White paper:
HEVC analysers

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August 2014

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About Vcodex

Vcodex are world experts in video compression. We provide essential analysis and advice on technology, strategy and intellectual property. Our input will help you get the most out of your video compression technology.

Video compression is the technology behind moving digital images. It is essential to video on phones, cameras, laptops and TV. In fact, anything you can watch on a screen uses video compression. Vcodex.com

HEVC Analysers

High Efficiency Video Coding (HEVC) [1,2] is a next generation video coding standard which has the potential to improve delivery of High Definition and Ultra High Definition video. A HEVC analyser is software with a user-friendly interface for visualisation and testing of HEVC bitstreams. It can be a very useful tool for broadcasters and content delivery professionals, quality assurance teams, educators, codec architects and for anyone new to the standard. This white paper gives an overview of popular HEVC analysers including installation guides, usage and available features. HEVC bitstream analyzers covered include Elecard HEVC analyser, Parabola Explorer and Zond265. **

Elecard HEVC analyser

Developed by Elecard, the bitstream analyzer comes in trial and full versions. The analyzer currently runs on Windows machines with Microsoft .NET framework installed. To install, download the installer from [3] and follow the on-screen instructions. The User manual [4] explains the system requirements. Once installed successfully, start by opening a HEVC file and explore the various features available using the menu bar in the main window.

Figure 1: Elecard HEVC analyzer - main window

** If you would like us to cover your analyzer product, please get in touch.
Figure 2: Example picture overlay showing block partitions

Figure 3: Example picture overlay showing colour-coded block types (I, P and B)

Figure 4: Example compression residual of a frame in bits

Figure 5: Example area chart with tooltip information

Key features:
- Figure 1 shows the main window, which includes the frame navigation view, picture view, metadata information, bitstream view and coding unit information view.
- Frame navigation includes a frame size chart with colours highlighting different types of frames (I, P and B), area chart with coding stats per frame and thumbnails.
- Display of reference frames.
- Header information at all levels of the video stream can be viewed in the metadata panel.
- Picture overlay options include block partitions which appear as a grid over the current picture, a colour-coded grid for different prediction types, motion vector field, block sizes, quantizers and residual.
- The bitstream panel includes a hex viewer and displays a hierarchical view of the syntax elements in the bitstream.
- The coding unit panel displays location, slice index, tile index, sizes, coded, prediction (mv, mvd and mv candidates) and transform unit information.
- Quality estimation using PSNR.
- Display of VPS, SPS, PPS, Slice headers with offsets and bit size indication (as in the Standard documentation)

Prerequisites:

Hardware Requirements
- 4 GB RAM for video resolution below HD
- 8 GB RAM for HD video (or higher)

Software Requirements
- 32-bit Windows® operating system for SD video
- 64-bit Windows® operating system for HD video (or higher)
- Microsoft .NET Framework 4.0 (or higher)
Parabola Explorer

Developed by Parabola Research, the analyser is available in trial and full versions from their website [5]. The software currently runs on Windows machines only. To install, register with Parabola Research [6] and a download link to the software installer is sent via email. Run the installer and follow the on-screen instructions to install the software. The user manual is available at [7].

Figure 6: Parabola Explorer HEVC bitstream analyzer - main window
Key features:

- Figure 6 shows the main window which includes the frame navigation view, picture view, bitstream pane and coding statistics pane.
- Frame navigation using thumbnails, inter-picture dependency graph or bit distribution chart.
- The inter-picture dependency graph has colours highlighting different types of frames (I, P and B) and arrows indicating frame relationships.
- Picture overlay options include block partitions, colour-coded prediction types, motion vector information and compression details such as bits per block, qp and residual.
- The bitstream viewer is consistent with the HEVC specification and allows the user to analyse the bitstream at picture, slice and block levels.
- Visualisation of video bitstream characteristics from picture relationships to CABAC bins.
- The software also includes error reports, error descriptions and references to the standard.

Prerequisites:

- Windows XP, Vista, 7, 8 or 8.1
- 32-bit Windows® operating system or 64-bit Windows® operating system
- Recommends 1920x1080 or higher display resolution
Zond265

Developed by Solveig Multimedia, the software is available from [8] and comes in demo and full versions. The demo version allows analysis of first 10 frames per sequence with no time limit. Registration is required to get the download link for the demo version. The documentation and FAQs are available at [9].
Key features:

- Figure 11 shows the main window, which includes picture view, toolbar options, bitstream pane, and the timeline window.
- The timeline window shows bits per frame and video quality measurement using PSNR and MSSIM metrics.
- Picture overlay options include picture type, colour components, slice/tile boundaries, partition types, transform partitions, motion vectors and compression details (bits, residual and qp).
- Bitstream pane has options to display bitstream syntax, stream stats, frame stats and information at frame and coding unit level.
- There is an option to observe buffer size statistics including a buffer fullness plot.
- Includes a command line tool for generating quality reports.

Prerequisites:

- Linux 32 and 64 bits versions of Zond 265 are available.
- Windows XP to Windows 7
Zond265 command line tool: examples of usage

1. Create a quality report using a reference video clip:

```
zond265.exe "Video\hm140_randaccess.265" -iref "Video\hm_randaccess.yuv" -report
```

2. Create a report about PSNR video quality for frames from 5 to 10 and save the result to the file "report.csv":

```
zond265.exe "Video\hm140_randaccess.265" -iref "Video\hm_randaccess.yuv" -report t="quality" qm="PSNR" start_f="5" stop_f="10"
```


References

About the authors

Vcodex is led by Professor Iain Richardson, an internationally known expert on the MPEG and H.264 video compression standards. Based in Aberdeen, Scotland, he frequently travels to the US and Europe.

Professor Richardson is the author of “The H.264 Advanced Video Compression Standard”, a widely cited work in the research literature. He has written three further books and over 50 journal and conference papers on image and video compression. He regularly advises companies on video codec technology, video coding patents and mergers/acquisitions in the video coding industry. Professor Richardson leads an internationally renowned image and video coding research team, contributes to the MPEG industry standards group and is sought after as an expert witness and litigation consultant.


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