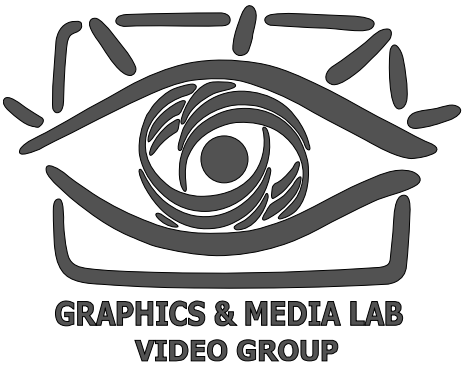

Deinterlacing algorithms comparison

Full version

Authors: Dmitriy Vatolin, Alexander Petrov, Maxim Kolinichenko

Algorithms:

- MSU Deinterlacer
- ELA
- YADIF
- QTGMC
- MCBob
- nnedi3
- TDeint
- SmoothDeinterlacer

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CS MSU Graphics&Media Lab

Video Group

http://www.compression.ru/video/deinterlacer/index_en.html

deinterlacer@graphics.cs.msu.ru

1 Comparison

1.1 Comparison method

Our algorithm was compared with a set of free deinterlacers. Progressive source was converted to interlaced scan and processed by different deinterlacing algorithms. The result of this processing was compared with a source video using PSNR and SSIM metrics. Number of processed frames per second (FPS) was measured to estimate speed of algorithms.

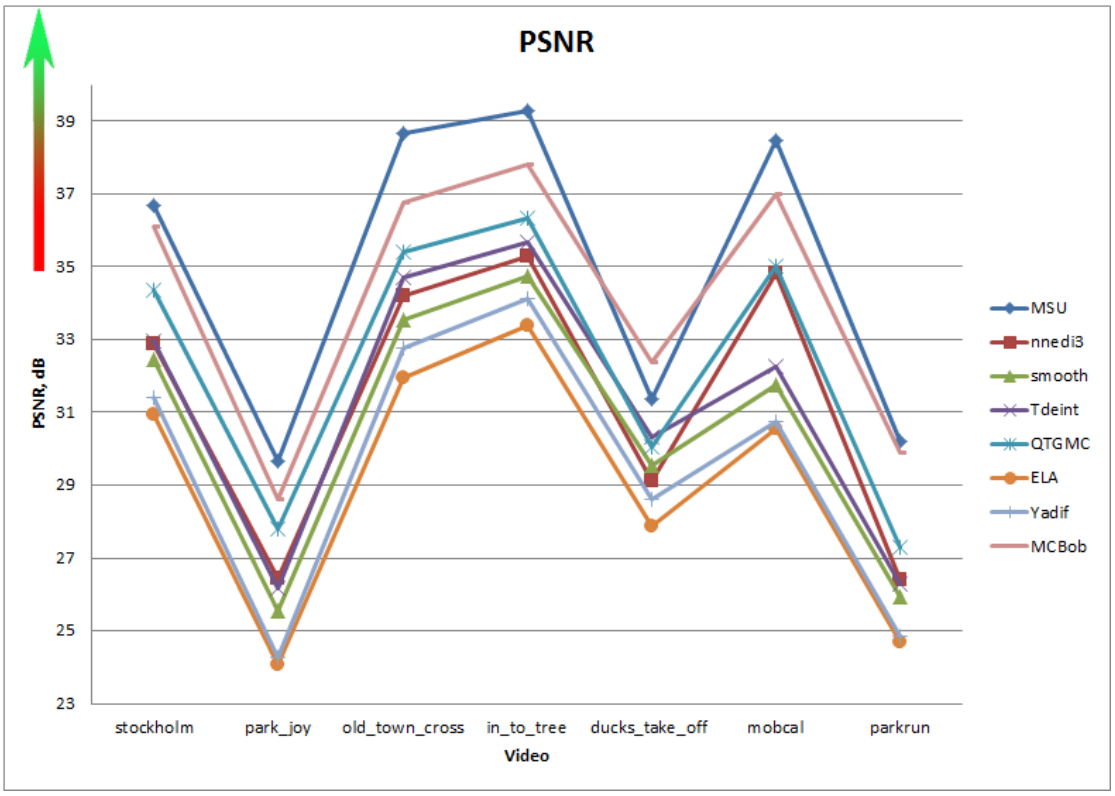
1.2 References

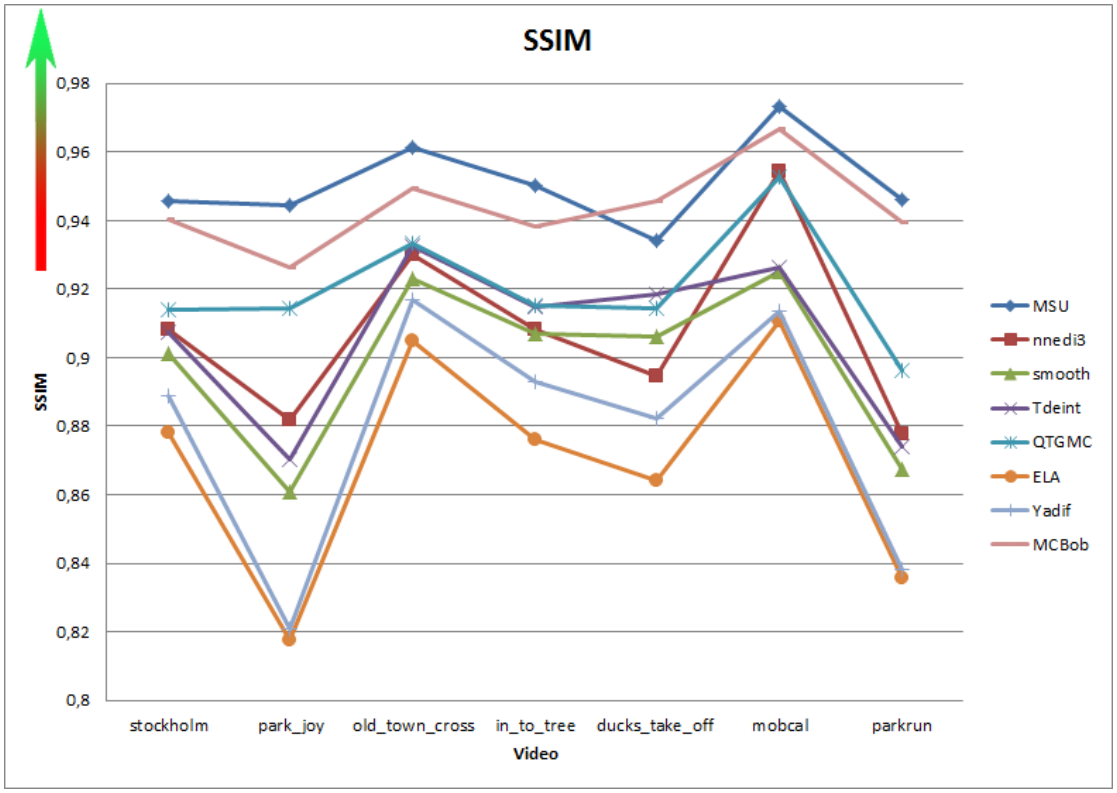
All of the test sequences are located at http://media.xiph.org/video/derf/

List of deinterlacers:

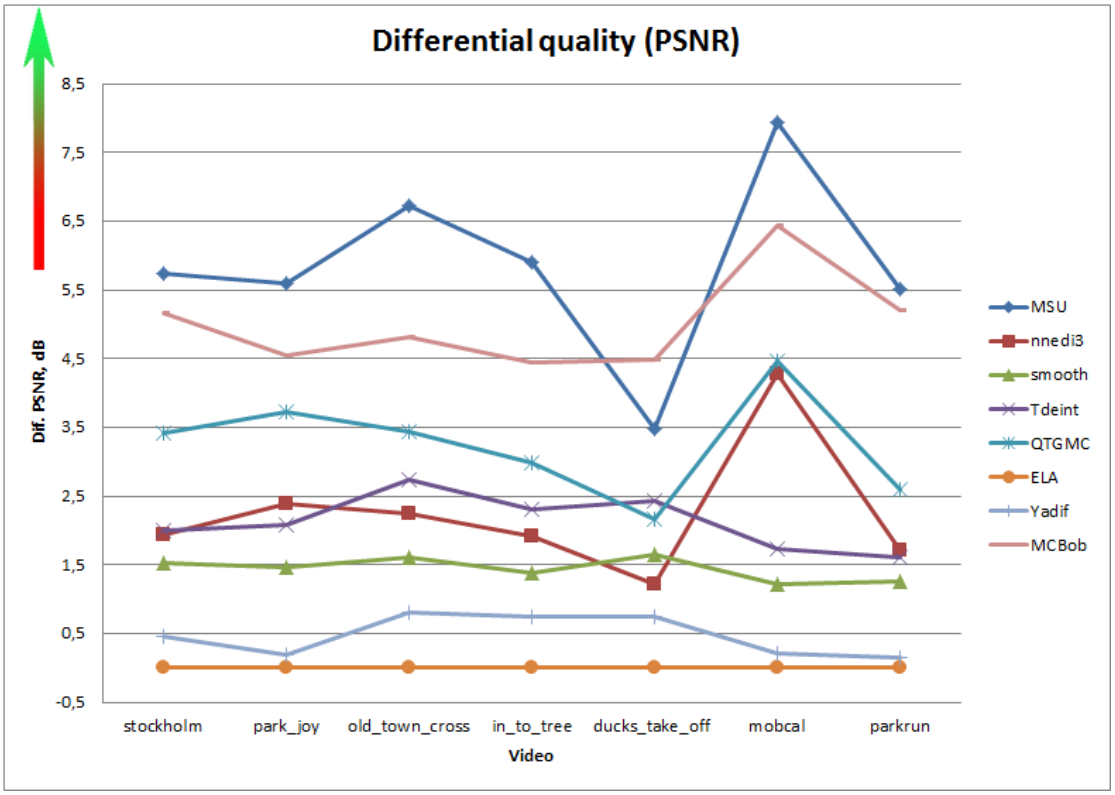
- **MSU - http://www.compression.ru/video/deinterlacer/src/msu_deinterlacer.zip**
- **nnedi3 - http://web.missouri.edu/~kes25c/nnedi3.zip**
- **TDeint - http://web.missouri.edu/~kes25c/TDeintv11.zip**
- **Smooth - http://web.missouri.edu/~kes25c/SmoothDeinterlacer_25.zip**
- **QTGMC - http://forum.doom9.org/showthread.php?t=156028**
- **MCBob - http://forum.doom9.org/showthread.php?t=124676**
- **ELA, YADIF - built-in VirtualDub implementations**

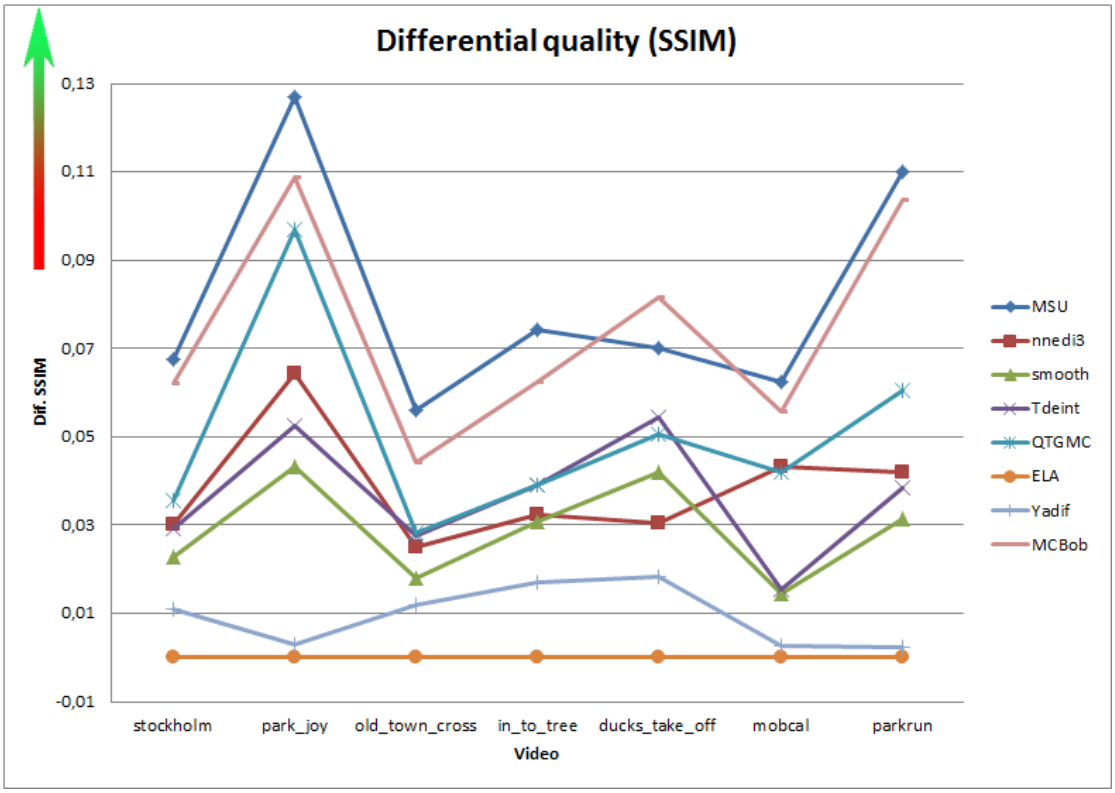
1.3 Charts



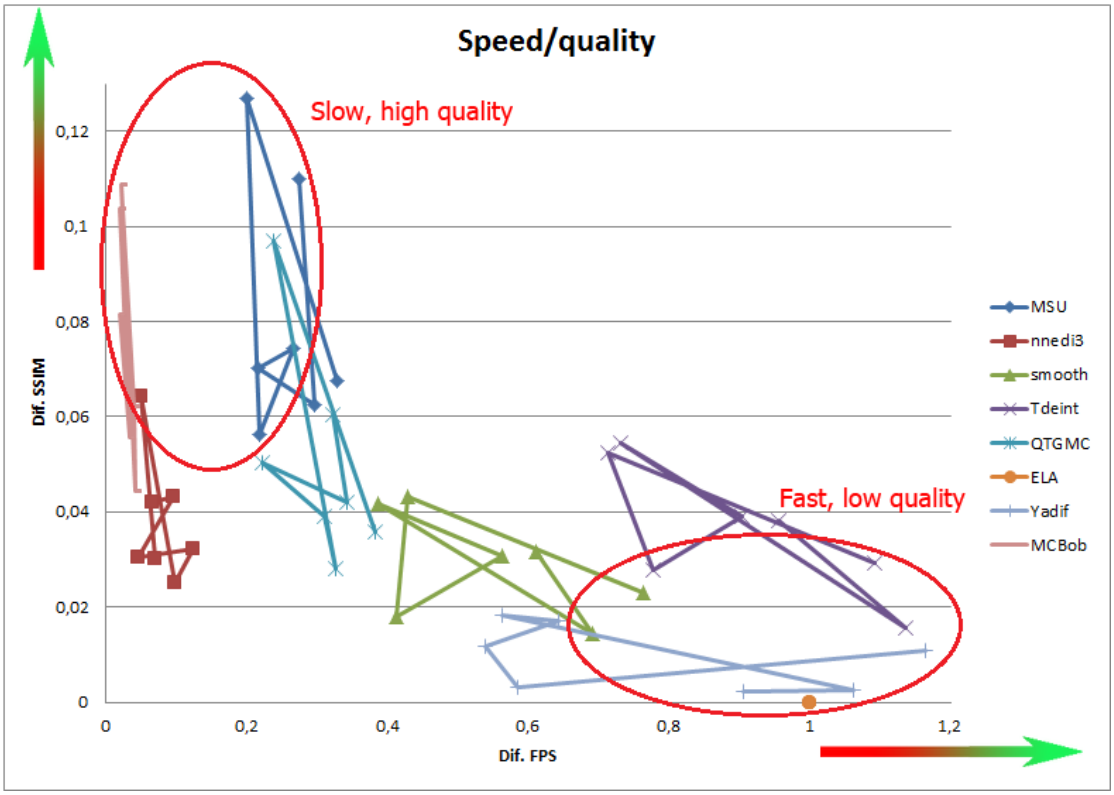


Absolute values of PSNR and SSIM metrics are presented on the charts above. (An arrow points to "better")



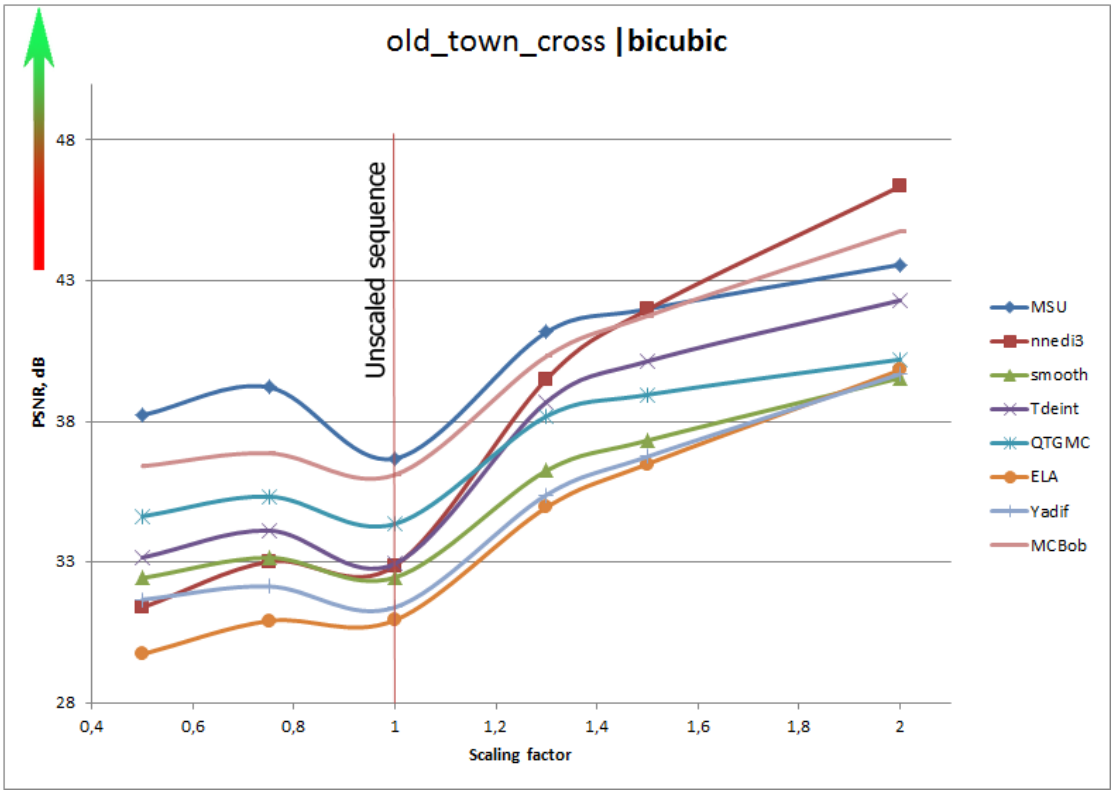


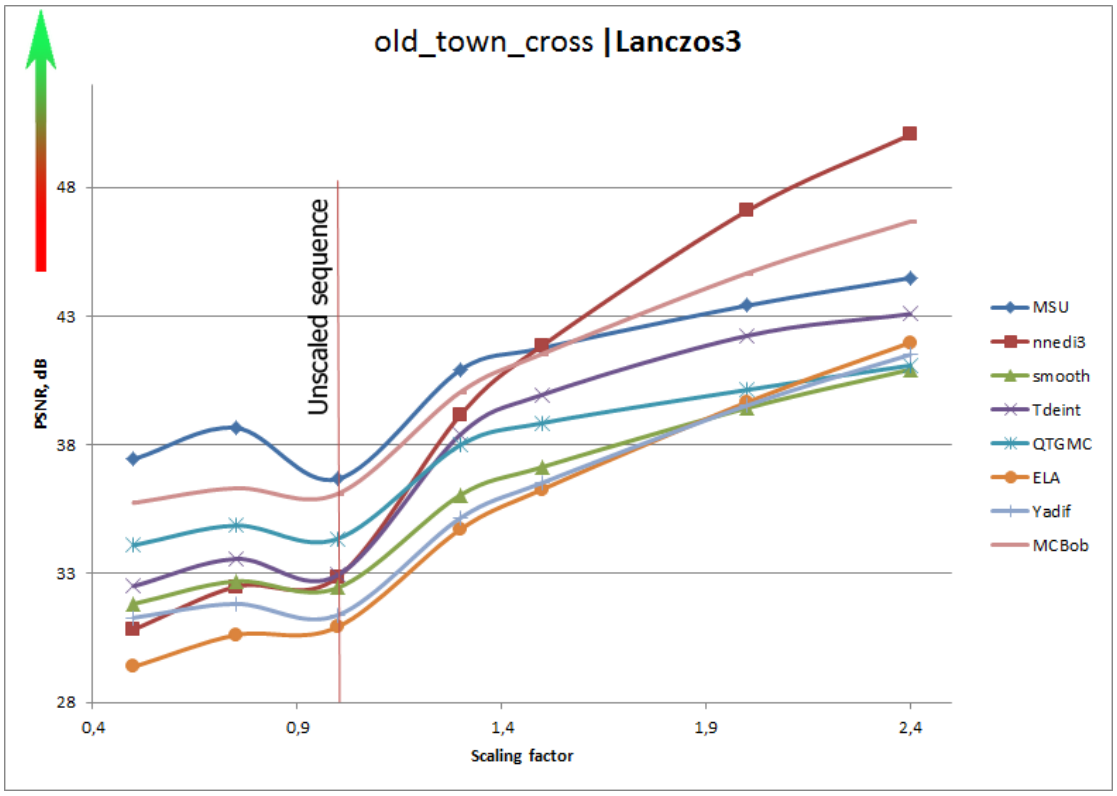
The differences between metrics' values of ELA algorithm and other deinterlacing algorithms are shown on these charts



This chart shows relations between speed and quality of different algorithms, where speed is FPS/FPS$_{ELA}$

1.4 Remarks





During the comparison it was noticed that some transformations of progressive video may affect comparison results. For example, similarity of interpolation algorithms in resizing and deinterlacing leads to higher quality metric value for this deinterlacer. Relation between scaling factor and PSNR value is shown on these charts for Lanczos and bicubic resizing. PSNR value in the point where scaling factor equals 1 stands out of common chart behavior. This fact proves an importance of correct source videos in this kind of comparisons. Processing a video that has been converted from resized progressive source is a very rare usecase for deinterlacing algorithms, so our comparison was performed only with unscaled test sequences.

2 Visual comparison

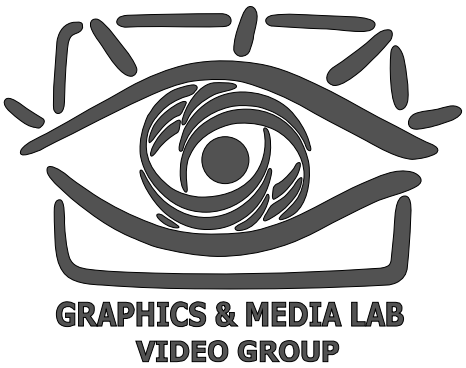
Some zoomed-in samples are shown below. Our algorithm is intended to minimize negative effects of deinterlacing like smoothing and "combing".

Interlaced frames

MSU Deinterlacer results

Other algorithms' result

3 About the Graphics & Media Lab Video Group



The Graphics & Media Lab Video Group is part of the Computer Science Department of Moscow State University. The Graphics Group began at the end of 1980's, and the Graphics & Media Lab was officially founded in 1998. The main research avenues of the lab include areas of computer graphics, computer vision and media processing (audio, image and video). A number of patents have been acquired based on the lab's research, and other results have been presented in various publications.

The main research avenues of the Graphics & Media Lab Video Group are video processing (pre- and post-, as well as video analysis filters) and video compression (codec testing and tuning, quality metric research and codec development).

The main achievements of the Video Group in the area of video processing include:

- High-quality industrial filters for format conversion, including high-quality deinterlacing, high-quality frame rate conversion, new, fast practical super resolution and other processing tools.
- Methods for modern television sets, such as a large family of up-sampling methods, smart brightness and contrast control, smart sharpening and more..
- Artifact removal methods, including a family of denoising methods, flicking removal, video stabilization with frame edge restoration, and scratch, spot and drop-out removal.
- Application-specific methods such as subtitle removal, construction of panorama images from video, video to high-quality photo conversion, video watermarking, video segmentation and practical fast video deblur.

The main achievements of the Video Group in the area of video compression include:

- Well-known public comparisons of JPEG, JPEG-2000 and MPEG-2 decoders, as well as MPEG-4 and annual H.264 codec testing; codec testing for weak and strong points, along with bug reports and codec tuning recommendations.
- Video quality metric research; the MSU Video Quality Measurement Tool and MSU Perceptual Video Quality Tool are publicly available.
- Internal research and contracts for modern video compression and publication of MSU Lossless Video Codec and MSU Screen Capture Video Codec; these codecs have one of the highest available compression ratios.

The Video Group has also worked for many years with companies like Intel, Samsung and RealNetworks.

In addition, the Video Group is continually seeking collaboration with other companies in the areas of video processing and video compression.

E-mail: video@graphics.cs.msu.ru