Media Analysis Tools

How we check media files

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Different needs

- Metadata extraction and review
- File format (containers, coding) validation
- File format investigation
- Local policy conformance
- Metadata editing/fixing
- Audiovisual quality control

MediaInfo

Metadata extraction and review

- Convenient unified display
- Of most relevant technical and tag data
- For video / audio / text / ancillary data files
- 6k downloads/day, 40k GUI launches/day
- BSD-2-Clause license

MediaInfo

Supported formats

- Most formats used by either individuals or professionals
- Detects weird transport layers
  e.g. Dolby E spanned on 2 audio tracks, subtitles in the ancillary data, sidecar files...

MediaInfo

Export

- Classic flat text, XML...
- Also in professional output formats e.g. PBCore, EBUCore, FIMS...

MediaConch

A conformance checker

- Implementation checker
- Policy checker
- Reporter
- GPLv3+/MPLv2+ license

MediaConch

Supported formats

- Implementation checker for Matroska, FFV1, PCM natively
- Implementation checker for PDF and TIFF via plugins (veraPDF and DPFManager projects)
- Policy checker for all formats
- Optional server mode (watch folder)
- Optionaly an ordonancer
  e.g. FFmpeg transmux / transcode before checks

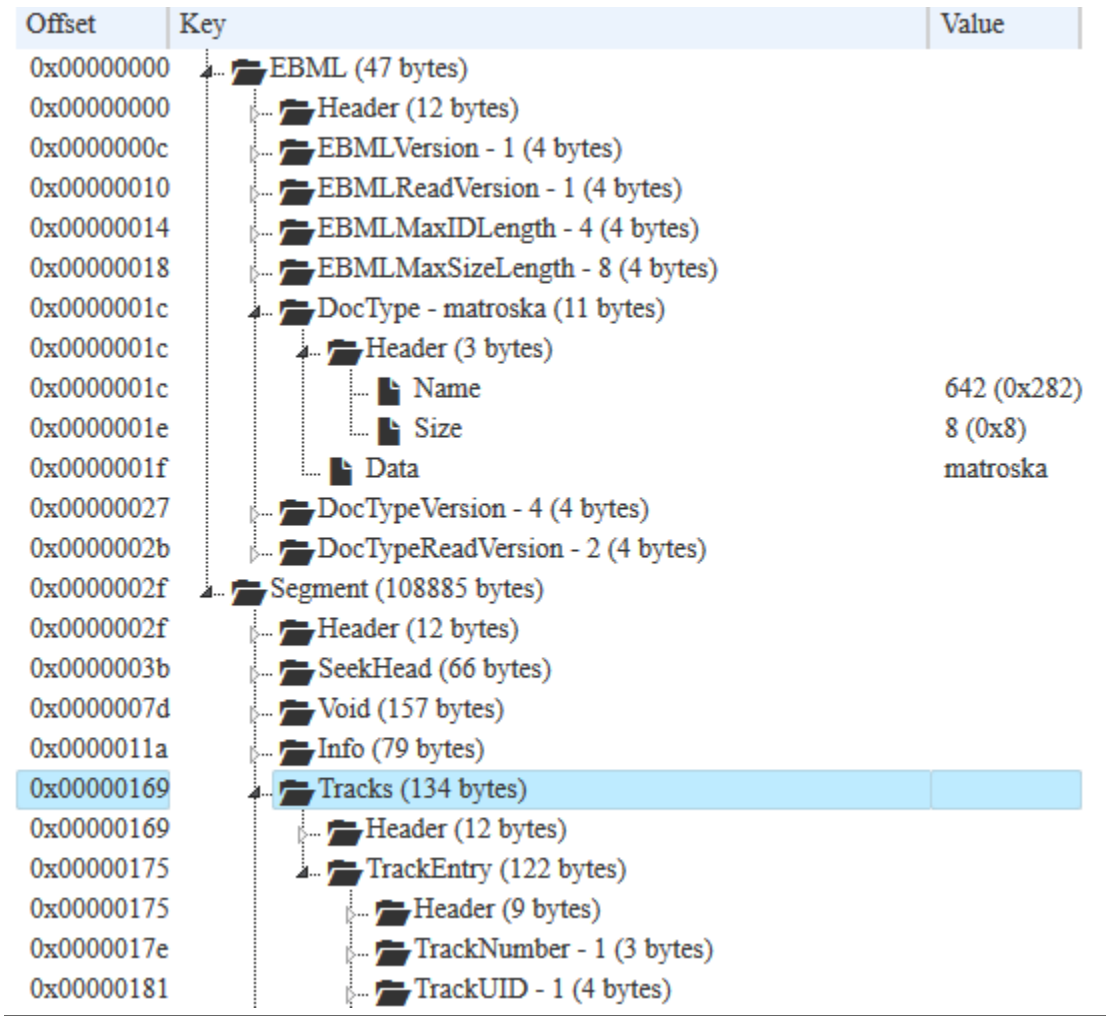
MediaTrace

Deep check of bytes

- Provides meaning of each bit in a file
- Work in progress (sometimes stalls due to too much information, only first frames displayed)
- Available in MediaInfo GUI (text mode), MediaConch GUI (Tree mode), MediaInfo and MediaConch CLI (Text, XML)
- BSD-2-Clause license (in MediaInfoLib)

MediaTrace

Example with a Matroska file



Offset	Key	Value
0x00000000	EBML (47 bytes)	
0x00000000	Header (12 bytes)	
0x0000000c	EBMLVersion - 1 (4 bytes)	
0x00000010	EBMLReadVersion - 1 (4 bytes)	
0x00000014	EBMLMaxIDLength - 4 (4 bytes)	
0x00000018	EBMLMaxSizeLength - 8 (4 bytes)	
0x0000001c	DocType - matroska (11 bytes)	
0x0000001c	Header (3 bytes)	
0x0000001c	Name	642 (0x282)
0x0000001e	Size	8 (0x8)
0x0000001f	Data	matroska
0x00000027	DocTypeVersion - 4 (4 bytes)	
0x0000002b	DocTypeReadVersion - 2 (4 bytes)	
0x0000002f	Segment (108885 bytes)	
0x0000002f	Header (12 bytes)	
0x0000003b	SeekHead (66 bytes)	
0x0000007d	Void (157 bytes)	
0x0000011a	Info (79 bytes)	
0x00000169	Tracks (134 bytes)	
0x00000169	Header (12 bytes)	
0x00000175	TrackEntry (122 bytes)	
0x00000175	Header (9 bytes)	
0x0000017e	TrackNumber - 1 (3 bytes)	
0x00000181	TrackUID - 1 (4 bytes)	

MediaTrace

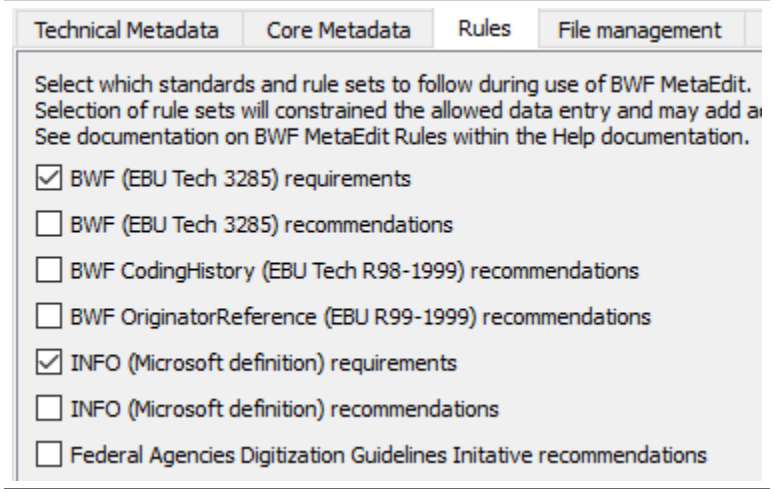
Example with a TIFF file

Offset	Key	Value
0x00000000	File Header (8 bytes)	
0x00000000	Magic	1296891946 (0x4d4d002a)
0x00000004	IFDOffset	8 (0x8)
0x00000008	IFD (294 bytes)	
0x00000008	Header (2 bytes)	
0x00000008	NrOfDirectories	24 (0x18)
0x0000000a	(Empty) - 0 (12 bytes)	
0x00000016	ImageWidth - 999 (12 bytes)	
0x00000022	ImageLength - 662 (12 bytes)	
0x00000022	Tag	257 (0x101)
0x00000024	Type	3 (0x3)
0x00000026	Count	1 (0x1)
0x0000002a	ImageLength	662 (0x296)
0x0000002c	Padding	(2 bytes)
0x0000002e	BitsPerSample - 1 (12 bytes)	
0x0000003a	Compression - Raw (12 bytes)	
0x0000003a	Tag	259 (0x103)
0x0000003c	Type	3 (0x3)
0x0000003e	Count	1 (0x1)
0x00000042	Compression	1 (0x1)
0x00000044	Padding	(2 bytes)
0x00000046	PhotometricInterpretation - B/W or Grey scale (12 bytes)	
0x00000052	(Empty) (216 bytes)	
0x0000012a	IFDOffset	0 (0x0)

BWF MetaEdit

WAV/BWF Metadata checker and editor

- Focused on WAV format, used a lot by archives
- Difference between requirements and recommandations
- Can delete/modify/add metadata
- Can export metadata
- Public domain



BWF MetaEdit

Enforce the guidelines developed by

- FADGI (US Federal Agencies Audio-Visual Working Group)
- European Broadcasting Union (EBU)
  - BWF (EBU tech 3285)
  - CodingHistory (EBU tech R98-1999)
  - OriginatorReferencce (EBU tech R99-1999)
- Microsoft (INFO chunk)

QCTools

Audiovisual quality control

- On the decoded frame
- Focused on digitalized content
- Initially focused on video artefacts, now checking also audio
- BSD-3-Clause license for UI/new filters, GPLv2+ for FFmpeg libs

QCTools

Tied to FFmpeg

- Depends on FFmpeg for demux, decode, and check
- Some tests were already present in FFmpeg (especially libavfilter), we added an UI
- We also added some tests to libavfilter upstream

QCTools

List - Video

- YUV: MIN, AVG, MAX, LOW, HIGH, Difference
- Saturation, Hue, Temporal Outliers, Vertical Line Repetitions
- Broadcast Range, Crop Width/Height
- Peak Signal to Noise Ratio (PSNRf), Structural SImilarity Metric (SSIMf), Mean Square Error (MSEf)
- Interlacement Detection

Note: tool is focused on field comparison for the moment

QCTools

List - Audio

R.128, Audio Phase Meter, DC Offset, Audio Diffs, RMS

Interfaces

Not only one interface: different people, different needs, different technical knowledges

- Command line
- Graphical interface
- Server (REST API)
- Web interface

Standardization

Issues:

- Checking is good, but compared to what?
- Lack of open video/audio standards
- Lot of people work on lossy formats (e.g. VP9, AV1, Opus)
- Some people need lossless formats

Standardization

CELLAR: IETF workgroup

- Container: Matroska
- Video: FFV1
- Audio: FLAC (not started)

Sponsorships

Lot of work, we need sponsorship

- Several compagnies (usually don't like to be named :( )
- European Union (especially PREFORMA project)
- US Federal Agencies Digital Guidelines Initiative
- National Endowment for the Humanities
- The Knight Foundation

Contributions

We need you!

- Patch for new features
- Patch for bug fixes
- Participation in CELLAR
- Design (e.g MediaConch new displays)
- Participation in documentation writting
- Testing
- ...

Stay in touch

MediaInfo: https://mediaarea.net/MediaInfo

MediaConch: https://mediaarea.net/MediaConch

BWF MetaEdit: https://mediaarea.net/BWFMetaEdit

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