

JPEG 2000: A PDS Perspective

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May 23, 2005

Archive Format Considerations

Data Providers

- Cost

Current Users

- Ease of use
- Data Integrity

Future Users

- Data Integrity
- Data Accessibility

Not just an improved version of JPEG...

- Compression scheme
- JP2 image format

The Compression Scheme

- Based heavily on EBCOT (Embedded Block Coding with Optimized Truncation)
- Higher compression ratio than JPEG
- Lossless compression available
- Improved error resilience
- Region of Interest (ROI)

The Compression Scheme

Enables:

- Browsing
- Subsetting
- Zooming
- Panning

JP2 - the format

From the specification:

- binary container
- image properties
- intellectual property rights information
- metadata (including vendor-specific information)

Metadata storage

- XML-based
- Could collaboratively incorporate work of other organizations in the field: ASU, MIPL, USGS

Documentation

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- Formal specification only available through ISO/IEC
- Final draft available online
- Evolving standard?

The Specification

- Part I: Core coding system (royalty and license free; NOT patent free)
- Part II: optional extensions for performance improvement
- Part III: Motion JPEG 2000
- Part IV: Conformance (validation tests)
- Part V: Reference software (Java and C)
- Part VI: Compound image file format (fax, electronic publishing, etc.)
- Part VII: abandoned.
- Part VIII: JPSEC (security aspects)▣
- Part IX: JPIP (interactive protocols and API)▣▣
- Part X: JP3D (volumetric imaging)
- Part XI: JPWL (wireless applications)
- Part XII: ISO Base Media File Format (common with MPEG-4)

Software

- Open-source, software-based, free implementations of the codec:
 - JasPer (C) version 1.700.2 or later
 - <http://www.ece.uvic.ca/~mdadams/jasper/>
 - JJ2000 (Java) version 5.1 or later
 - <http://JPEG2000.epfl.ch/>

Patent & Copyright Issues

“The ISO and the IEC draw attention to the fact that it is claimed that compliance with this Recommendation may involve the use of patents...”

“ISO and IEC take no position concerning the evidence, validity and scope of these patent rights.

The holders of these patent rights have assured the ISO and IEC that they are willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world...

Attention is drawn to the possibility that some of the elements of this Recommendation may be the subject of patent rights other than those identified above. ISO and IEC shall not be held responsible for identifying any or all such patent rights.”

Patent & Copyright Issues, Cont.

Question: Where are the JPEG 2000 test images? The paper "JPEG 2000 still image coding versus other standards" refers to an official JPEG 2000 test set, is it generally available?

Answer: The images consisted of quite a large set, some of which were donated just for the purposes of the evaluation. Unfortunately, many of these have associated copyright that prevent us making them widely available. We do plan to review this shortly, and we plan to make some images available, once we have the necessary agreements. A few images were from standard test charts, and could be purchased with the test chart. If there is sufficient interest, we can start a section on test images

Implementation

Assuming compression algorithm to be applied to tiled raster image:

- Compression only:
 - PDS attached label contains all metadata
 - .IMQ extension
- Full JP2 format:
 - PDS detached label
 - Metadata also contained in JP2 label
 - .JP2 extension

Requirements

- Compression only:
 - Images validated for compliance
 - Decoding algorithm included in archive
 - Current version of specification must be maintained
- Full JP2 format:
 - Same as for compression scheme
 - Include documentation on vendor-specific metadata in archive

Impact (Archive Considerations Only)

- Compression only:
 - Implement decoding algorithm in NASAView
- Full JP2 format:
 - Implement decoding algorithm in NASAView
 - Metadata repeated in two places, possibly with differing keywords

Summary - Archive Format Considerations, Revisited

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