x45][0x67] using the big endian format.

3.7
JPSearch core metadata schema
metadata schema defined in Clause 5 of ISO/IEC 24800-2

3.8
JPSearch Registration Authority
registration authority defined in ISO/IEC 24800-2 who manages schema and translation rules

4 Overview

Figure 1 illustrates a concept of JPSearch file format. It is designed as a full-compatible file format with existing JPEG (Exif) and JPEG 2000 file format. It contains several `JPSearchMetadata` blocks which are a container of JPSearch metadata and each of them has one or more `ElementaryMetadata` blocks inside. `ElementaryMetadata` block is a basic structure of this specification. It stores an instance of certain metadata schema by certain author. Multiple instances for the same schema can be instantiated simultaneously to implement social tagging functionality. Any types of metadata schemes can be used if they are registered as JPSearch metadata using ISO/IEC 24800-2 framework.

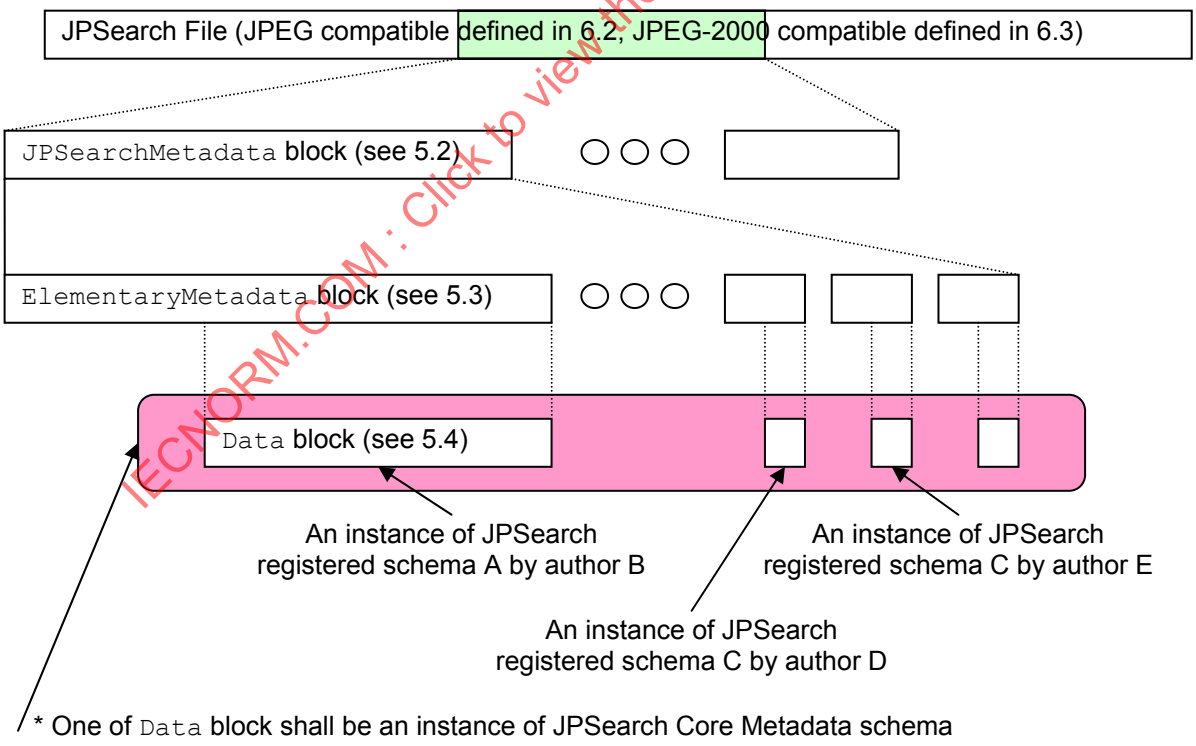

Figure 1 — Concept of JPSearch file format

In this Part of ISO/IEC 24800, Clauses 5 and 6 provide the specification of overall file format and detailed structure of `JPSearchMetadata` block and `ElementaryMetadata` block, respectively.

5 JPSearch Metadata syntax

5.1 JPSearch Metadata Block overall structure

`A JPSearchMetadata` block is a file-format-independent bit-stream to describe various kinds of metadata. It consists of one or more `ElementaryMetadata` block(s) as follows.

```
JPSearchMetadata {
  StartCode;
  VersionID;
  NumberOfElementaryMetadata;
  ElementaryMetadata[];
}
```

Table 1 — Component semantics of in `JPSearchMetadata` block

Tag Name	Type	length	Semantics
`StartCode`	Fixed length string	4 bytes	A 4-byte-length unique code to identify the start point. 'JPS' with a termination code (0x00) is used as the `StartCode`.
`VersionID`	unsigned char	1 bytes	0x01 is reserved for ISO/IEC 24800-4. Other values are reserved for future extensions. Note: `VersionID` will be changed only when the syntax of metadata box is modified.
`NumberOf Elementary Metadata`	unsigned short (big endian)	2 bytes	Specifying the number of `ElementaryMetadata`. Value 0xffff is reserved. The value 0 (0x0000) is prohibited.
`Elementary Metadata`	Binary stream	-	Describing `ElementaryMetadata` block (see 5.2)

Note that additional bit stream may continue after `ElementaryMetadata` if `VersionID` is not 0x01.

5.2 `ElementaryMetadata` block

An `ElementaryMetadata` block is designed to contain one instance of `ElementaryMetadata`. Multiple blocks shall be included in a file to carry several metadata instances written in different JPSearch metadata schema. Several blocks using the same JPSearch metadata schema can be also instantiated simultaneously. JPSearch Part 4 compliant file format shall contain at least one elementary metadata block whose `SchemaAndIdentifier` is "JPSearch:schema:coremetadata", which means that the block contain an instance of JPSearch core metadata schema.

```
ElementaryMetadata {
  StartCode;
  LengthOfBlock;
  SchemaIdentifier;
  Annotation {
    LengthOfAnnotation;
    ConfidentMeasure;
    Creation&DateAndTime;
    LastUpdateDateAndTime;
    LengthOfAuthor;
    Author;
    FlagReadOnly;
  }
  LengthOfData;
  Encoding;
  Data;
}
```

Table 2 — Component semantics of `ElementaryMetadata`

Tag Name	Type	length	Semantics
`StartCode`	String	4 bytes	A unique code to identify the start point. A string 'SEM' with termination code (0x00) is used as `StartCode`.
`LengthOf Block`	Unsigned long (big endian)	4 bytes	Specifying the size of elementary metadata block including `StartCode`.
`Schema Identifier`	URI string	-	Specifying the identifier of a registered schema to recognize the syntax and semantics of `Data` block. URI format is used with termination character 0x00 at the end. (See ISO/IEC 24800-2)
`Annotation`	Binary stream	-	Describing `Annotation` block (see Table 3)
`LengthOf Data`	Unsigned long (big endian)	4 bytes	Specifying the size of `Data` block in Bytes
`Encoding`	Unsigned char	1 byte	Specifying the encoding method used for `Data`. Available values are shown in Table 4.
`Data`	Binary stream	-	Instance of metadata. The syntax of `Data` depends on `Encoding` and `SchemaIdentifier` as shown in 5.3.

Compliant systems shall use `LengthOfBlock` to skip a elementary metadata block to have interoperability with future extensions where additional bits might be added after `Data`.

Table 3 — Component semantics of `Annotation` block in `ElementaryMetadata`

Tag Name	Type	Length	Semantics
`LengthOf Annotation`	unsigned long (big endian)	4 bytes	Specifying the size of `Annotation` block in byte. It should be noted that `Annotation` block may be extended in future.
`Confident Measure`	unsigned char	1 byte	Lower 4 bits are valid and higher 4 bits are reserved for future extensions. Describing the overall reliability of the data in range of [0, 15]. The value The higher value means more confident. The value 0 (0x00) means that the following metadata is meaningless and 15 (0x0f) stands for completely reliable. Note that 15 (0x0f) can be used only by content creator, who captures the corresponding image.
`Creation DateTime`	ASCII	20 bytes	Describing creation date/time of `Data` in GMT. The format shall be YYYY/MM/DD-HH:MM:SS(null). Here YYYY, MM, DD, HH, MM, SS denote year, month day, hour, minute, second respectively. (null) denotes the code 0x00.
`LastUpdate DateTime`	ASCII	20 bytes	Describing the last update date/time of `Data` in GMT. The format shall be YYYY/MM/DD-HH:MM:SS(null). Here YYYY, MM, DD, HH, MM, SS denote year, month day, hour, minute, second respectively. (null) denotes the code 0x00.
`LengthOf Author`	unsigned char	1 byte	Specifying the size of `Author` field in byte. Note that the maximum size of the field including termination character code is limited to 256 byte.
`Author`	Unicode string	Specified by `LengthOfAu thor`	Describing the author's name of `Data`. Any Unicode string can be used. The string shall be terminated by null(0x00)
`FlagRead Only`	Unsigned char	1 byte	Specifying if the update of `Data` is allowed. 0x00 means allowed and 0xff not. Other values are reserved for future extension.

Compliant systems shall use `LengthOfAnnotation` to reach the start position of `LengthOfData` to have interoperability with future extensions where additional bits might be added after `FlagReadOnly`.

5.3 Syntax and semantics of Data block in an elementary metadata

The syntax and semantics of `Data` block is depending on the metadata specification used as well as coding method identified by `Encoding`. Table 4 shows semantics of `Encoding` field used in `ElementaryMetadata` blocks. When `Encoding` is 'T' (textual XML representation), a schema file to parse `Data` can be obtained from JPSearch Registration Authority using schema management procedure defined in ISO/IEC 24800-2. If Encoding is NUL, see the corresponding specification identified by `SchemaIdentifier` to obtained syntax used.

Table 4 — Semantics of `Encoding`

Value	Semantics
'T' (0x54)	Data is written as an textual XML instance. The corresponding schema can be obtained using schema registration process defined in ISO/IEC 24800-2. (recommended)
'B' (0x42)	Data is encoded using schema-supplier defined method. The syntax information to decode `Data` shall be provided by Registration Authority.
NUL (0x00)	No encoding method is identified. See the corresponding specification.
Others	Reserved for future extensions of ISO/IEC 24800-4.

5.4 Pre-registered metadata

Any metadata schema which has been registered and has a unique ID using ISO/IEC 24800-2 can be instantiated in a file; however, at least, an instance of JPSearch core metadata schema shall be included. Table 5 show the list of identifier which shall be recognized by ISO/IEC 24800-4 compliant systems.

A registration mechanism of user-defined metadata shcema is specified in ISO/IEC 24800-2.

Table 5 — A list of pre-registered metadata schemas available for JPSearch file formats

Identifier (see ISO/IEC 24800-2)	Semnatics
"JPSearch:schema:coremetadata"	JPSearch core metadata defined in Clause 3 in ISO/IEC 24800-2.

6 JPSearch File structure

6.1 Overview

JPSearch file format is an extension of JPEG-1/JPEG 2000 file format. It is fully compatible with JPEG-1 or JPEG 2000 and provides additional functionality carrying associated metadata within a file.

6.2 JPEG-1 and its compliant file formats

Figure 2 illustrates the structure of a file format defined in ISO/IEC 10918-1. JPSearch file format for JPEG-1 and its compliant file formats shall be fully compatible with ISO/IEC 10918-1. Metadata defined in Clause 5 shall be stored in application marker segments, APP3 as shown in Figure 2.

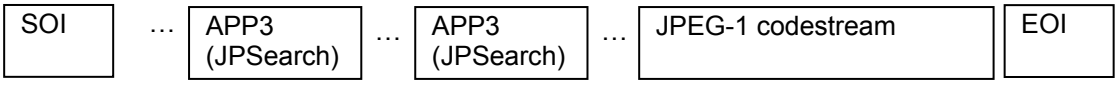

Figure 2 — Overall structure of JPEG-1-compliant version of JPSearch file format