
Differ Documentation Documentation

Release 0.5

Jan Stavel

February 02, 2013

CONTENTS

1	Installation	3
1.1	Installation	3
2	Recognized Validator Outputs	5
2.1	DJDump	5
2.2	JPyLyzer	6
2.3	ExifTool	10
2.4	JHOVE	10
2.5	FITS	11
2.6	KDU	12
2.7	DAITSS	13
2.8	IMAGEMAGICK	13
3	Command Line Application	15
3.1	Arguments of the application	15
3.2	Example of property list definition	15
3.3	Examples	15

Contents:

Contents

- Welcome to Differ Documentation!
 - Installation
 - * Installation
 - DROID
 - PRONOM
 - Recognized Validator Outputs
 - * DJDump
 - Significant Properties
 - Layers and Compressions
 - * JPyLyzer
 - Significant Properties
 - * ExifTool
 - Significant Properties
 - * JHOVE
 - Significant Properties
 - * FITS
 - Significant Properties
 - * KDU
 - Significant Properties
 - * DAITSS
 - * IMAGEMAGICK
 - Command Line Application
 - * Arguments of the application
 - * Example of property list definition
 - * Examples
 - Program usage
 - Program output when validating image
 - Program output when comparing images
 - Program output examples

INSTALLATION

1.1 Installation

1.1.1 DROID

Home page

Download [Zip file](#) with binary.

1.1.2 PRONOM

<http://www.nationalarchives.gov.uk/PRONOM/Format/proFormatSearch.aspx?status=new>

RECOGNIZED VALIDATOR OUTPUTS

2.1 DJDump

Contents

- Welcome to Differ Documentation!
 - Installation
 - * Installation
 - DROID
 - PRONOM
 - Recognized Validator Outputs
 - * DJDump
 - Significant Properties
 - Layers and Compressions
 - * JPyLyzr
 - Significant Properties
 - * ExifTool
 - Significant Properties
 - * JHOVE
 - Significant Properties
 - * FITS
 - Significant Properties
 - * KDU
 - Significant Properties
 - * DAITSS
 - * IMAGEMAGICK
 - Command Line Application
 - * Arguments of the application
 - * Example of property list definition
 - * Examples
 - Program usage
 - Program output when validating image
 - Program output when comparing images
 - Program output examples

od verze 16 do v26 umi DJVU

od verze 27 can recognize sDJVU

2.1.1 Significant Properties

Information	Value from an example
format version	v21
datum vytvoreni	
velikost souboru	
num of colors	(color .. 24bit)
rozliseni	200 dpi
pocet pixelu	3776x2520
gamma correction	2.2
pocet vrstev	4
expozice	
vyvazeni bile	

DJVU can use max. 24 bits for a color channel or indexed colors.

2.1.2 Layers and Compressions

BG .. background 44 .. compression IW44

FG .. foreground BZ .. compression JP2 2K .. compression JPEG200 JP .. compression JPEG

SJBZ .. mask with compression

DJBZ .. shared layer with compression JP2 TXTA .. hidden text layer TXTZ .. hidden text layer

slices nejsou moc dulezite.

2.2 JPyLyzer

output of jpylyzer

2.2.1 Significant Properties

Table 2.1: Map of significant properties

Properties	Properties as used in program	XPath in JPylyzer xml output
File last modified	fileLastModified	fileInfo/fileLastModified
File name	fileName	fileInfo/fileName
File path	filePath	fileInfo/filePath
File size	fileSizeInBytes	fileInfo/fileSizeInBytes
Image width	ImageWidth	jp2HeaderBox/imageHeaderBox/width
Image height	ImageHeight	jp2HeaderBox/imageHeaderBox/heigh
Color depth	colorDepth	contiguousCodestreamBox/siz/ssizDepth
Number of channels	numOfChannels	jp2HeaderBox/imageHeaderBox/nC
Color space	colorSpace	properties/jp2HeaderBox/colourSpecificationBox/enumC
Resolution vertical	vResolutionInPixelsPerInch	jp2HeaderBox/resolutionBox/displayResolutionBox/vRe
Resolution horizontal	hResolutionInPixelsPerInch	jp2HeaderBox/resolutionBox/displayResolutionBox/hRe
Display resolution horizontal	hDisplayResolutionInPixelsPerInch	jp2HeaderBox/resolutionBox/displayResolutionBox/hRe
Display resolution vertical	vDisplayResolutionInPixelsPerInch	jp2HeaderBox/resolutionBox/displayResolutionBox/vRe

Conti

Table 2.1 – continued from previous page

Properties	Properties as used in program	XPath in JPylyzer xml output
Validation (well formed and valid)	wellFormedAndValid	isValidJP2
Type of format	imageFormat	properties/jp2HeaderBox/imageHeaderBox/c
Universal unique identifier (UUID)	uuid	properties/uuidBox/uuid
Commentary	commentary	contiguousCodestreamBox/com/comment
Number of tiles	numberOfTiles	contiguousCodestreamBox/siz/numberOfTiles
Transformation	transformation	contiguousCodestreamBox/cod/transformation
Compression	compression	contiguousCodestreamBox/cod/transformation
Compression ratio	compressionRatio	properties/compressionRatio
Number of decomposition levels	numOfDecompositionLevels	contiguousCodestreamBox/cod/levels
Number of quality layers	numOfQualityLayers	contiguousCodestreamBox/cod/layers
Progression order	progressionOrder	contiguousCodestreamBox/cod/order
Code block width	codeBlockWidth	contiguousCodestreamBox/cod/codeBlockWidth
Code block height	codeBlockHeight	contiguousCodestreamBox/cod/codeBlockHeight
Coding bypass	codingBypass	contiguousCodestreamBox/cod/codingBypass
Start of packet header	sop	contiguousCodestreamBox/cod/sop
End of packet header	eph	contiguousCodestreamBox/cod/eph
Precincts	precincts	contiguousCodestreamBox/cod/precincts

tabulka - identifikace image style format

jp2000

file format

*.jp2 , *.jpf

- validace all //tests are important
- charakterizace

commentaries

kakadu

compression

reversible/irreversible

transformation

5-3 reversible

9-7 irreversible

compression ration

2.39

tails

```
<contiguousCodestreamBox>
<siz>
  <numberOfTiles>1</numberOfTiles>
```

progression order

```
<order>RPCL</order>
```

```
values
```

```
=====
```

```
CPRL
```

```
RPCL
```

```
RLCP
```

```
LRCP
```

```
PCRL
```

```
CPRL
```

```
num of decomposition levels
```

```
<cod>
```

```
<levels>5</levels>
```

```
quality layers
```

```
<layers>1</layers>
```

```
precinct
```

```
.. staci vypsati ve formate
```

```
128x128, 256x256
```

```
<cod>          <precinctSizeX>128</precinctSizeX>          <precinctSizeY>128</precinctSizeY>
<precinctSizeX>128</precinctSizeX>          <precinctSizeY>128</precinctSizeY>          <precinct-
SizeX>128</precinctSizeX>          <precinctSizeY>128</precinctSizeY>          <precinct-
SizeX>128</precinctSizeX>          <precinctSizeY>128</precinctSizeY>          <precinct-
SizeX>128</precinctSizeX>          <precinctSizeY>128</precinctSizeY>          <precinct-
SizeX>256</precinctSizeX> <precinctSizeY>256</precinctSizeY>
```

```
regions of interest :: no/yes
```

```
code block size
```

```
<cod>
```

```
<codeBlockWidth>64</codeBlockWidth>
```

```
<codeBlockHeight>64</codeBlockHeight>
```

```
tail length layer :: yes/no
```

```
bypass :: <cod> <codingBypass>yes</codingBypass>
```

```
icc profiles :: yes/no
```

```
soh start of packet header (zacatek hlavy paketu)
```

```
<sop>yes</sop>
```

```
eph end of packet header
```

```
<eph>yes</eph>
```

```
xml box
```

```
no
```

```
uuid box
```

```
<uuidBox>
  <uuid>be7acfc8-97a9-42e8-9c71-999491e3afac</uuid>
</uuidBox>
```

toto poskladat nejak dale.

rozliseni

```
<vResdInPixelsPerInch>299.98</vResdInPixelsPerInch>
```

rozliseni display

```
<hResdInPixelsPerInch>299.98</hResdInPixelsPerInch>
```

depth:

```
<contiguousCodestreamBox>
<siz>
<ssizDepth>8</ssizDepth>
```

precincts

```
<cod>
<precincts>yes</precincts>
```

multiple component transformation

```
<cod>
<multipleComponentTransformation>yes</multipleComponentTransformation>
```

reset on boundaries

```
<resetOnBoundaries>no</resetOnBoundaries>
```

transformation

```
<transformation>5-3 reversible</transformation>
```

compression ration

```
<compressionRatio>2.39</compressionRatio>
```

comments

```
<com>
<lcom>15</lcom>
<rcom>ISO/IEC 8859-15 (Latin)</rcom>
<comment>Kakadu-v6.4</comment>
</com>
```

2.3 ExifTool

2.3.1 Significant Properties

Information	Value from an example
datum vytvoreni	File Modification Date/Time : 2011:12:01 16:21:26+01:00
velikost souboru	File Size : 4.1 MB
pocet barev	
24bitu, 8bitu (grey scale)	Bits Per Sample : 8
rozliseni	Image Size : 3776x2520
pocet vrstev	vzdy 1 vrstva
expoze	1/125
vyvazeni bile	White Balance : Auto

prednostne

```
velikost souboru
typ souboru
main type
software type 2.1
modified date
exif tool version
resolution x, y
color space
Exif Image Width      : 3776
Exif Image Height     : 2520
image unique id
Compression           : JPEG (old-style)
Encoding Process       : Baseline DCT, Huffman coding
Bits Per Sample       : 8
Color Components       : 3
Image Size            : 3776x2520
```

ostatni veci vlozit do sekce exif.

ExifTool Version Number : 8.60 File Name : 2_2_11-Voda-Glitch10.jpg File Modification Date/Time : 2011:12:01 16:21:26+01:00

File Type : JPEG MIME Type : image/jpeg JFIF Version : 1.01

Exif Byte Order : Little-endian (Intel, II)

commentaries:: Make : Panasonic

X Resolution : 180 Y Resolution : 180 Resolution Unit : inches

typ algoritmu :: Y Cb Cr Positioning : Co-sited

Exposure Time : 1/125 F Number : 2.8

Exif Version : 0221

exit :: Components Configuration : Y, Cb, Cr, - Compressed Bits Per Pixel : 4

2.4 JHOVE

xml output

2.4.1 Significant Properties

Table 2.2: Map of significant properties

Properties	Properties as used in program	XPath in JHove xml output
File last modified	fileLastModified	repInfo/lastModified
File name	fileName	
File path	filePath	repInfo/@uri
File size	fileSizeInBytes	repInfo/size
MIME type	contentType	repInfo/mimeType
Image width (Pixels)	imageWidth	//mix:mix/mix:BasicImageInformation/mix:BasicImageWidth
Image height (Pixels)	imageHeight	//mix:mix/mix:BasicImageInformation/mix:BasicImageHeight
Color depth	colorDepth	//mix:ImageColorEncoding/mix:BitsPerSample/mix:bitsPerSample
Number of channels	numOfChannels	//mix:ImageColorEncoding/mix:BitsPerSample/mix:bitsPerSample
Color space	colorSpace	//property[text(name)='EnumCS']/value
Resolution vertical (PPI)	vResolutionInPixelsPerInch	
Resolution horizontal (PPI)	hResolutionInPixelsPerInch	
Display resolution horizontal (PPI)	hDisplayResolutionInPixelsPerInch	
Display Resolution vertical (PPI)	vDisplayResolutionInPixelsPerInch	
Validation (well formed and valid)	wellFormedAndValid	repInfo/status
Type of format	imageFormat	repInfo/format
Universal unique identifier (UUID)	uuid	concat(//property[text(name)='UUID']/values/value)
Commentary	commentary	
Tile size X (Pixels)	tileSizeX	//property[text(name)='XTSize']/values/value
Tile size Y (Pixels)	tileSizeY	//property[text(name)='YTSize']/values/value
Number of tiles	numberOfTiles	count(//name[text()='TilePart'])
Transformation	transformation	//property[text(name)='Transformation']/values/value
Compression	compressionScheme	//mix:Compression/mix:compressionScheme
Compression ratio	compressionRatio	
Number of decomposition levels	numOfDecompositionLevels	//property[text(name)='NumberDecompositionLevels']/values/value
Number of quality layers	numOfQualityLayers	//property[text(name)='NumberOfLayers']/values/value
Multiple Component Transformation	multipleComponentTransformation	//property[text(name)='MultipleComponentTransformation']/values/value
Progression order	progressionOrder	//property[text(name)='ProgressionOrder']/values/value
Code block width (Pixels)	codeBlockWidth	//property[text(name)='CodeBlockWidth']/values/value
Code block height (Pixels)	codeBlockHeight	//property[text(name)='CodeBlockHeight']/values/value
Quantization style	quantizationStyle	//property[text(name)='QuantizationStyle']/values/value
Coding bypass	codingBypass	
Start of packet header	sop	
End of packet header	eph	
Precincts	precincts	

z mix se dají vytáhnout všechny věci.

V JHOVE jsou nejdůležitější identifikace.

2.5 FITS

'FITS on Wikipedia <<http://en.wikipedia.org/wiki/FITS>>' _

'FITS samples <<http://tdc-www.harvard.edu/wcstools/samples/>>' _

‘High Level Science Products <<http://archive.stsci.edu/hlsp/>>’_

‘FITS images of Galaxy Halos, Outer disks, Substructure, Thick disks and Star clusters
<<http://archive.stsci.edu/pub/hlsp/ghosts/data/ngc0253/>>’_

2.5.1 Significant Properties

Information	Value from an example
datum vytvoreni	/fits/fileinfo/created[0]
velikost souboru	/fits/fileinfo/size
pocet barev	
24bitu, 8bitu (grey scale)	/fits/metadata/image/bitsPerSample
rozliseni	/fits/metadata/image/imageWidth x /fits/metadata/image/imageHeight
pocet vrstev	
expozice	
vyvazeni bile	/fits/metadata/image/lightSource

iccProfileName - “ICC Profile”

2.6 KDU

2.6.1 Significant Properties

Table 2.3: Map of significant properties

Properties	Properties as used in program	XPath in KDU_expand xml output

Consumed 0 tile-part(s) from a total of 1 tile(s).

... Bits per pixel Consumed 114 codestream bytes (excluding any file format) = 0.003479 bits/pel.

o,no,no

... Color depth;colorDepth Sprecision=8,8,8

... ;SSampling Ssampling={ 1,1},{ 1,1},{ 1,1}

... ;sdims Sdims={ 512,512},{ 512,512},{ 512,512}

... Transformation Cycc=yes

... ;cmct Cmct=0

... Number of quality layers Clayers=1

... Start of packet header Cuse_sop=no

... End of packet header Cuse_eph=no

... Progression order Corder=RLCP

Calign_blk_last={no,no}

... Number of decomposition levels Clevels=5

... ;cads Cads=0

... ;cdfs Cdfs=0


```
... ;cdecomp Cdecomp=B(-:-:-)
... Compression (reversible/irreversible) Creversible=no
... Type of algorithm W5X3, W9X7 Ckernels=W9X7
... ;catk Catk=0
... Precints Cuse_precincts=no
... Code block size Cblk={32,32}
... Bypass;Cmodes Cmodes=0
... ;qguard Qguard=2
Qderived=no          Qabs_steps=0.003906,0.001953,0.001953,0.000977,0.001953,0.001953,0.000977,0.001
953,0.001953,0.000977,0.001953,0.001953,0.000977,0.001953,0.001953,0.000977
```

2.7 DAITSS

xml output

2.8 IMAGEMAGICK

xml output

COMMAND LINE APPLICATION

3.1 Arguments of the application

The application can validate one image or compare two images.

Argument	What
-save-report	Save report into file with the same name and with extension *.drep
-load-report	Load report from a given file and print it in a readable form at stdout
-include-image-in-report	
-report-format	html/txt/pdf/xml
-transform-report	transform xml report into other format - html/txt/pdf
-save-histogram	save histogram as csv
-save-raw-outputs	save raw outputs from validators into files
-load-properties	program will print just properties that has 1 in the file defined by this argument
-show-properties	program will print out all known properties in a usable format and will finish

Compare report contains of all informations from validation reports and even compare informations.

3.2 Example of property list definition

```
Image width;1  
Image height;0
```

So property =Image width= will be printed and =Image height= will not be printed.

3.3 Examples

3.3.1 Program usage

validates image, prints report readable way at stdout and saves it into file image.drep
c:\> differ.bat --save-report image.jpg

loads report from file image.drep and prints it readable way at stdout
c:\> differ.bat --load-report image.drep

validates images and compares it and prints report readable way at stdout
and save it into file image1.drep and image2.drep
c:\> differ.bat --save-report image1.jpg image2.jpg

validates images and compares it and prints report readable way at stdout
The program will print properties regarding to a file properties.lst
c:\> differ.bat --load-properties properties.lst image1.jpg image2.jpg

The program will print properties in a format that can be used to choose properties to print in future
c:\> differ.bat --show-properties

3.3.2 Program output when validating image

Characterization
=====

image.jpg: 2480x1748

Significant Properties
=====

Property	Unit	Source	Value
Code block height	px	jhove	
	px	jpylyzer	
Code block width	px	jhove	
	px	jpylyzer	
Coding bypass		jpylyzer	
Color depth		exiftool	8
		jhove	8
		jpylyzer	
Color space		exiftool	sRGB
		jhove	
		jpylyzer	
Commentary		jpylyzer	
Compression		exiftool	JPEG (old-style)
		jhove	JPEG
		jpylyzer	
Compression ratio		jpylyzer	
Display resolution horizontal	PPI	jpylyzer	
Display resolution vertical	PPI	jpylyzer	
Encoding process		exiftool	Baseline DCT, Huffman coding
End of packet header		jpylyzer	
exit-code		djvudump	error (1)
		exiftool	ok
		exiv2	ok
		fits	ok
		jhove	ok
		jpylyzer	ok
File last modified		exiftool	2011:10:24 15:06:10+02:00
		fits	
		jhove	2011-10-24T15:06:10+02:00
		jpylyzer	Mon Oct 24 15:06:10 2011
File name		core	image.jpg
		exiv2	/opt/differ/differ-cmdline/image.jpg
		fits	/opt/differ/differ-cmdline/image.jpg
		jpylyzer	image.jpg
File path		core	/opt/differ/differ-cmdline/image.jpg
		exiv2	/opt/differ/differ-cmdline/image.jpg
		fits	/opt/differ/differ-cmdline/image.jpg

		jhove	/opt/differ/differ-cmdline/image.jpg
		jpylyzer	/opt/differ/differ-cmdline/image.jpg
File size		exiftool	294 kB
		exiv2	301376
		fits	301376
		jhove	301376
		jpylyzer	301376
File type		exiftool	JPEG
Image height		core	2480
	px	exiftool	2480
	px	exiv2	2480
	px	fits	2480
	px	jhove	2480
	px	jpylyzer	
Image width		core	1748
	px	exiftool	1748
	px	exiv2	1748
	px	fits	1748
	px	jhove	1748
	px	jpylyzer	
MIME type		exiftool	image/jpeg
		exiv2	image/jpeg
		jhove	image/jpeg
Multiple Component Transformation		jhove	
Number of channels		exiftool	3
		jhove	3
		jpylyzer	
Number of decomposition levels		jhove	
		jpylyzer	
Number of quality layers		jhove	
		jpylyzer	
Number of tiles		jhove	0
		jpylyzer	
Precincts		jpylyzer	
Progression order		jhove	
		jpylyzer	
Quantization style		jhove	
Resolution horizontal	PPI	exiftool	300
	PPI	exiv2	1748
	PPI	jpylyzer	
Resolution unit		exiftool	inches
Resolution vertical	PPI	exiftool	300
	PPI	exiv2	2480
	PPI	jpylyzer	
Software type		exiftool	Adobe Photoshop CS4 Windows
Start of packet header		jpylyzer	
Thumbnail		exiv2	image/jpeg, 934 Bytes
Tile size X	PPI	jhove	
Tile size Y	PPI	jhove	
Transformation		jhove	
		jpylyzer	
Type of format		jhove	JPEG
		jpylyzer	
Universal unique identifier (UUID)		jhove	
		jpylyzer	
Validation (well formed and valid)		jhove	Well-Formed and valid
		jpylyzer	False

```
Raw outputs of extractors
=====
```

```
    djvudump      'output <image-output-djvudump.raw>'_
    exiftool      'output <image-output-exiftool.raw>'_
    exiv2         'output <image-output-exiv2.raw>'_
    fits          'output <image-output-fits.raw>'_
    jhove         'output <image-output-jhove.raw>'_
    jpylyzer      'output <image-output-jpylyzer.raw>'_
```

```
Text report
=====
```

```
    `text report <image-report.txt>`_
```

3.3.3 Program output when comparing images

```
Characterization
=====
```

```
    Img A :: /opt/differ/differ-cmdline/image.jpg: 2480x1748
    Img B :: /opt/differ/differ-cmdline/image2.jpg: 2480x1748
```

```
Significant Properties
=====
```

Significant Property	Source	Value for Img A	Value for Img B
-----	-----	-----	-----
Color depth	exiftool	8	8
Color space	exiftool	sRGB	sRGB
Compression	exiftool	JPEG (old-style)	JPEG (old-style)
Encoding process	exiftool	Baseline DCT, Huffman coding	Baseline DCT, Huffman coding
File last modified	fits		
	exiftool	2011:10:24 15:06:10+02:00	2011:10:24 15:13:54+02:00
File size	fits	301376	307248
	exiftool	294 kB	300 kB
	exiv2	301376	307248
File type	exiftool	JPEG	JPEG
Image height	fits	2480 px	2480 px
	exiftool	2480 px	2480 px
	exiv2	2480 px	2480 px
	core	2480	2480
Image width	fits	1748 px	1748 px
	exiftool	1748 px	1748 px
	exiv2	1748 px	1748 px
	core	1748	1748
MIME type	exiftool	image/jpeg	image/jpeg
	exiv2	image/jpeg	image/jpeg
Number of channels	exiftool	3	3
Resolution horizontal	exiftool	300 PPI	300 PPI
	exiv2	1748 PPI	1748 PPI
Resolution unit	exiftool	inches	inches
Resolution vertical	exiftool	300 PPI	300 PPI
	exiv2	2480 PPI	2480 PPI
Software type	exiftool	Adobe Photoshop CS4 Windows	Adobe Photoshop CS4 Windows
Thumbnail	exiv2	image/jpeg, 934 Bytes	image/jpeg, 934 Bytes

format	jhove	JPEG	JPEG
height	jhove	2480	2480
mimetype	jhove	image/jpeg	image/jpeg
status	jhove	Well-Formed and valid	Well-Formed and valid
width	jhove	1748	1748

Raw outputs of extractors

=====

```
jpylyzer      'output <image-output-jpylyzer.raw>'_
jpylyzer      'output <image2-output-jpylyzer.raw>'_
```

Text report

=====

```
`text report <image-image2-report.txt>`_
```

Used significant properties

=====

```
`used properties <image-used-properties.txt>`_
`used properties <image2-used-properties.txt>`_
```

3.3.4 Program output examples