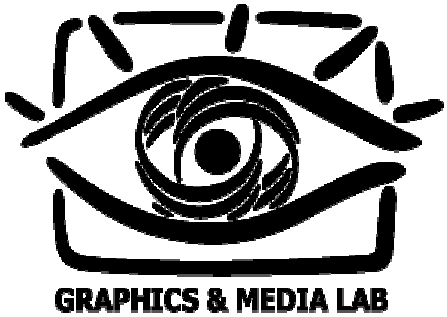

MPEG-4 AVC/H.264 Video Codecs Comparison

Project head: Dmitriy Vatolin
Measuring, refinement: Dmitriy Kulikov, Alexander Parshin
Translation: Daria Kalinkina
Verification: Stass Soldatov

Tested codecs:

Mpegable AVC Codec

Moonlight H.264 Video Codec

MainConcept H.264 Codec

Fraunhofer IIS Codec

Ateme MPEG-4 AVC / H.264 Codec

Videosoft H.264 Codec

DivX Pro 5.1.1 Codec

January 2005

CS MSU Graphics&Media Lab

Video Group

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videocodec-testing@compression.ru

Introduction

Thanks

We would like to thank Moonlight Cordless LTD, Fraunhofer Institute for Integrated Circuits IIS and Ateme for kindly providing us their codecs for this test.

Overview

Codecs

	CODEC	MANUFACTURER	VERSION
1.	Mpegable AVC Codec	dicas digital image coding GmbH	0.10
2.	Moonlight H.264 Video Codec	Moonlight Cordless LTD	0.1.2546
3.	MainConcept H.264 Codec	MainConcept AG	1.04.02.00
4.	MPEG-4 / AVC Codec	Fraunhofer Institute for Integrated Circuits IIS	Date 25.11.2004
5.	Ateme MPEG-4 AVC / H.264 Codec	Ateme	1.0.3.2
6.	Videosoft H.264 Codec main	Videosoft, Inc	2.1.0.2
7.	DivX Pro™ 5.1.1 Codec	DivXNetworks, Inc	5.1.1

Video sequences

	Sequence	Number of frames	Number of frames per second	Resolution and color space
1.	bankomatdi	376	30	704x352(RGB)
2.	battle	1599	24	704x288(RGB)
3.	bbc3di	374	25	704x576(RGB)
4.	foreman	300	15	352x288(RGB)
5.	susidi	374	25	704x576(RGB)

Goal and testing rules

Goal of H.264 codecs comparison

The main goal of this work was the comparative assessment of codecs quality in terms of consumer video compression. The video sequences used to perform this assessment were processed with a simple prevalent deinterlacing filter. The codecs were used with their default options.

Testing rules

- PSNR was measured using luv_avi program.
- Frame size was calculated as the ratio of the sequence size to the number of frames.
- Y-axis values on the Delta diagram were calculated as the difference between PSNR of the tested codecs and PSNR of the DivX codec.
- To test the codecs that place their logo on the frames of the compressed sequence a black rectangle was placed in its position on the both source and compressed sequences before their comparison.
- Compression with VfW (Video for Windows) codecs was performed using VirtualDub 1.5.4 video processing tool.
- Compression with DirectShow codecs was performed using GraphEdit (build 011008) tool.
- Compression with the codecs that had been installed as the separate applications was performed using these applications.
- For those codecs that compress video into their own internal format instead of avi the resulting compressed sequences were transformed into avi using GraphEdit (build 011008) and decoder given with the codec.
- MainConcept codec inserted extra frames into decoded sequences. These frames were deleted using VirtualDub 1.5.4 to perform per frames comparison. If the last frame in the corrected sequence differed visually from the last frame in the source uncompressed sequence comparison was not performed for this sequence.

Sequences

Bankomatdi

Sequence title	bankomatdi
Resolution	704x352
Number of frames	376
Color space	RGB
Frames per second	30
Source	MPEG-2 (DVD), Smart Deinterlace

Picture 1. Frame 168 from bankomatdi sequence

This sequence is a fragment of the “Terminator-2” movie, which represents the scene near the cash dispenser. The sequence is characterized by slow motion, very little change of background (in the second part of the sequence camera slowly goes to the right) and comparatively high resolution.

Battle

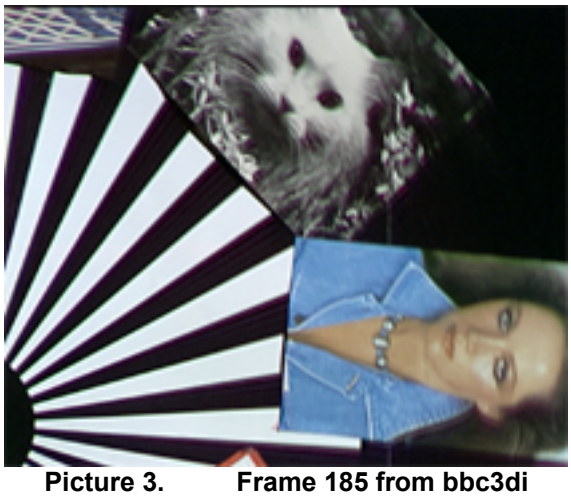
Sequence title	battle
Resolution	704x288
Number of frames	1599
Color space	RGB
Frames per second	24
Source	MPEG-2 (DVD), FlaskMPEG deinterlace

Picture 2. Frame 839 from battle sequence

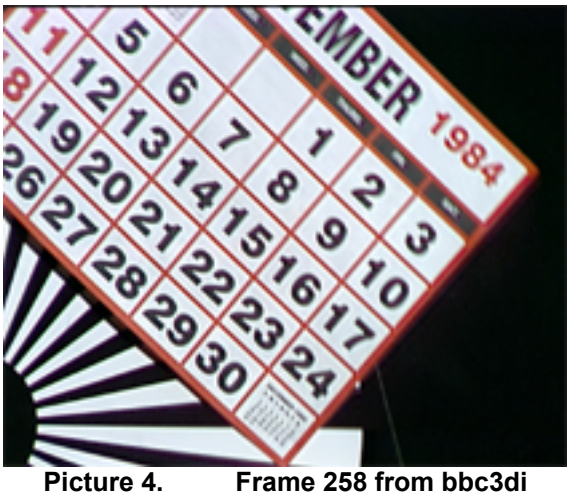
This sequence is also a fragment of the “Terminator-2” movie, which represents the very beginning of the film. In the terms of compression this sequence is the most difficult one among all other sequences that took part in the testing. It is caused by three main reasons: constant changing of brightness because of the explosions and laser flashes, very quick motion and frequent changes of the scene that make codecs often compress frames as I-frames.

Bbc3di

Sequence title	bbc3di
Resolution	704x576
Number of frames	374
Color space	RGB
Frames per second	25
Source	Original (standard sequence), Smart Deinterlace



Picture 3. Frame 185 from bbc3di sequence



Picture 4. Frame 258 from bbc3di sequence

This sequence is characterized by pronounced rotary motion. It contains a rotating striped drum with different pictures and photos on it. Quality of the compressed sequence can be estimated by the details on these images.

Foreman

Sequence title	foreman
Resolution	352x288
Number of frames	300
Color space	RGB
Frames per second	15
Source	Original (standard sequence), progressive

Picture 5. Frame 77 from foreman sequence

Picture 6. Frame 258 from foreman sequence

This is another standard sequence. It represents a face with very rich mimic. On the one hand motion here is not very intensive, but on the other it is disordered, not forward. Intricate character of motion creates problems for the motion compensation process. In addition camera is shaking which makes the image unsteady. In the end of the sequence camera suddenly turns to the building site and there follows an almost motionless scene. So this sequence also shows codec's behavior on a static scene after intensive motion.

Susidi

Sequence title	susidi
Resolution	704x576
Number of frames	374
Color space	RGB
Frames per second	25
Source	MPEG-2 (40Mbit), Smart Deinterlace

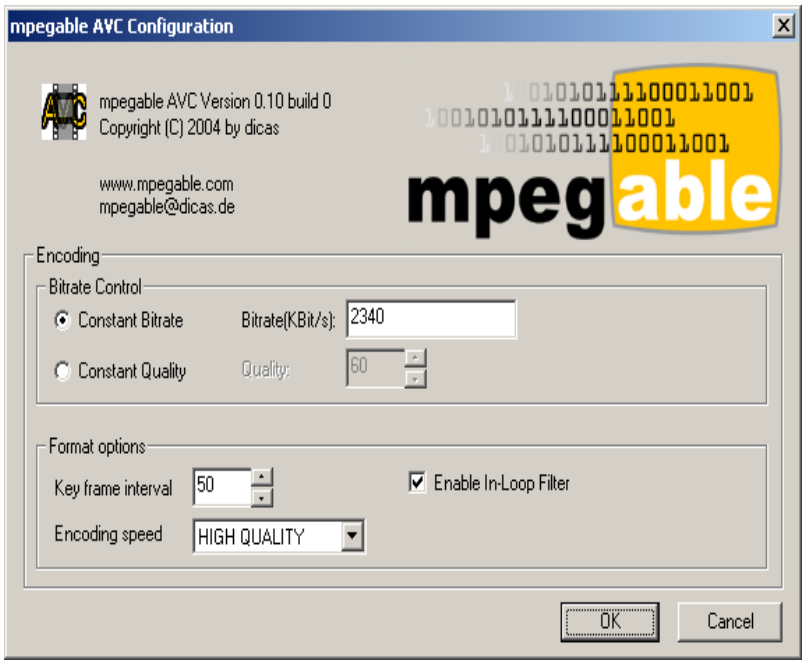
Picture 7. Frame 193 from susidi sequence

This sequence is characterized by high-level noise and slow motion. In its first part the scene is almost static (the girl only blinks), then there is some motion (she abruptly moves her head) and then the scene becomes almost static again. Noise is suppressed on every second frame due to the B-frames option in MPEG-2 codec.

Codecs

Mpegable AVC Codec

- This is a VfW (Video for Windows) codec.
- Compression was performed using VirtualDub 1.5.4 video processing tool.
- The codec is freeware.



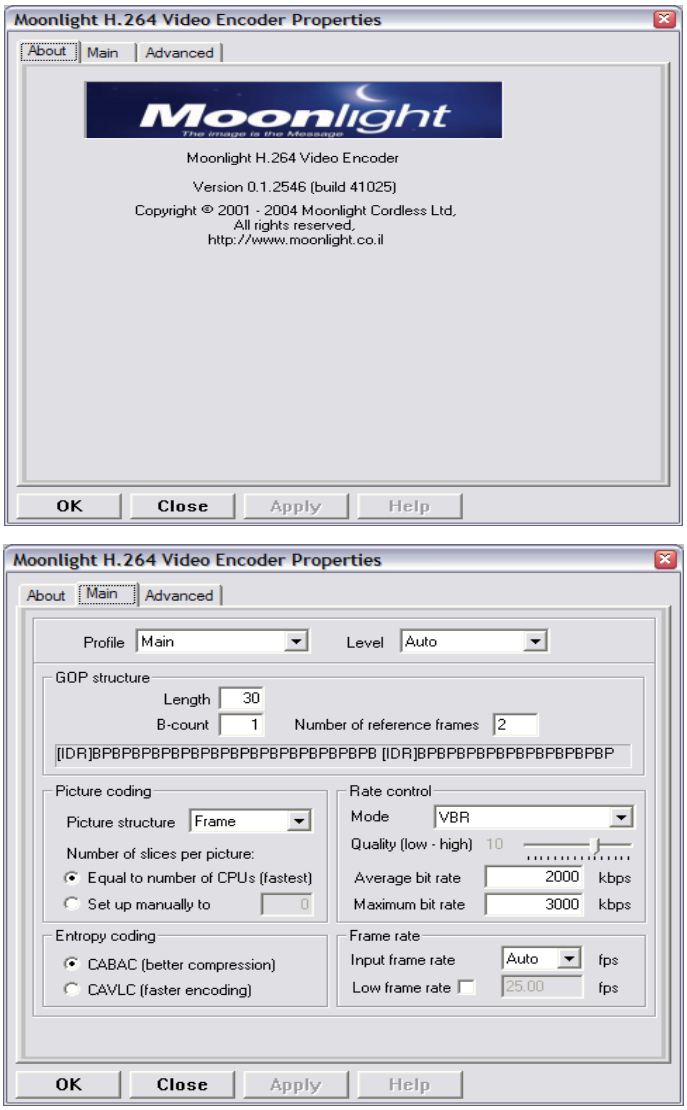
Picture 8. Mpegable AVC

Remarks:

VirtualDub jobs support contains an error on different bit rates. When trying to create several jobs only the last one is performed. Possible source is that codec might not save its settings during job creation.

Moonlight H.264 Video Codec

- This is a DirectShow codec.
- Compression was performed using GraphEdit (build 011008) tool.
- The version of the codec used in the testing was kindly provided by Moonlight Cordless LTD company.



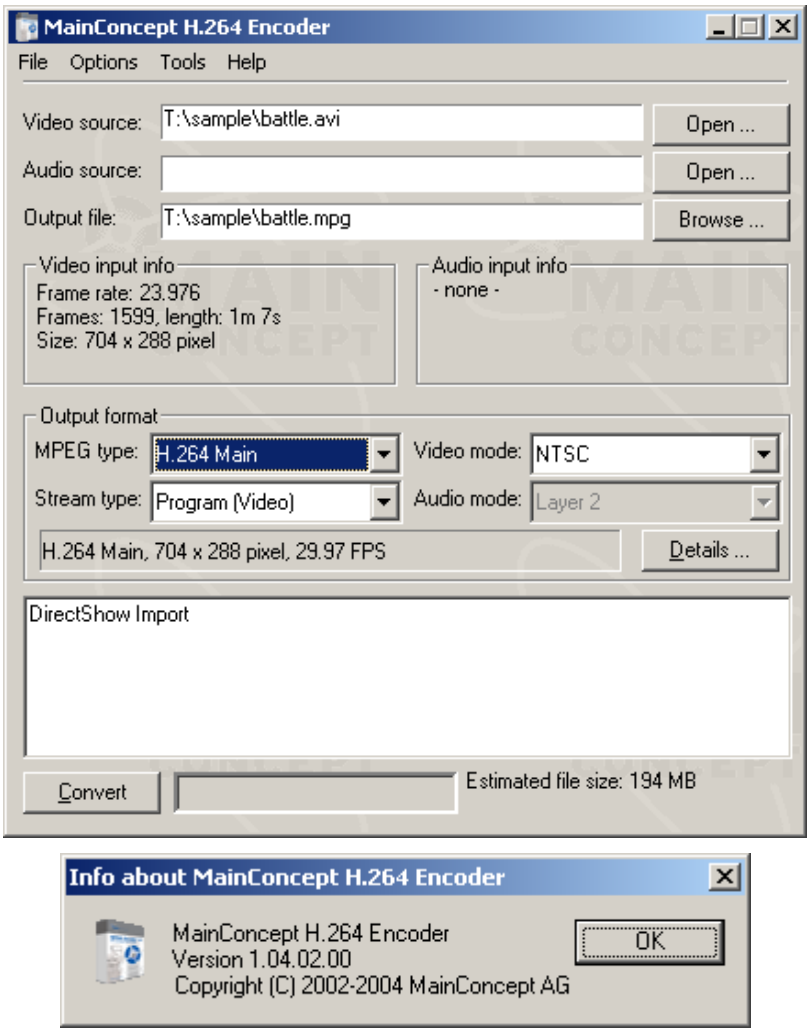
Picture 9. Moonlight

Remarks:

Codec was tested without problems.

MainConcept H.264 Codec

- This codec is provided a separate application for video compression.
- The codec installs its decoder to the system therefore the compressed video can be played with the standard player.
- The codec is freeware.
- GraphEdit (build 011008) tool was used for decoding.



Picture 10. MainConcept

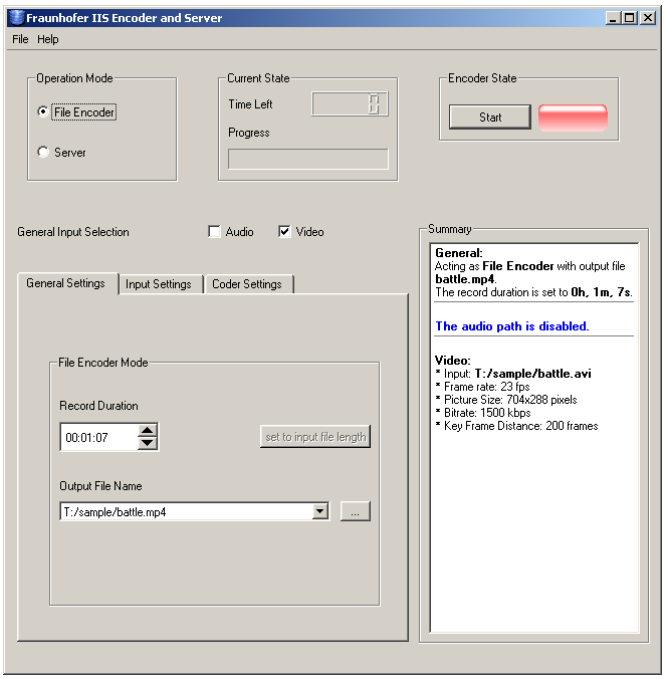
Remarks:

- The codec compresses only sequences with 30fps(NTSC) and 25fps(PAL) frame rates.

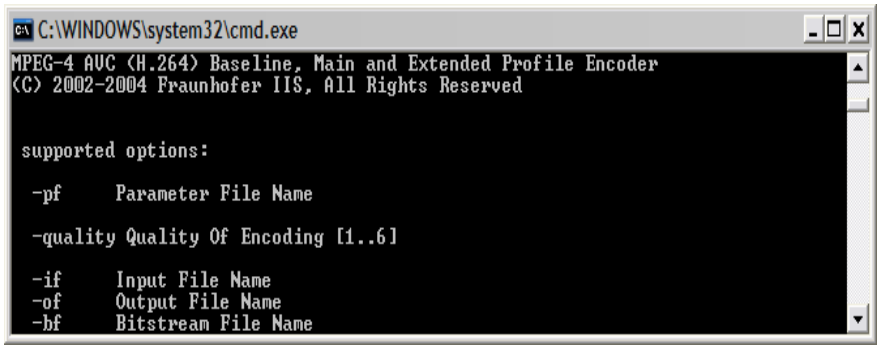
- The codec doesn't compress with bit rate lower than 200 (settings lower than that are simply replaced by 200 without informing a user about it).
- Extra frames were added to the sequence while decoding the compressed sequences. Generally the less the bit rate was the more often extra frames were inserted. At the same time we could not treat these frames as drop-frames, because the resulting sequence length was increased. They had to be removed manually in order to perform per frame comparison.

Fraunhofer IIS Codec

- This codec is provided as a two separate applications for video compression and playback.
- The version of the codec used in the testing was kindly provided by Fraunhofer IIS company. This version works in command line.



Picture 11. Fraunhofer



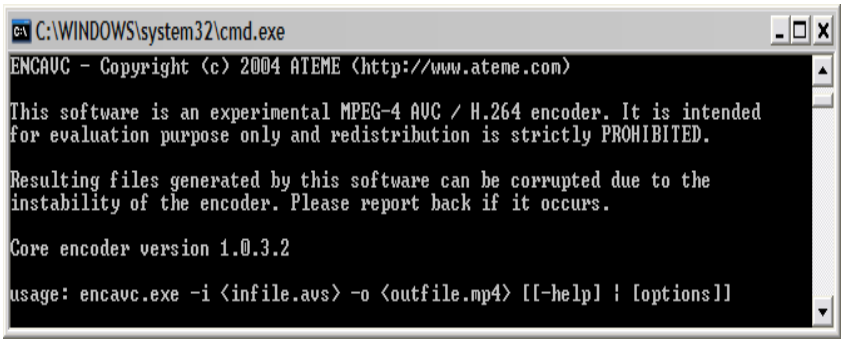
Picture 12. Fraunhofer command-line

Remarks:

- Only YUV format is acceptable as an input of console version, AVI format is acceptable for GUI version.

Ateme MPEG-4 AVC / H.264 Codec

- The version of the codec used in the testing was kindly provided by Ateme company
- This codec works with command line.
- The codec uses drop-frames to produce low bit rates.
- Input file should have YV12 format.



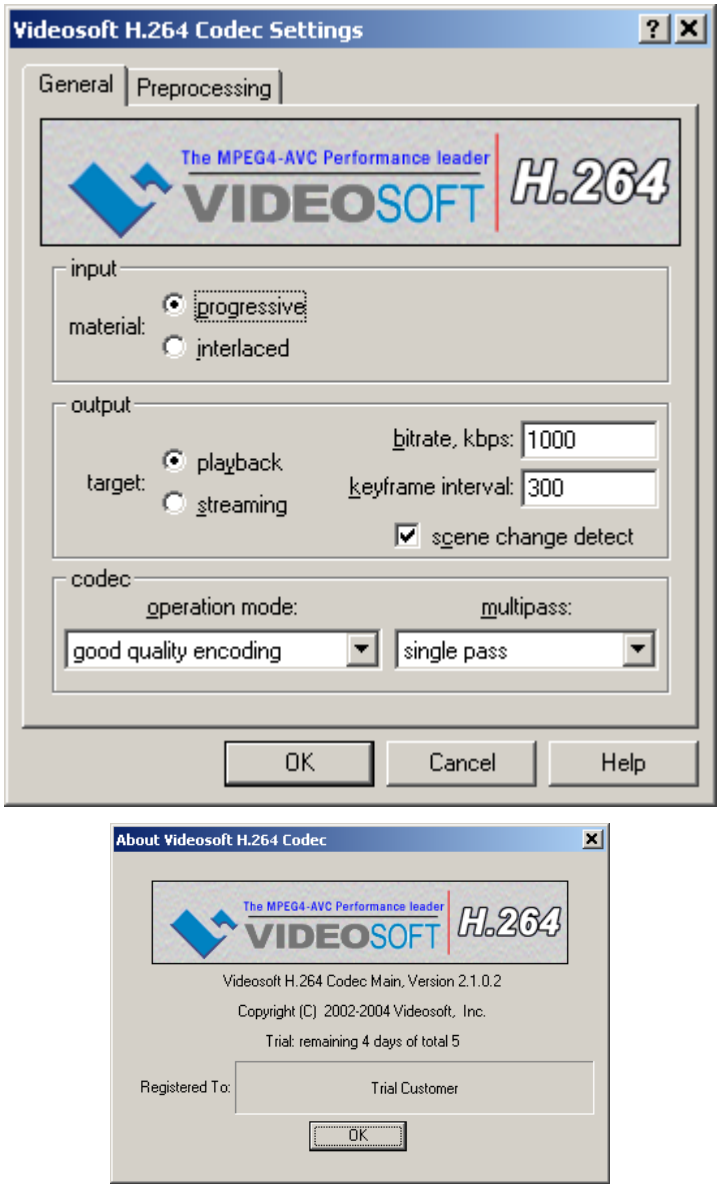
Picture 13. Ateme command-line

Remarks:

Codec was tested without problems.

Videosoft H.264 Codec

- This is a VfW (Video for Windows) codec.
- Compression was performed using VirtualDub 1.5.4 video processing tool.
- The codec is shareware with 5 days of trial use.



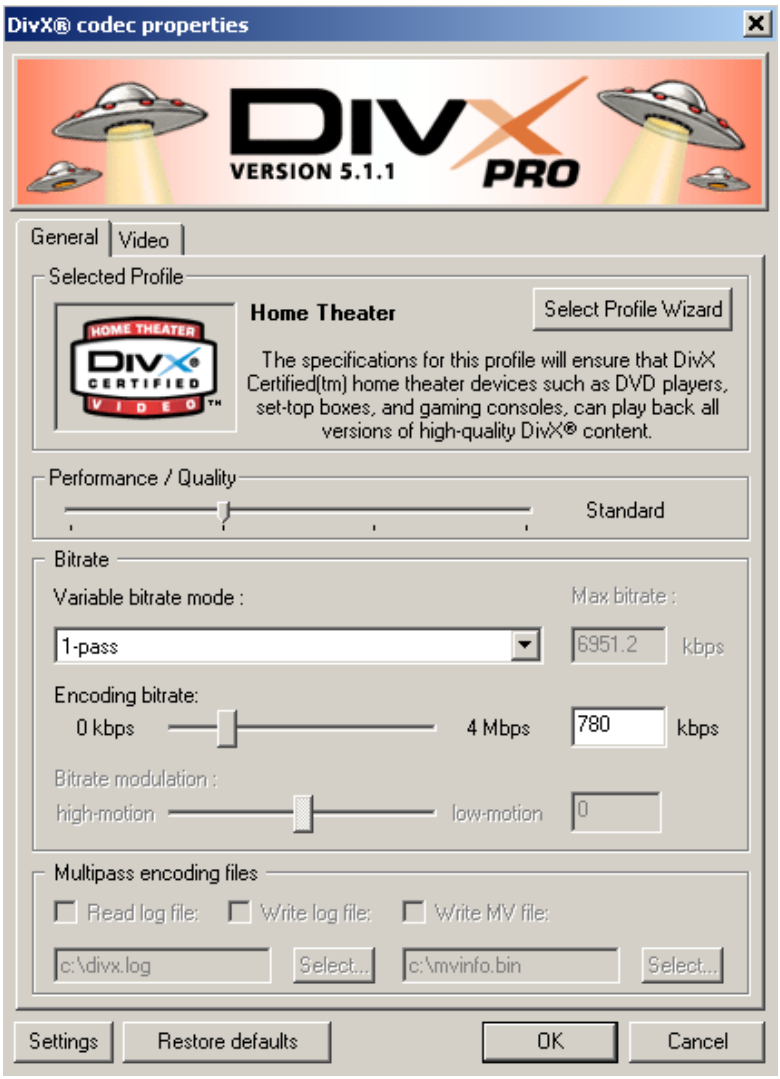
Picture 14. VSS

Remarks:

Codec was tested without problems.

DivX Pro™ 5.1.1 Codec

- This is a VfW (Video for Windows) codec.
- Compression was performed using VirtualDub 1.5.4 video processing tool.



Picture 15. DivX Pro™ 5.1.1

Remarks:

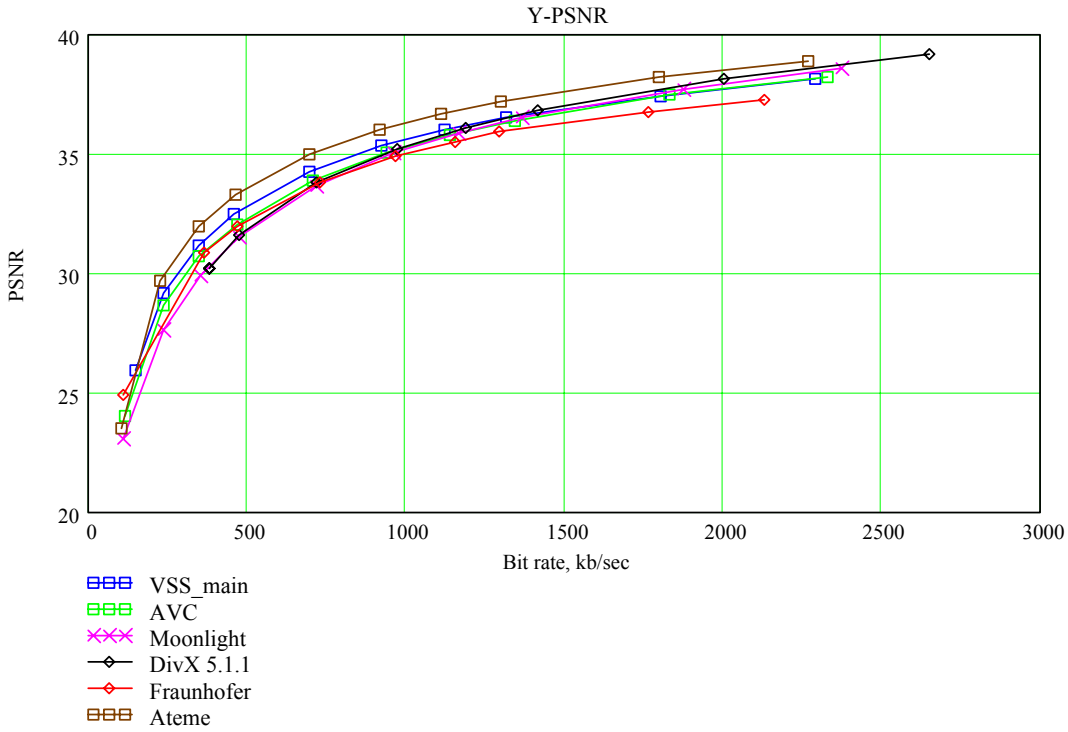
Codec was tested without problems.

Y-PSNR/Bit rate, Delta-Y-PSNR/Bit rate, U-PSNR/Bit rate и V-PSNR/Bit rate diagrams

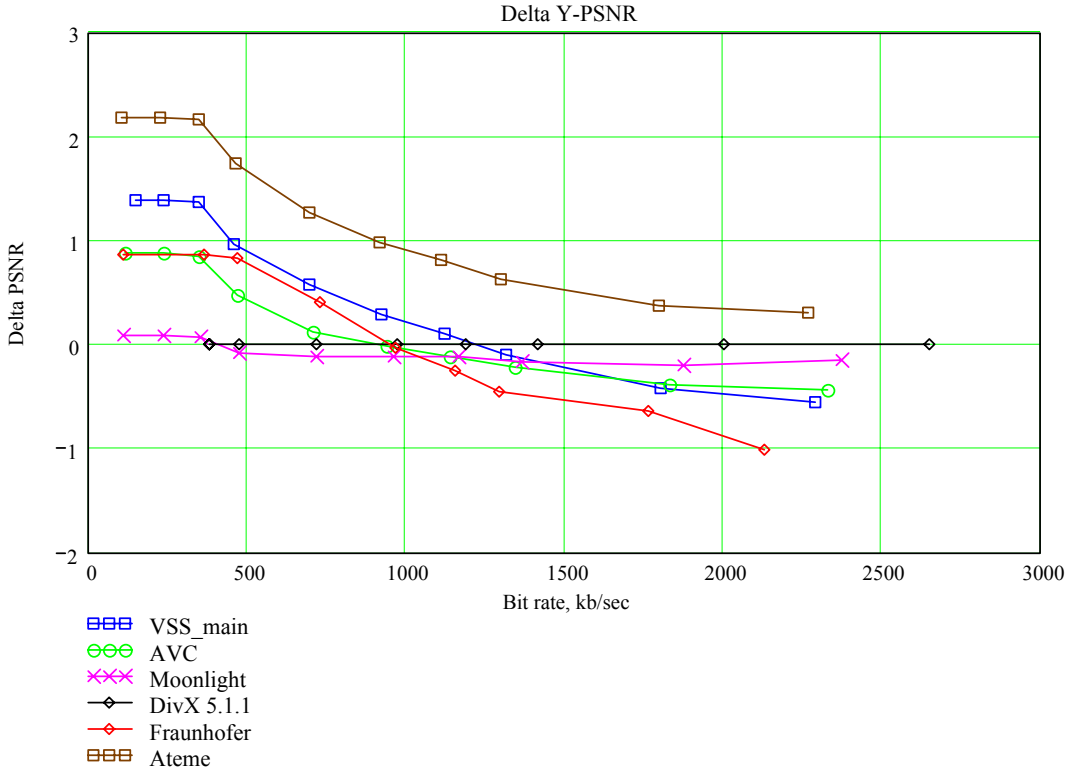
These diagrams clearly show the dependency dynamics of the compressed sequence quality from its size. Coordinates of the graph basic points are represented by the average PSNR values for the whole sequence and frame sizes. So each graph branch contains ten points that correspond to different bit rates.

Delta Y-PSNR are the diagrams of comparative PSNR values. DivX 5.1.1 is selected as a reference codec. Each point on a graph represents difference between point on codec PSNR graph and possibly interpolated DivX 5.1.1 PSNR value on this bit rate value.

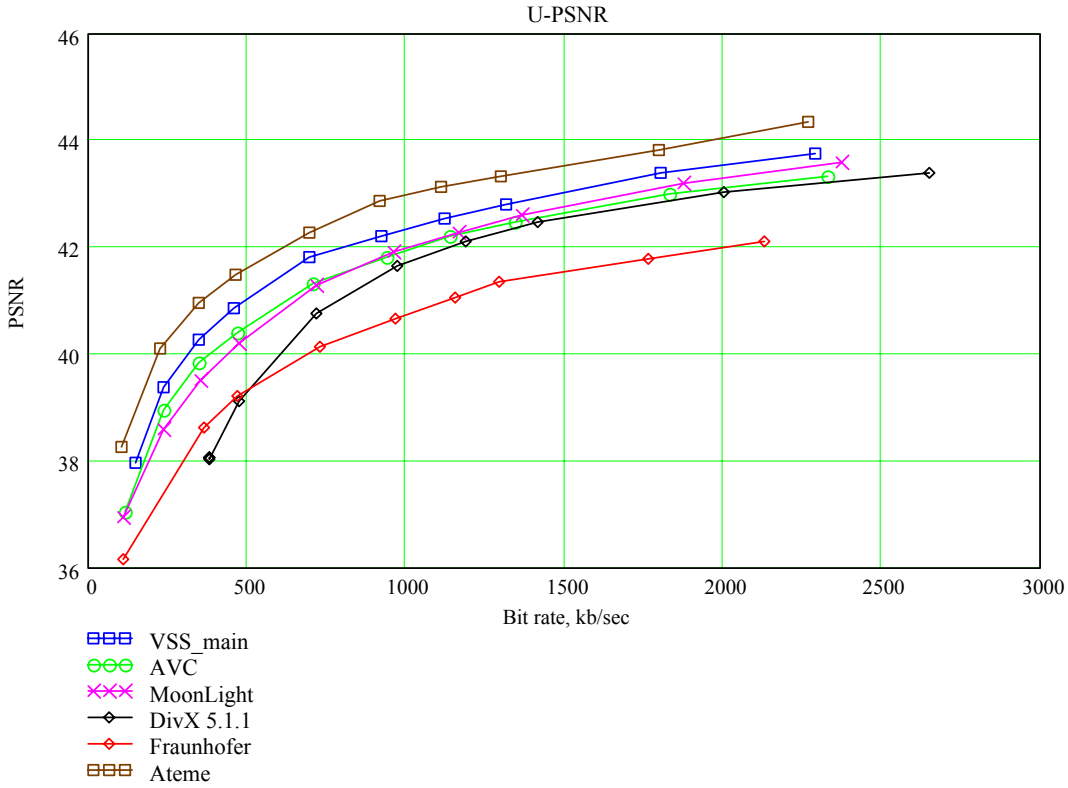
Bankomatdi sequence



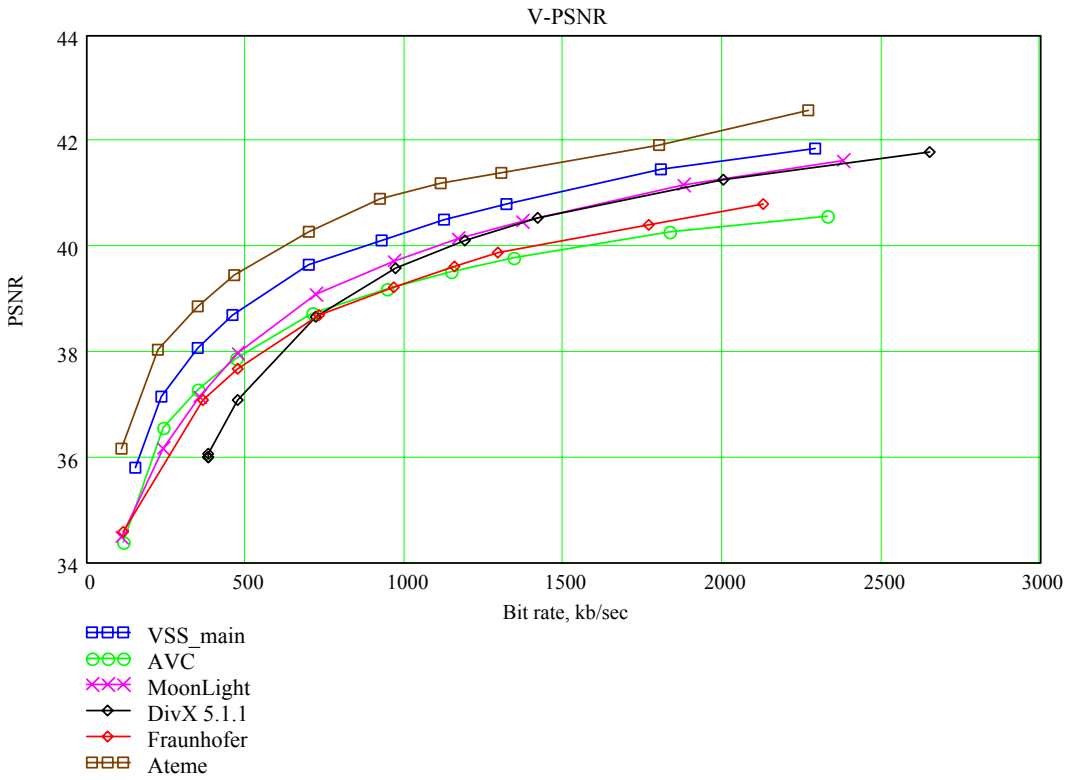
Picture 16. Y-PSNR. Sequence bankomatdi



Picture 17. Delta Y-PSNR. Sequence bankomatdi



Picture 18. U-PSNR. Sequence bankomatdi

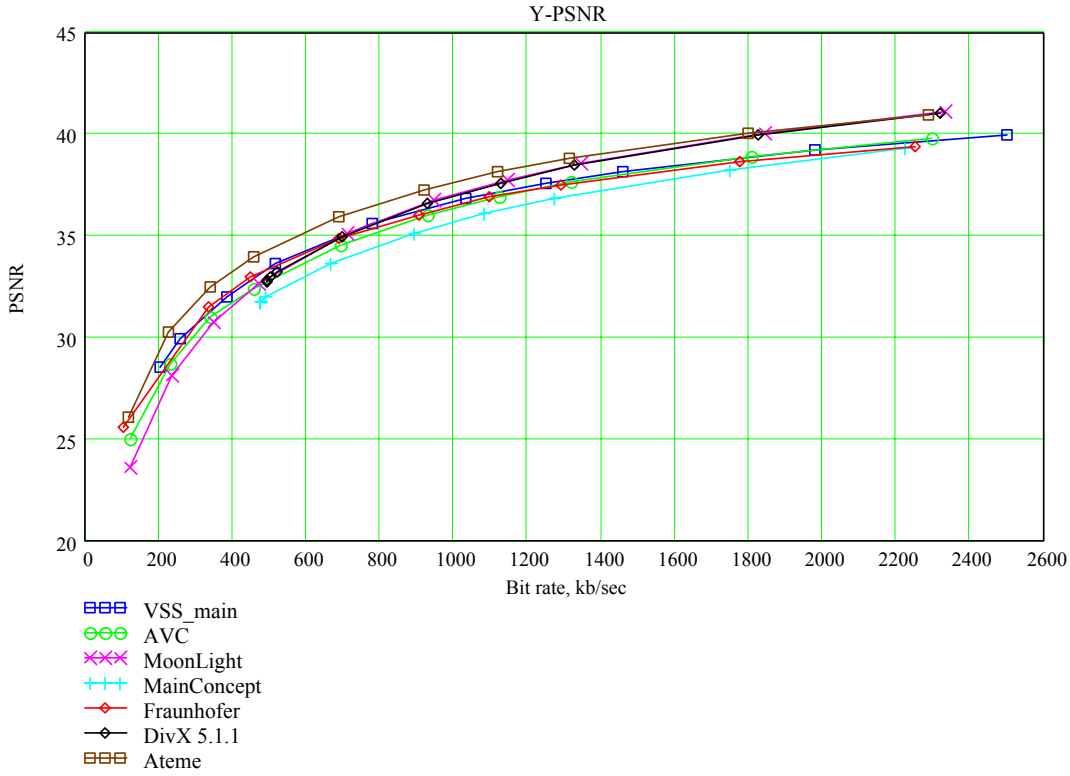


Picture 19. V-PSNR. Sequence bankomatdi

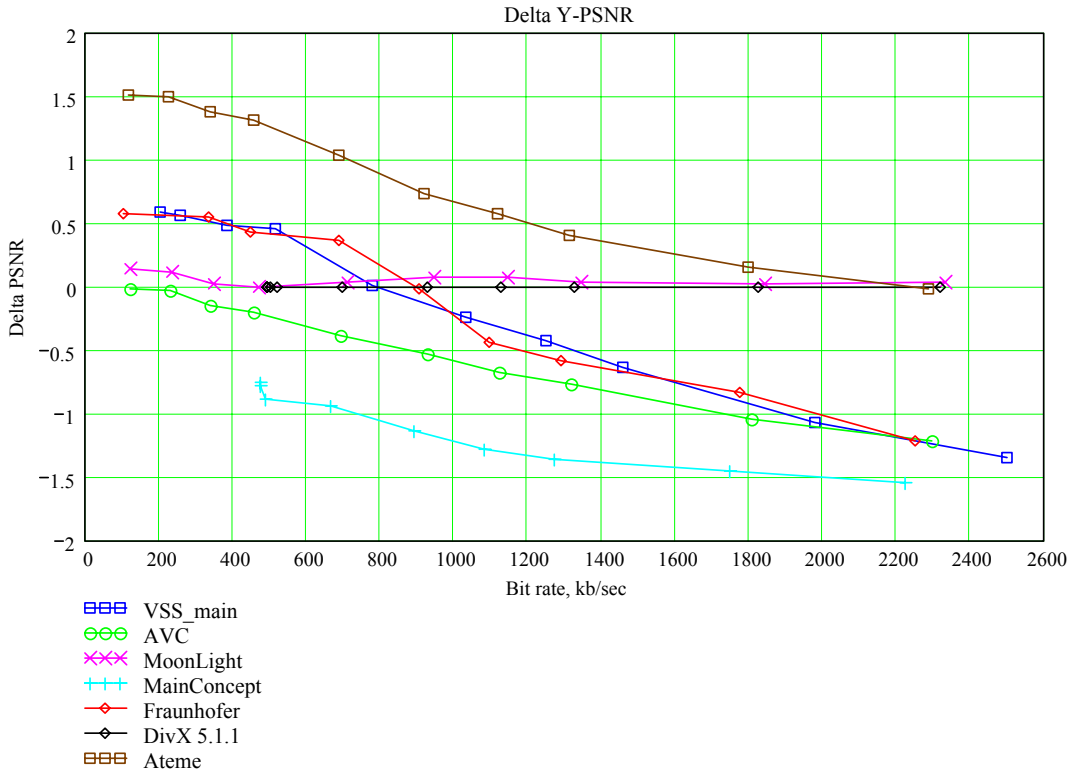
Conclusions:

- DivX codec is worse than H.264 codecs on the low bit rates.
- Ateme codec has shown best results on the average and high bit rates.
- Diagrams are similar for U and V components.

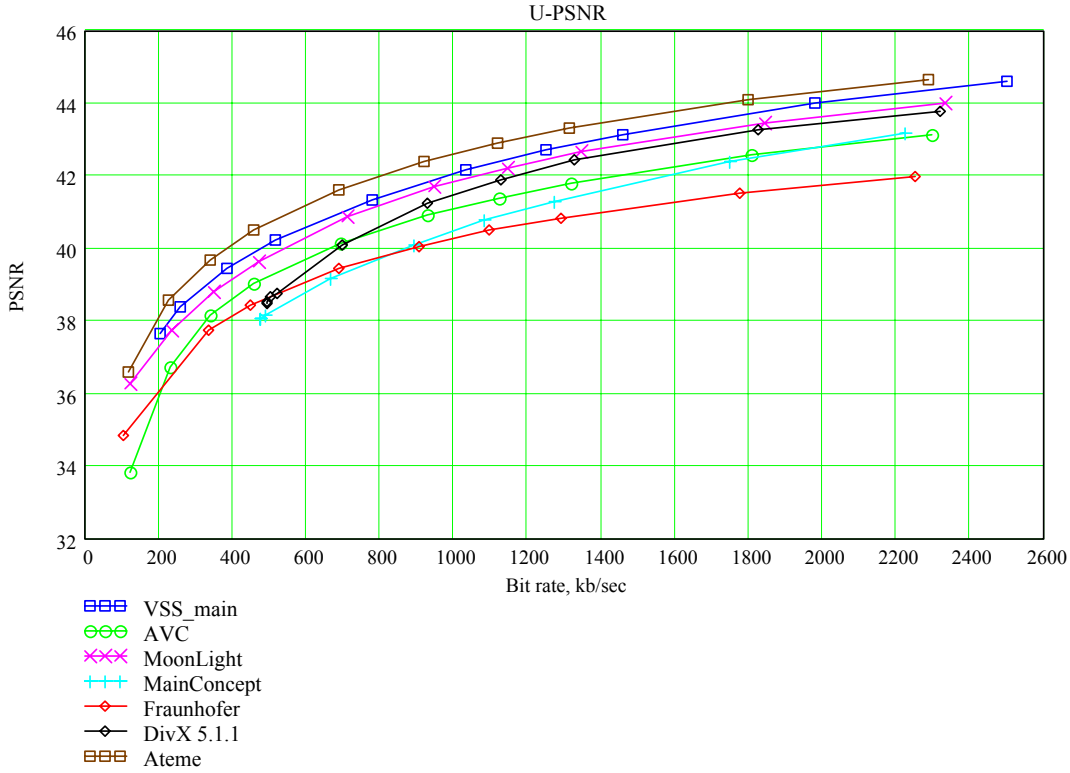
Battle sequence



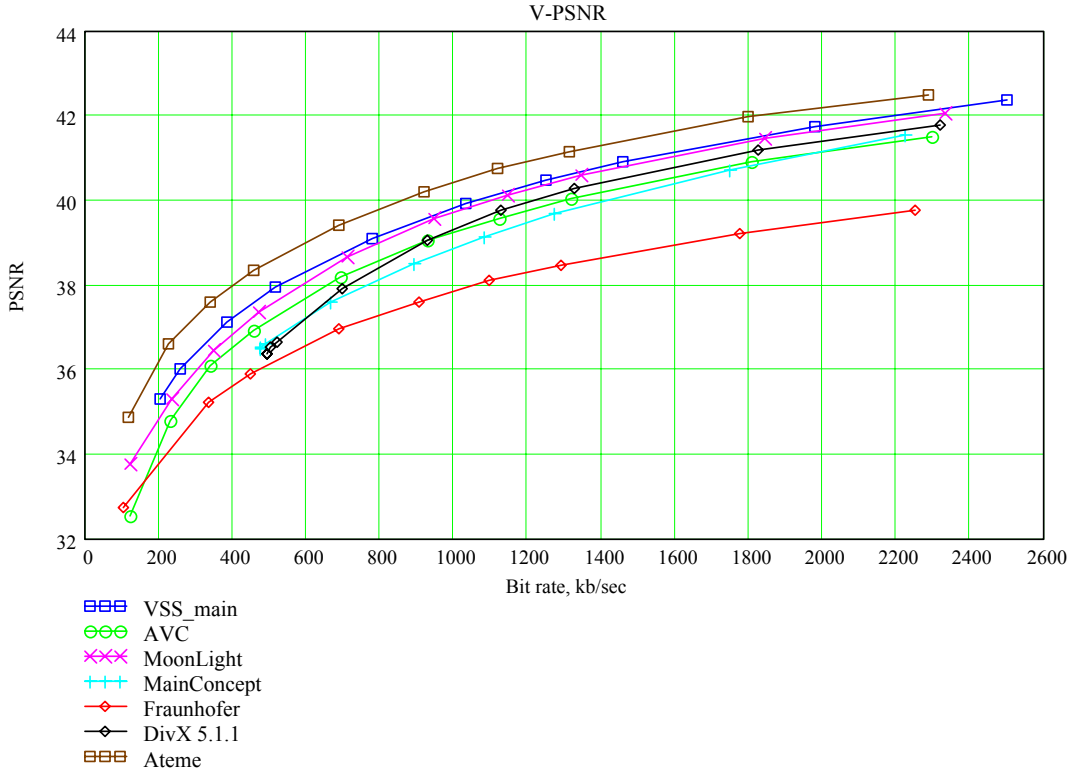
Picture 20. Y-PSNR. Sequence battle



Picture 21. Delta Y-PSNR. Sequence battle



Picture 22. U-PSNR. Sequence battle

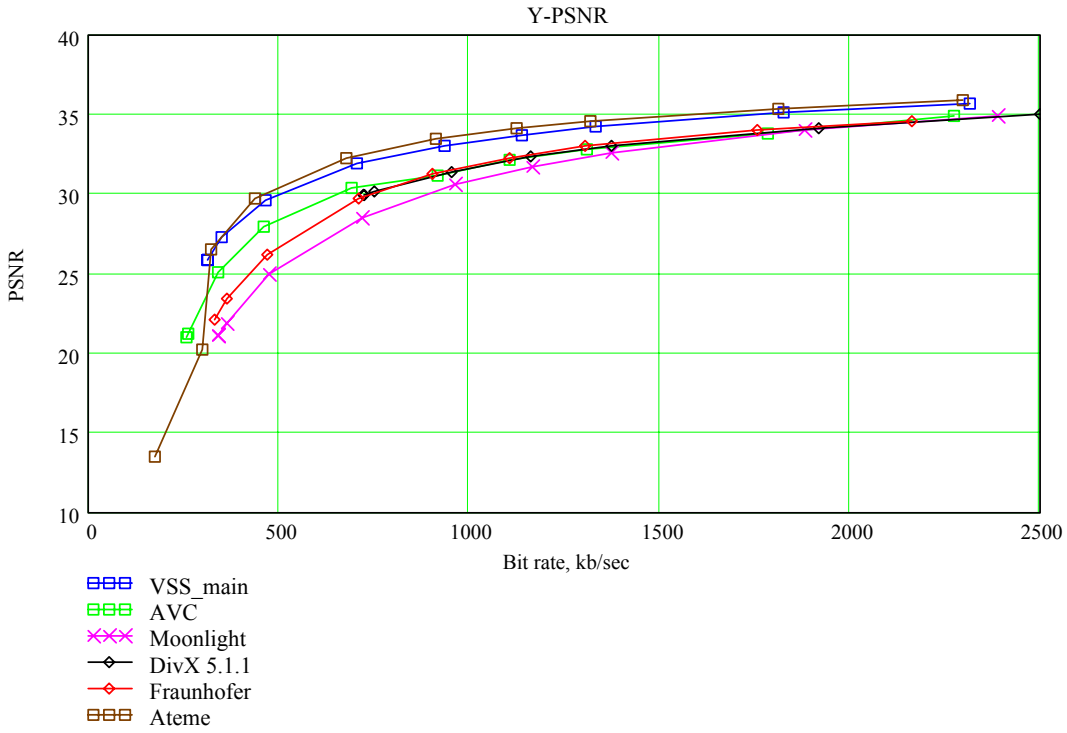


Picture 23. V-PSNR. Sequence battle

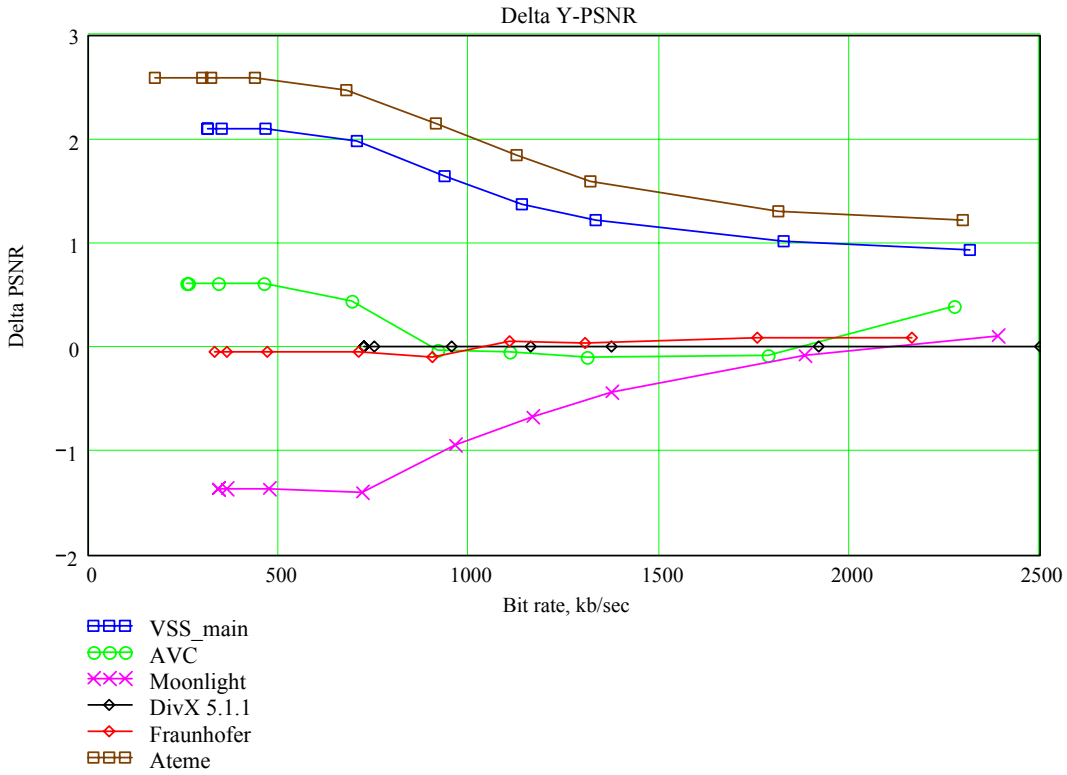
Conclusions:

- DivX codec is much worse than Videosoft, Fraunhofer and Ateme codecs on the low bit rates.
- Ateme codec is the best on the average and high bit rates.
- Diagrams are similar for U and V components.

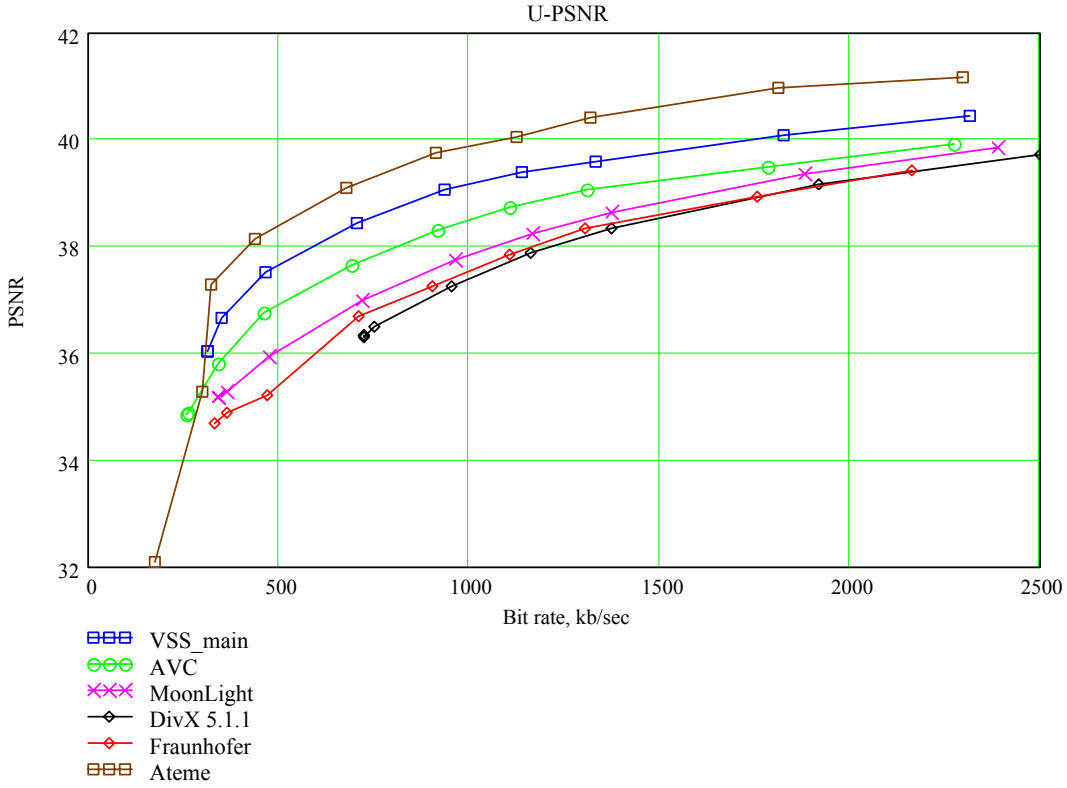
Bbc3di sequence



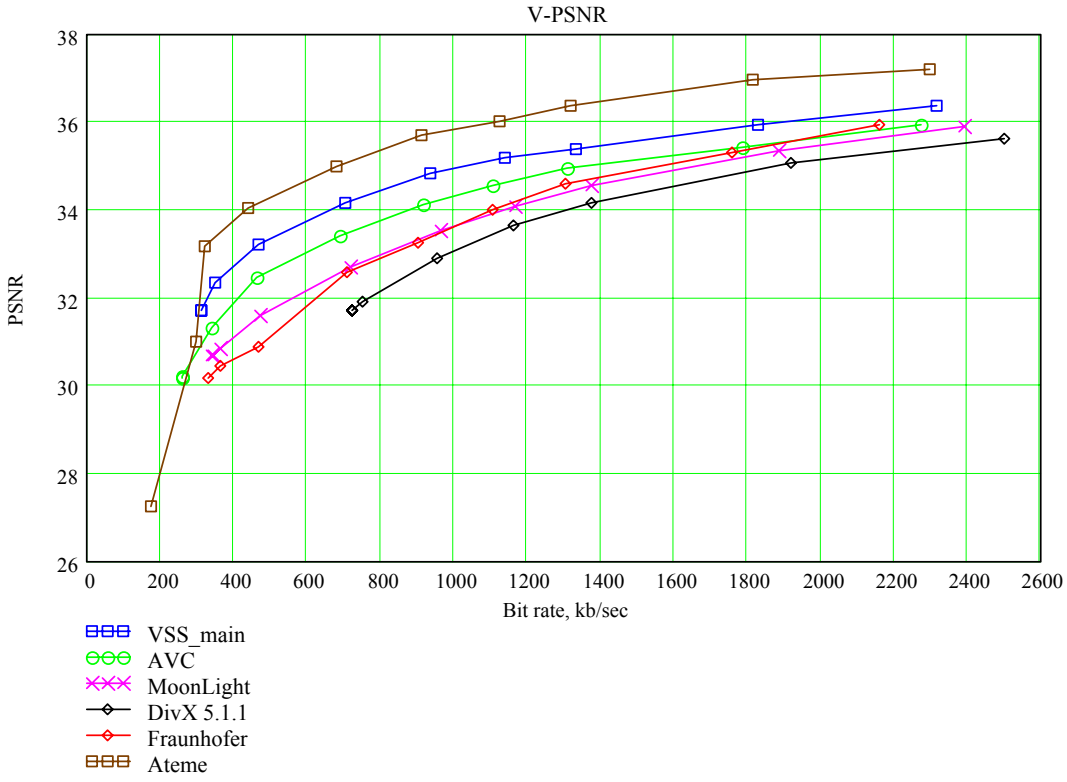
Picture 24. Y-PSNR. Sequence bbc3di



Picture 25. Delta Y-PSNR. Sequence bbc3di



Picture 26. U-PSNR. Sequence bbc3di

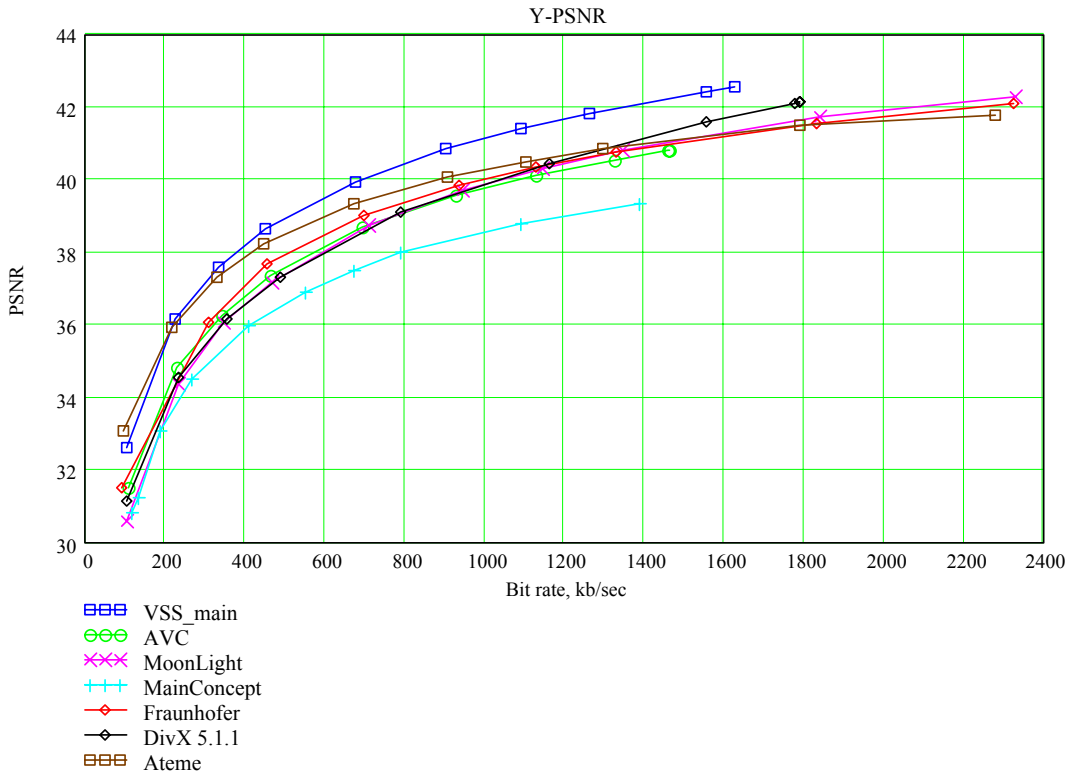


Picture 27. V-PSNR. Sequence bbc3di

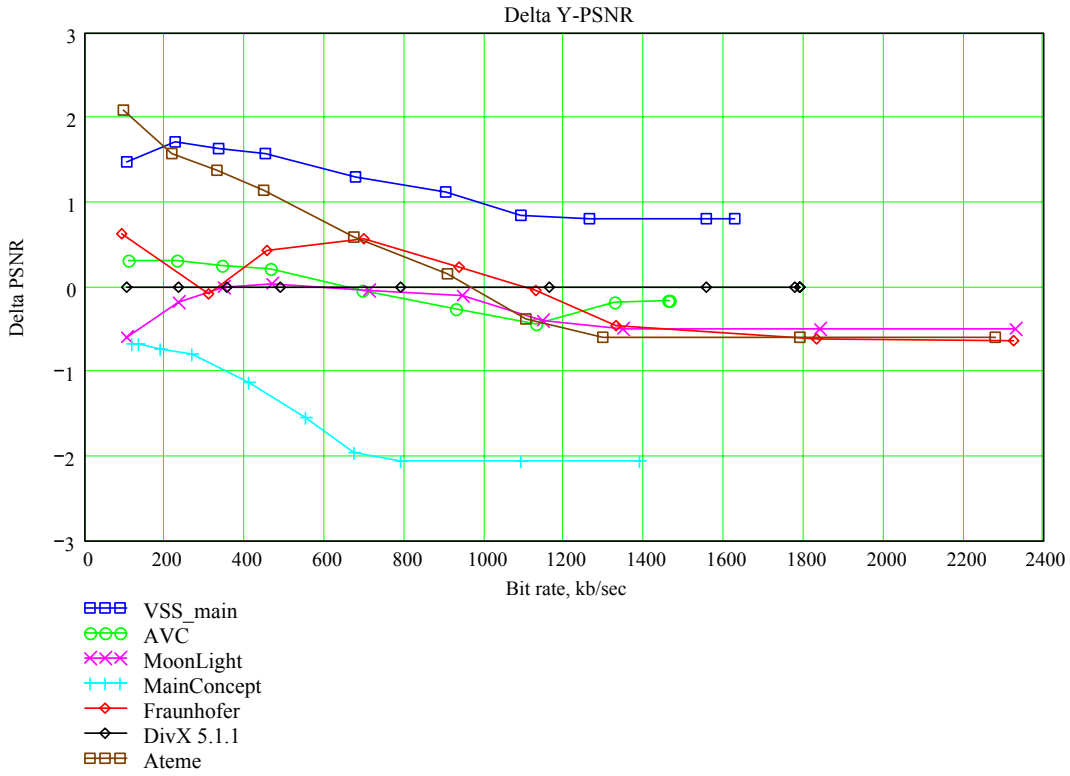
Conclusions:

- DivX codec is much worse than the other codecs except Moonlight on the low bit rates.
- Ateme and Videosoft codecs are the best on the average and high bit rates.
- Diagrams are similar for U and V components.

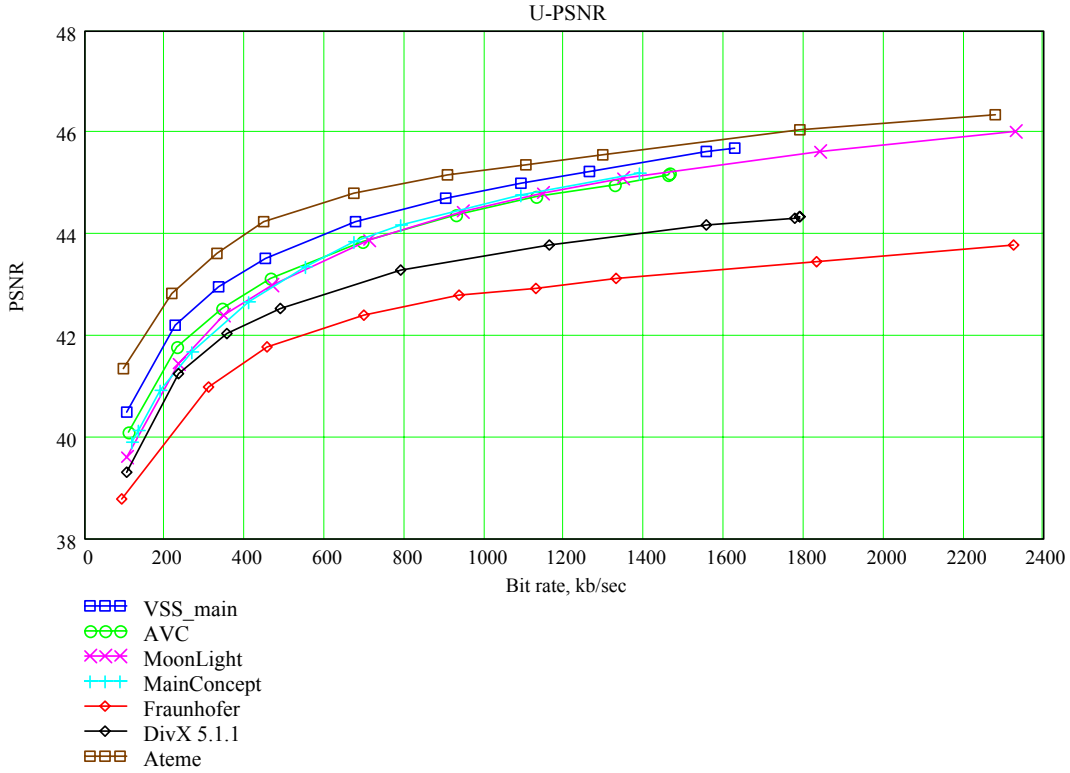
Foreman sequence



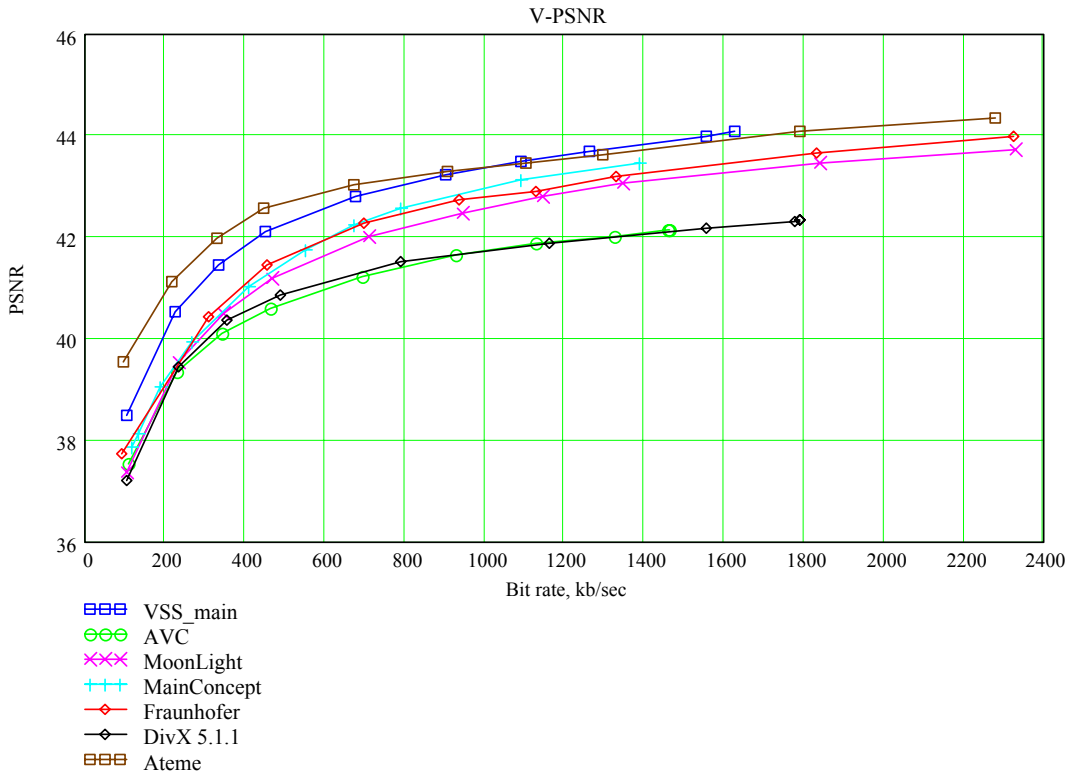
Picture 28. Y-PSNR. Sequence foreman



Picture 29. Delta Y-PSNR. Sequence foreman



Picture 30. U-PSNR. Sequence foreman

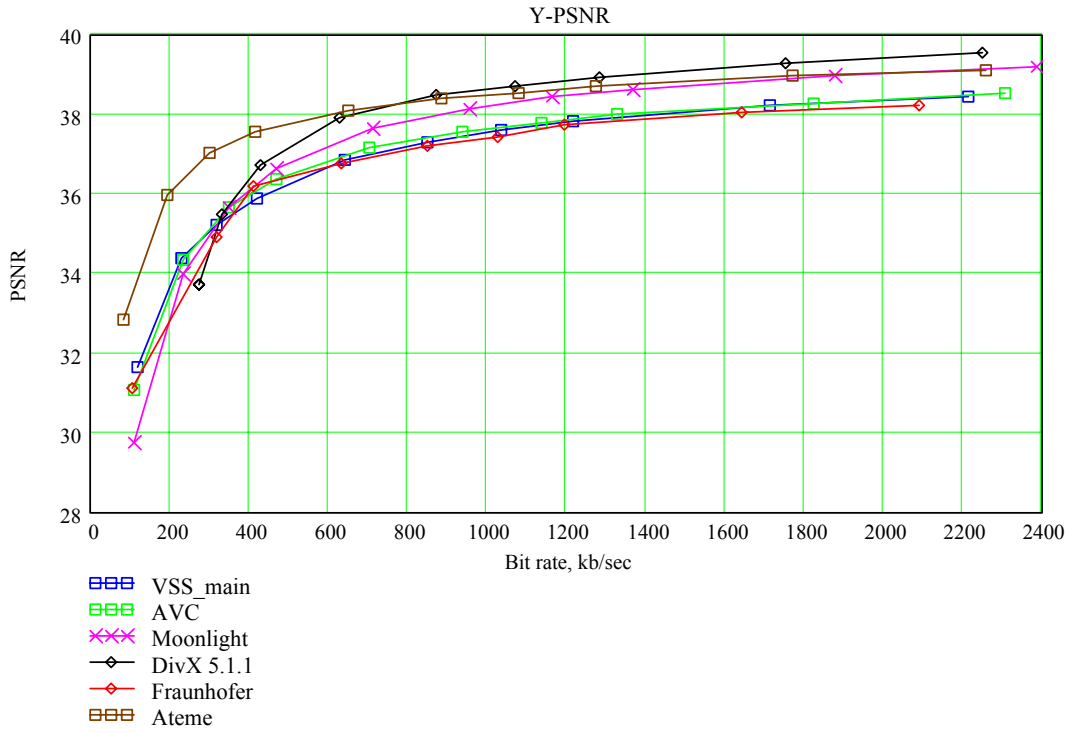


Picture 31. V-PSNR. Sequence foreman

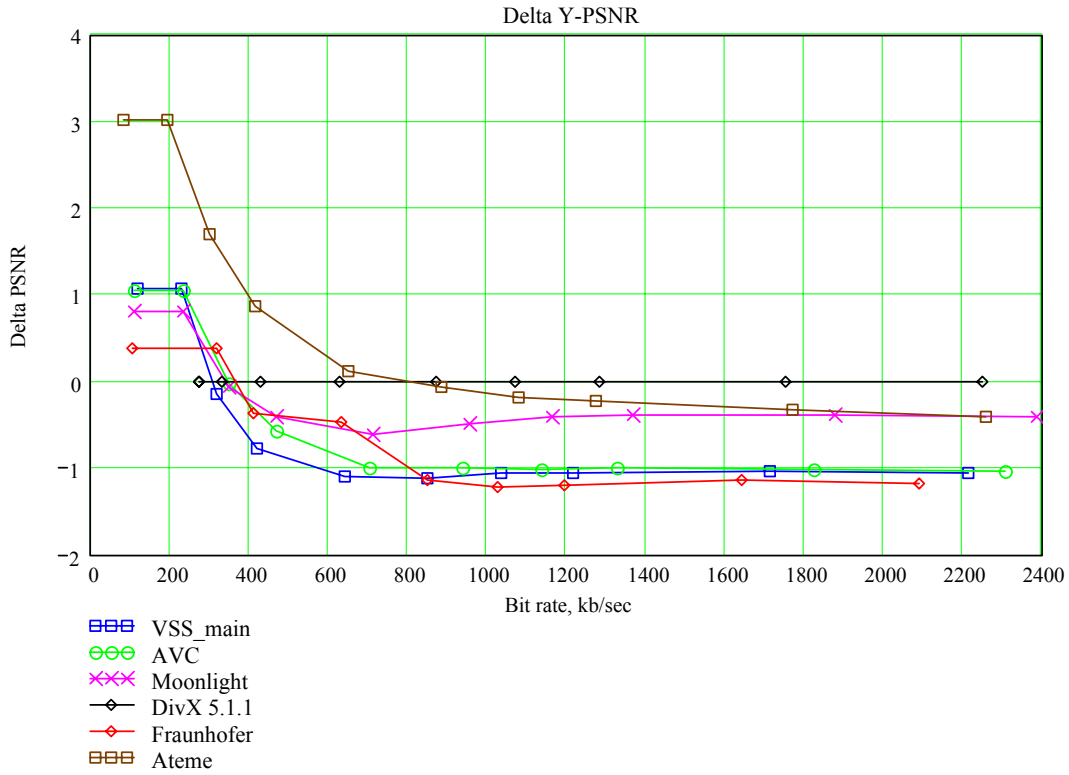
Conclusions:

- DivX codec is much worse than the other codecs except MainConcept on the low bit rates.
- Videosoft codec is the best on the average and high bit rates.
- Moonlight, Fraunhofer and Ateme codecs act similarly on the high bit rates.
- Diagrams are similar for U and V components except for the fact that Fraunhofer showed better result on the V component and AVC showed better result on the U component.

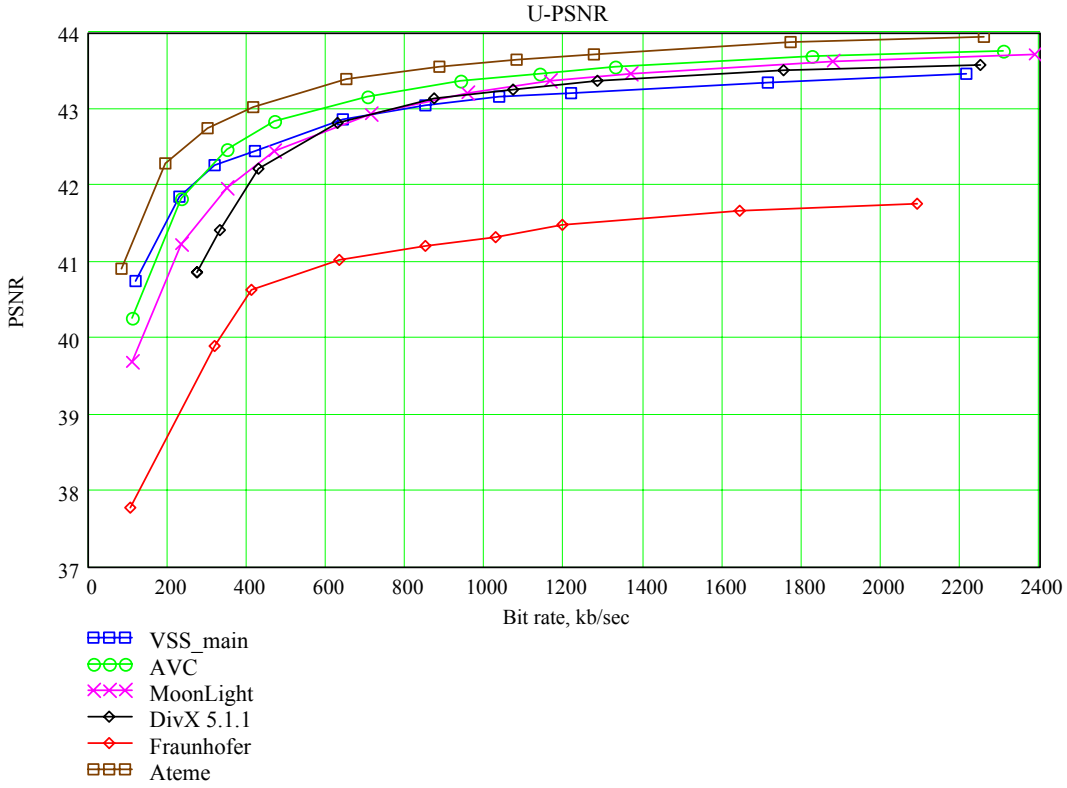
Susidi sequence



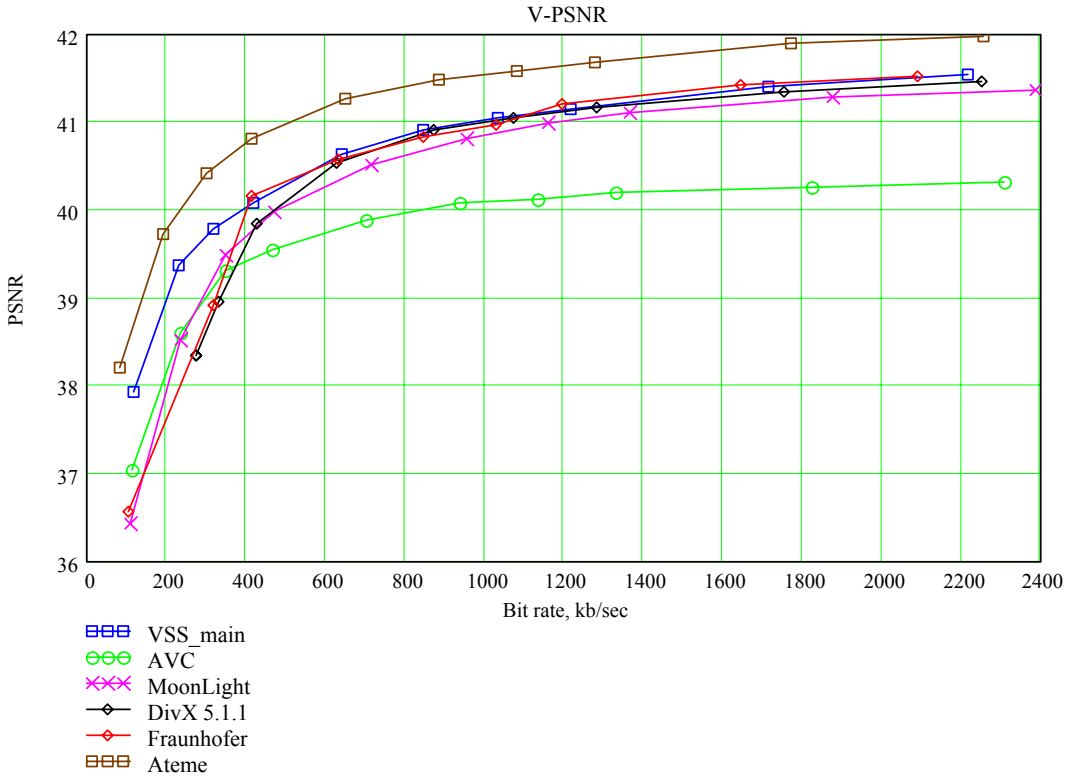
Picture 32. Y-PSNR. Sequence susidi



Picture 33. Delta Y-PSNR. Sequence susidi



Picture 34. U-PSNR. Sequence susidi



Picture 35. V-PSNR. Sequence susidi

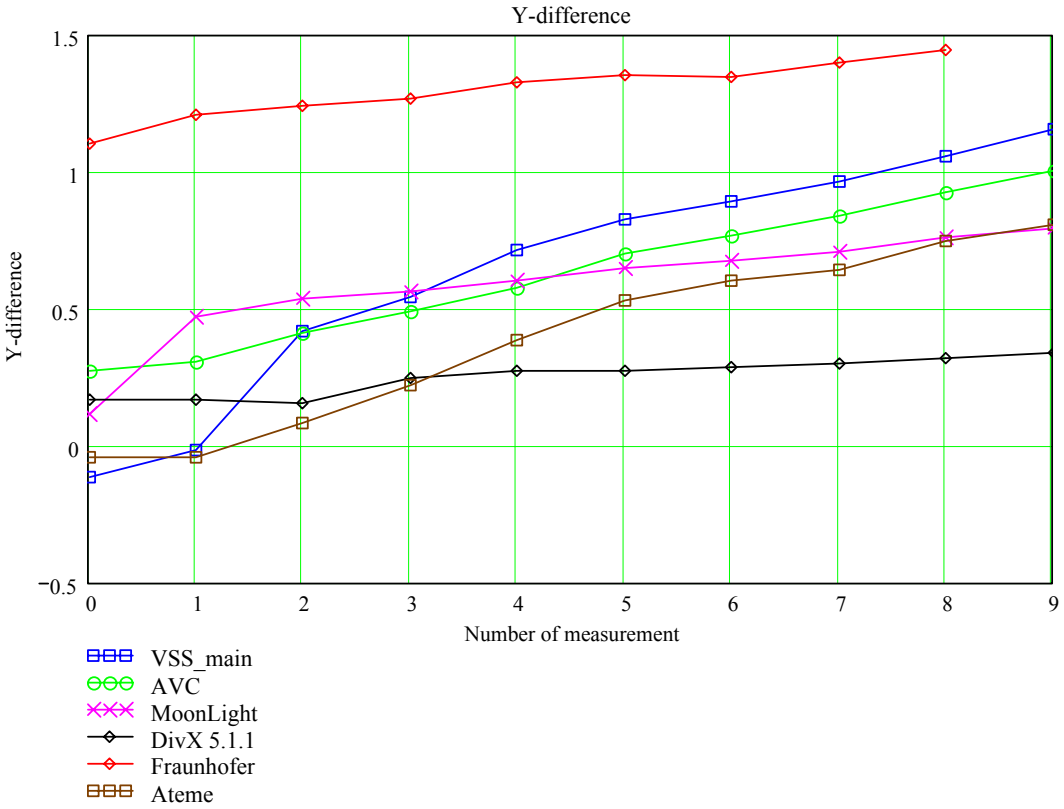
Conclusions:

- DivX codec is much worse than Ateme codec on the low bit rates.
- DivX codec is the best on the average and high bit rates.
- Diagrams are similar for U and V components except for the fact that Fraunhofer showed better result on the V component and AVC showed better result on the U component.

Average brightness shift diagrams

These diagrams show average shift of brightness produced by the codecs. Coordinates of the basic points represent average brightness values for the whole sequence and the number of measurement (bit rate). So each branch contains ten points that correspond to different bit rates.

Bankomatdi sequence

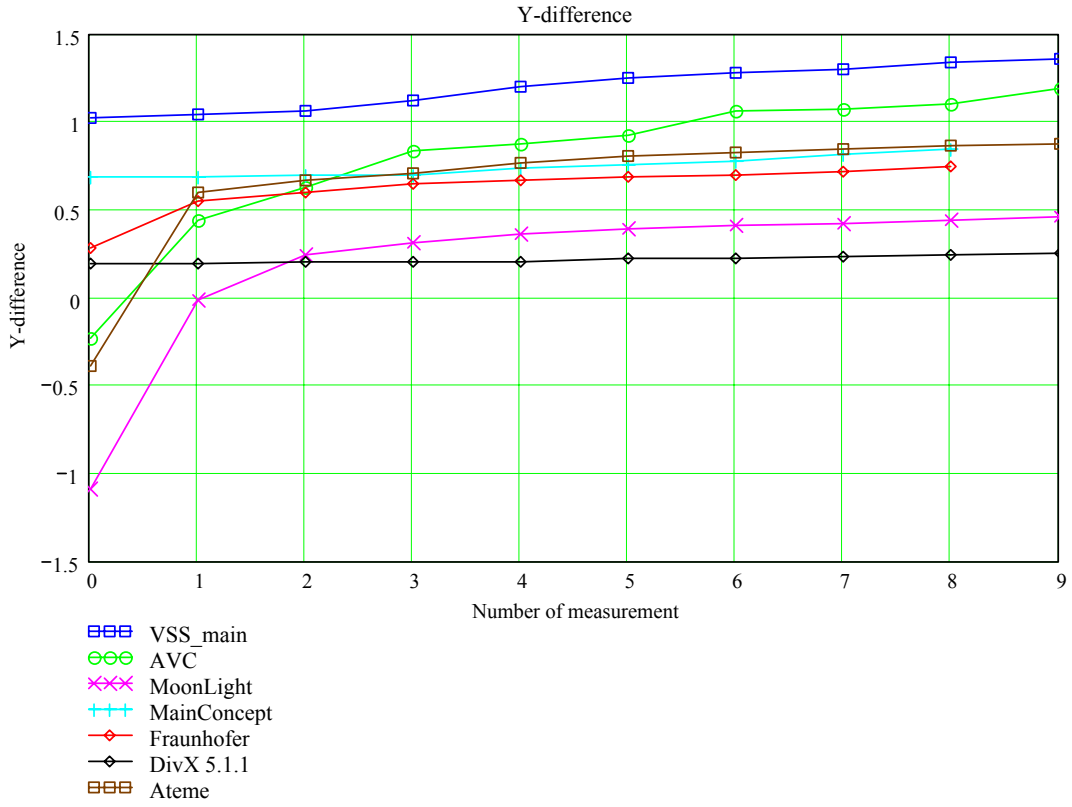


Picture 36. Y-difference. Sequence bankomatdi

Conclusions:

- All the H.264 codecs raise average brightness in the sequence. The more is the bit rate the more brightness changes.
- Fraunhofer codec raises brightness stronger than the other codecs.

Battle sequence

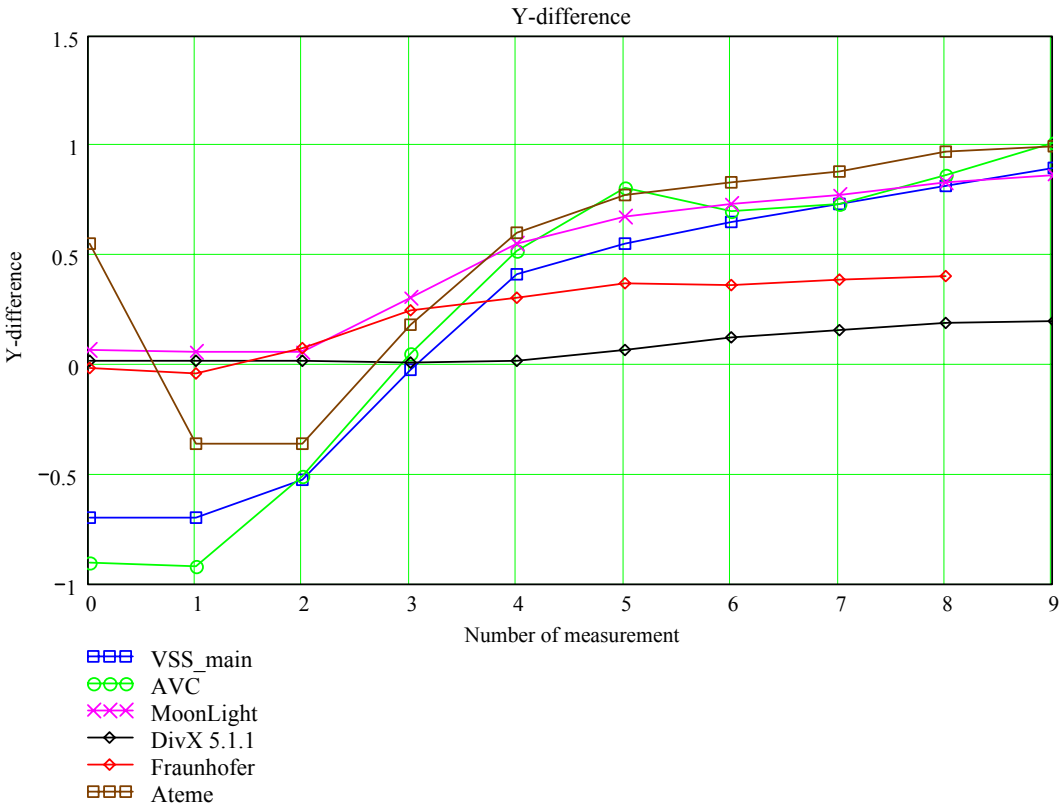


Picture 37. Y-difference. Sequence battle

Conclusions:

- All the H.264 codecs raise average brightness in the sequence. The more is the bit rate the more brightness changes.
- Videosoft codec raises brightness stronger than the other codecs.

Bbc3di sequence

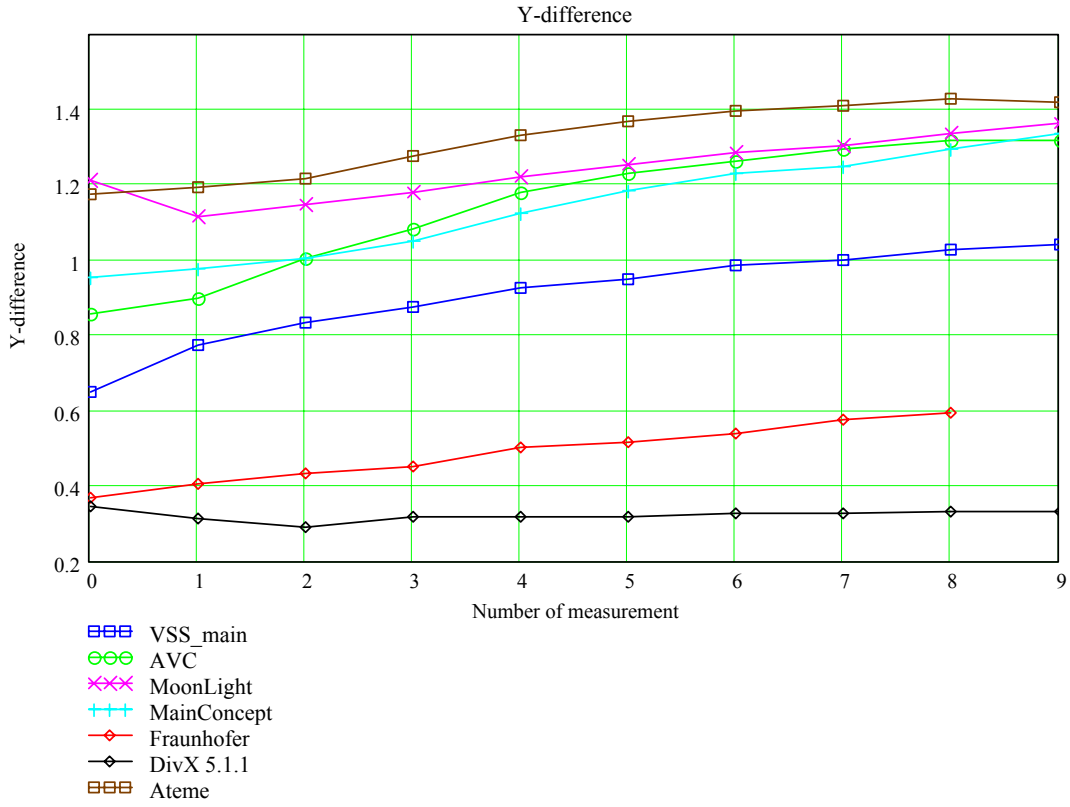


Picture 38. Y-difference. Sequence bbc3di

Conclusions:

- All the H.264 codecs raise average brightness in the sequence on the average and high bit rates. The more is the bit rate the more brightness changes.
- Change of brightness on the low bit rates is small.

Foreman sequence

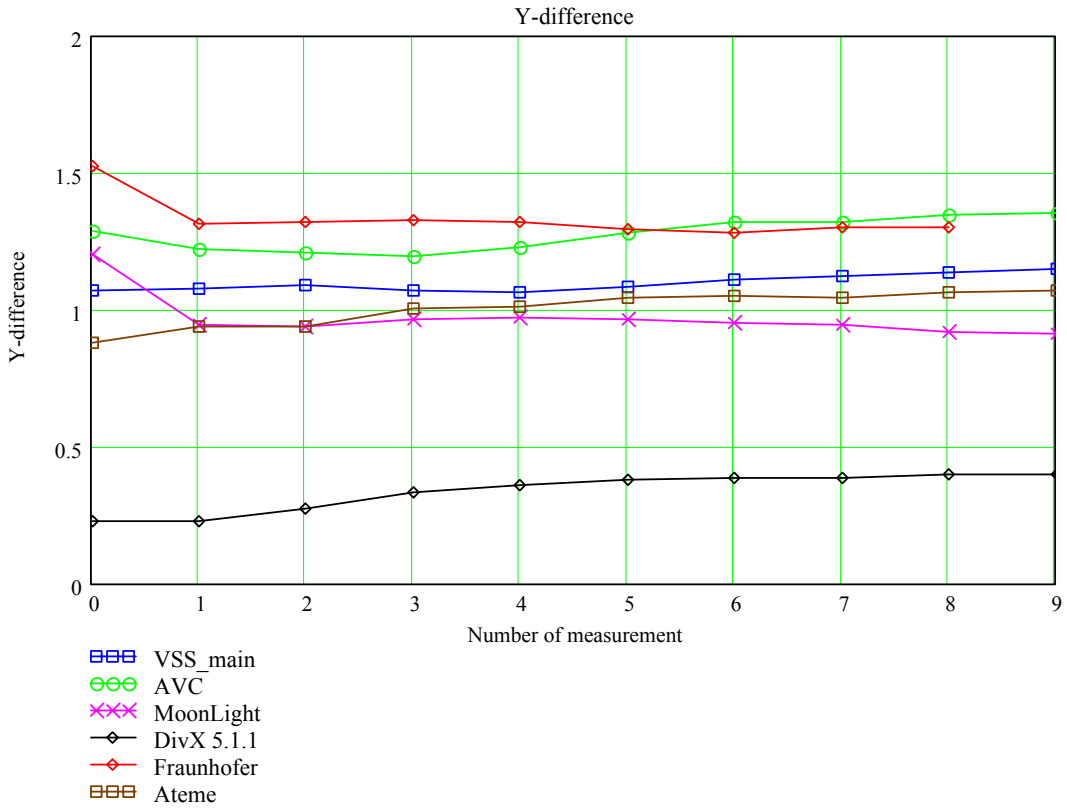


Picture 39. Y-difference. Sequence foreman

Conclusions:

- All the H.264 codecs except Fraunhofer strongly raise average brightness in the sequence. The more is the bit rate the more brightness changes.

Susidi sequence



Picture 40. Y-difference. Sequence susidi

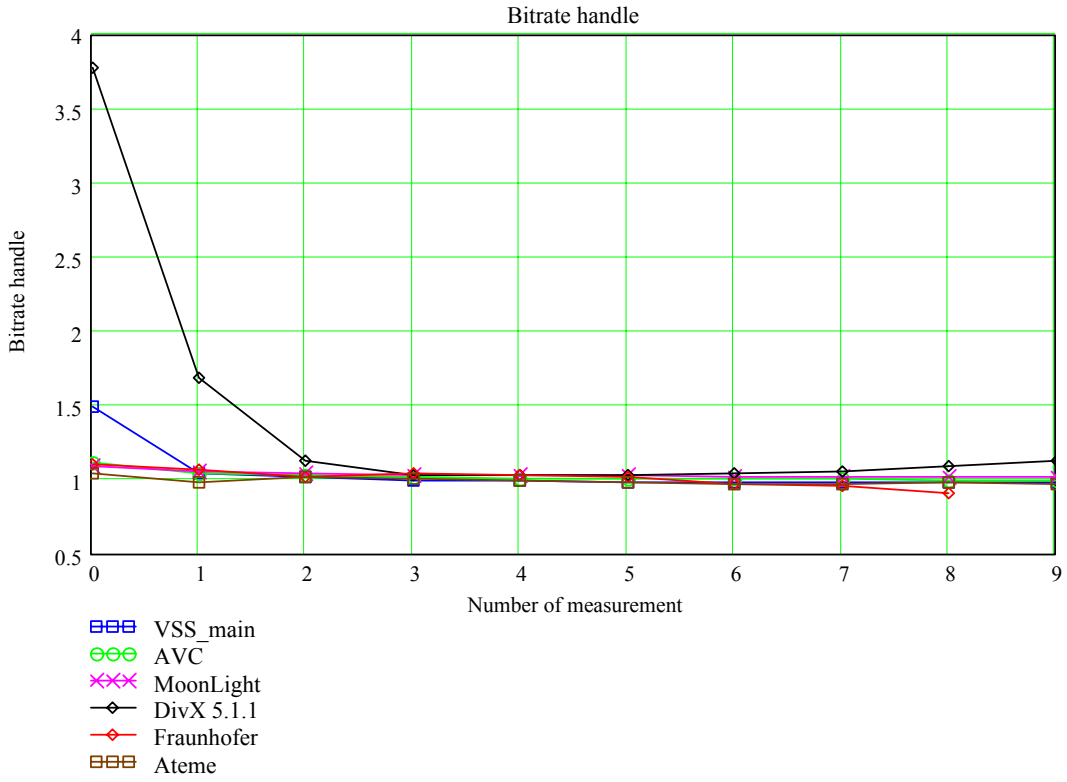
Conclusions:

- All the H.264 codecs strongly raise average brightness in the sequence. This change is approximately constant for all the bit rates.

Bit rate handling diagrams

These diagrams show how codecs handle different bit rates. Every branch consists of ten points that correspond to different bit rates. Value “1” means that the codec keeps the specified bit rate; value more than “1” means that the codec actually compresses with the higher bit rate than was specified.

Bankomatdi sequence

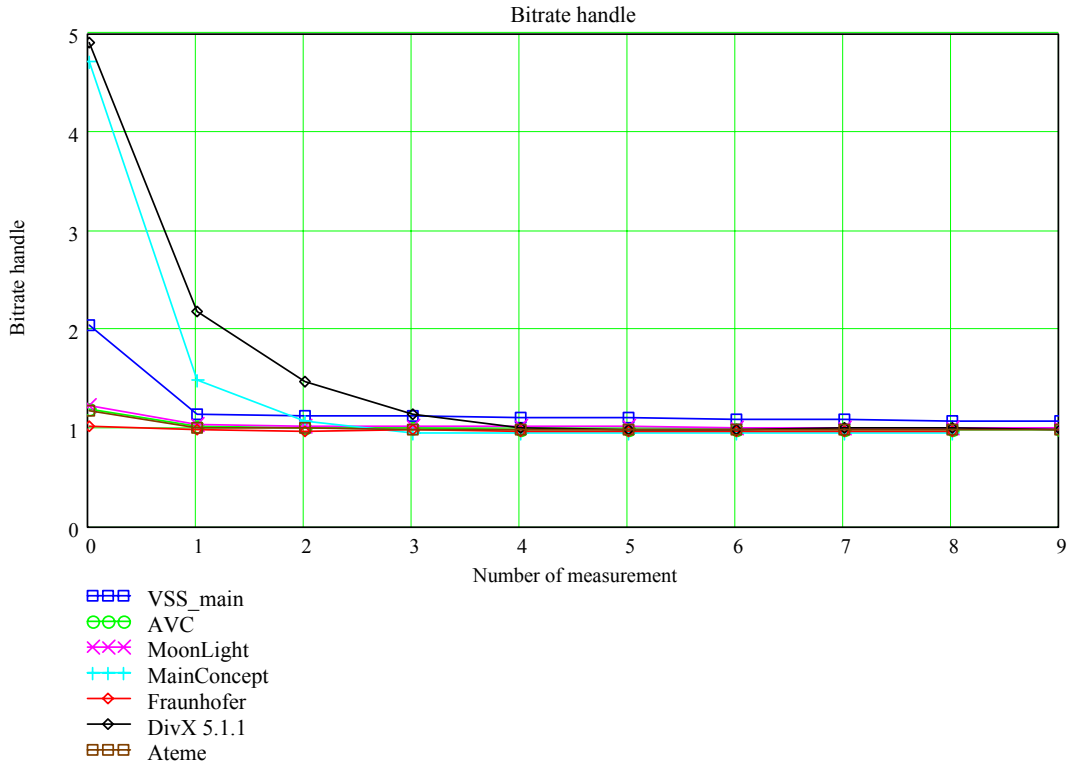


Picture 41. Bit rate handling. Sequence bankomatdi

Conclusions:

- Videosoft codec slightly increases specified low bit rates.
- DivX codec increases specified low bit rates.

Battle sequence

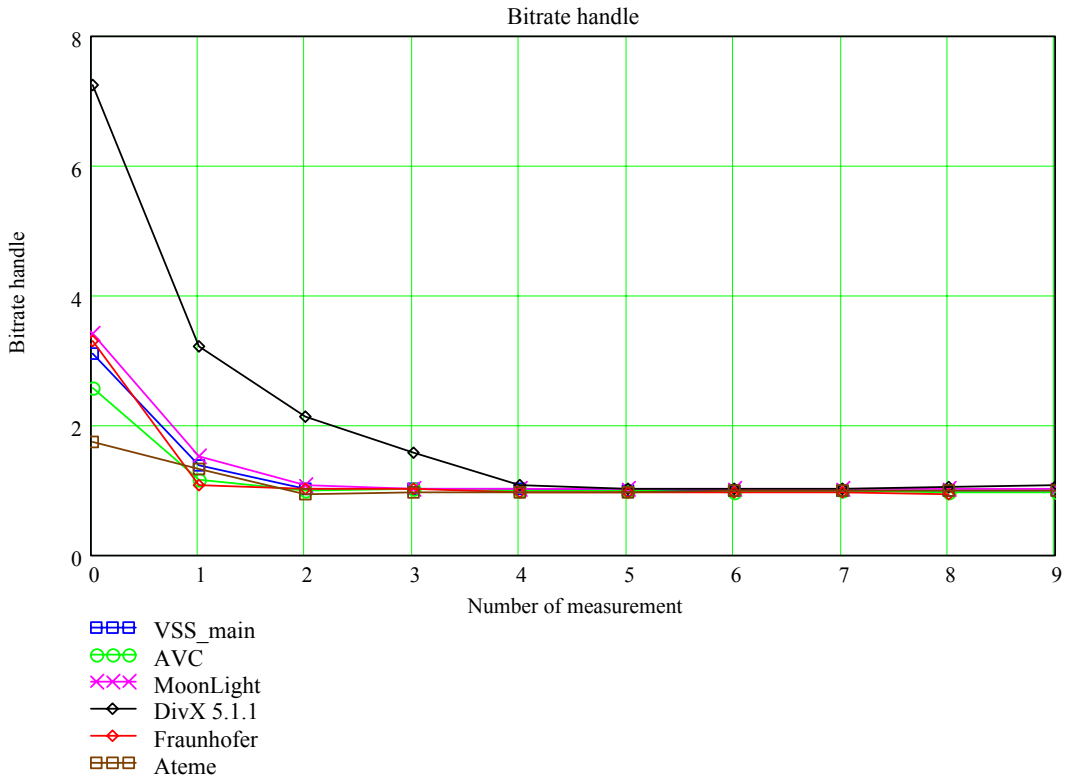


Picture 42. Bit rate handling. Sequence battle

Conclusions:

- Videosoft codec slightly increases specified low bit rates.
- DivX and MainConcept codecs strongly increase specified low bit rates.

Bbc3di sequence

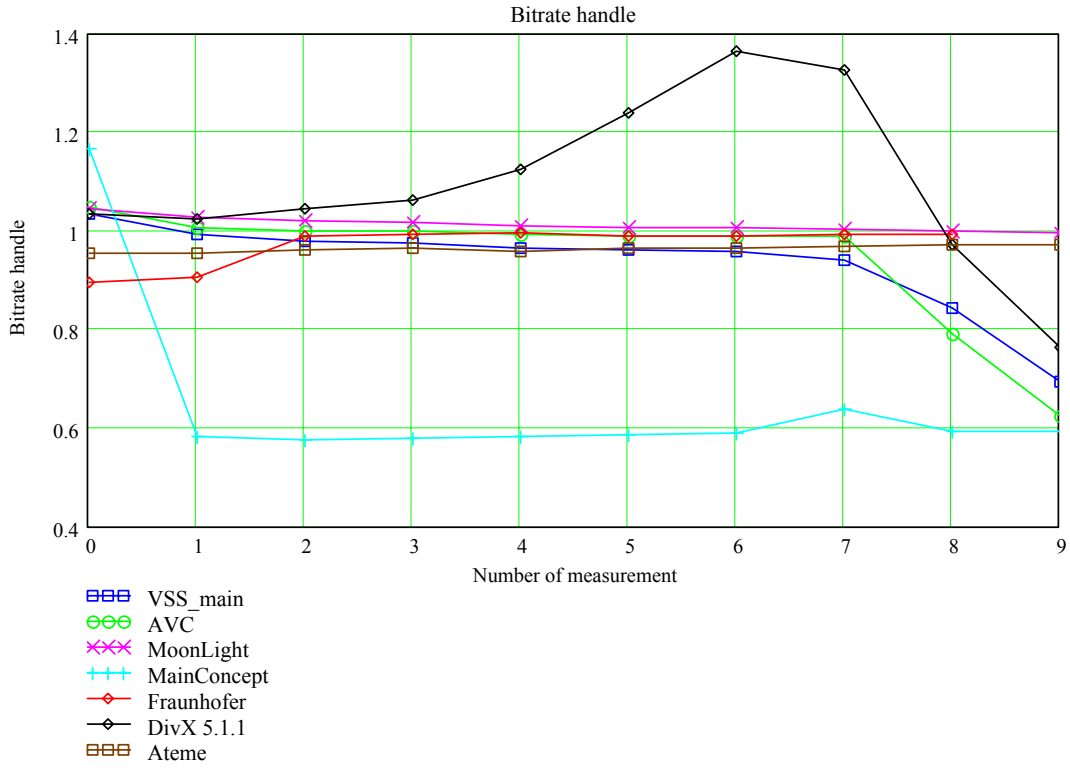


Picture 43. Bit rate handling. Sequence bbc3di

Conclusions:

- All the H.264 codecs slightly increase specified low bit rates.
- DivX codec strongly increases specified low bit rates.

Foreman sequence

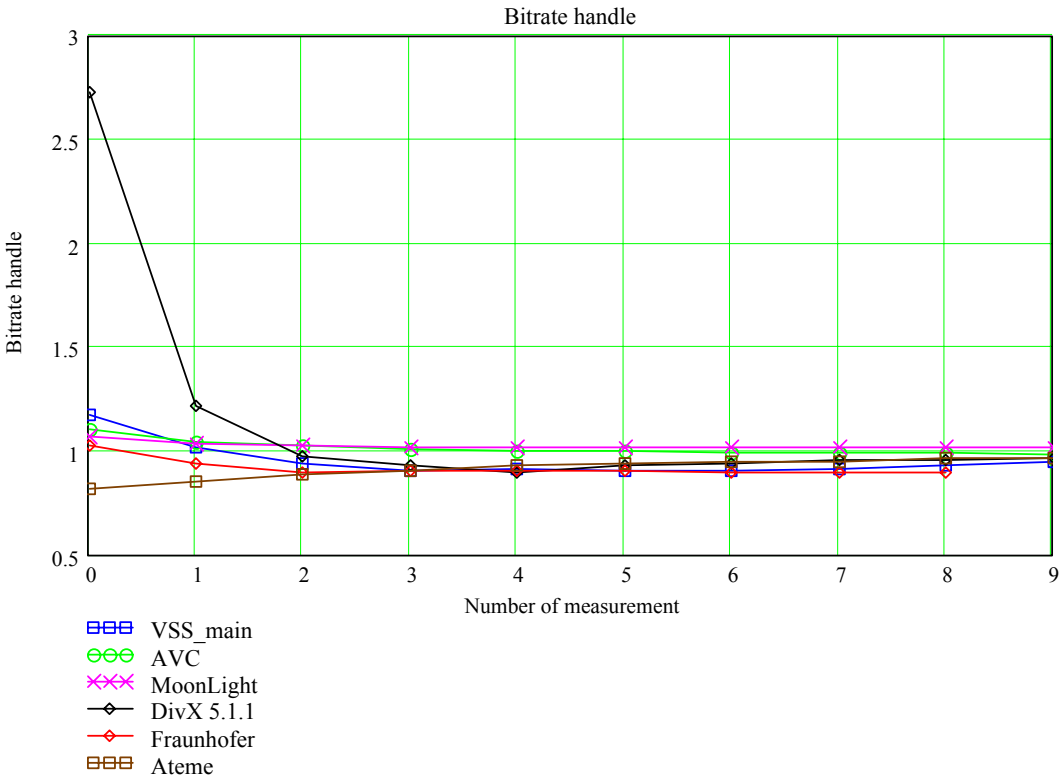


Picture 44. Bit rate handling. Sequence foreman

Conclusions:

- MainConcept significantly decreases specified bit rates.
- DivX increases specified bit rates.

Susidi sequence



Picture 45. Bit rate handling. Sequence susidi

Conclusions:

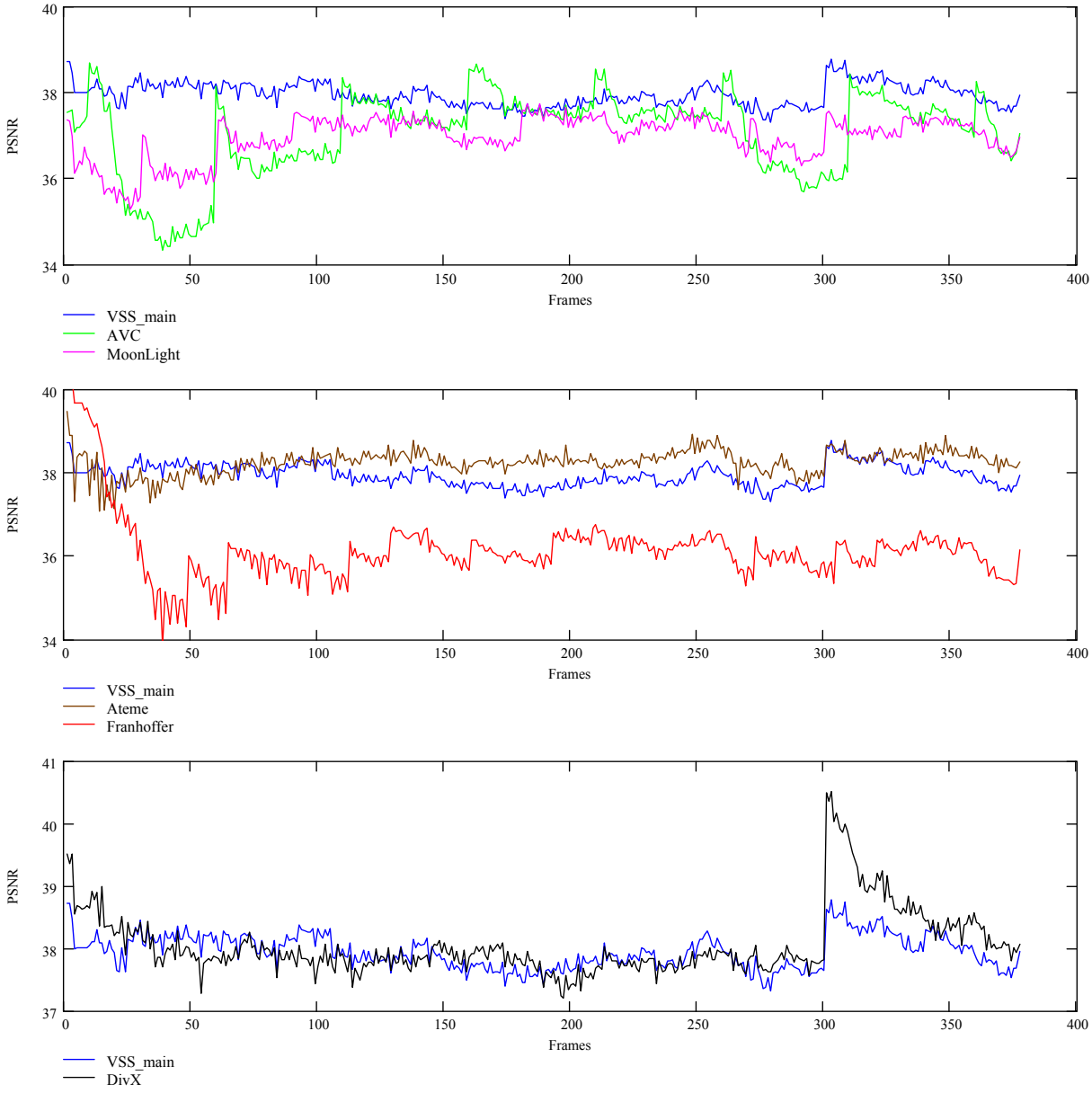
- DivX increases specified low bit rates.

Per frame sequences comparison

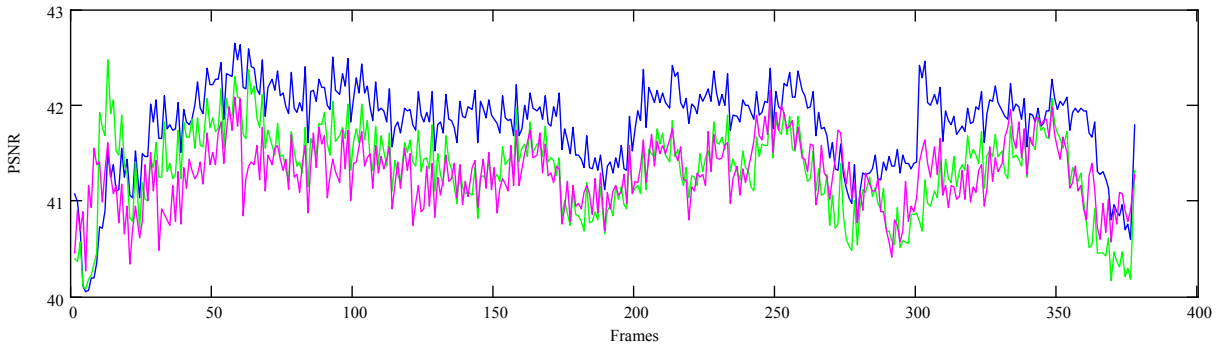
These diagrams show how compression quality changes from frame to frame. X-axis coordinate represents the number of the frame and Y-axis coordinate represents PSNR-value for this frame. Significant constant difference on the susidi diagram is caused by the noise suppression in every second frame (B-frames options in MPEG-2 coder).

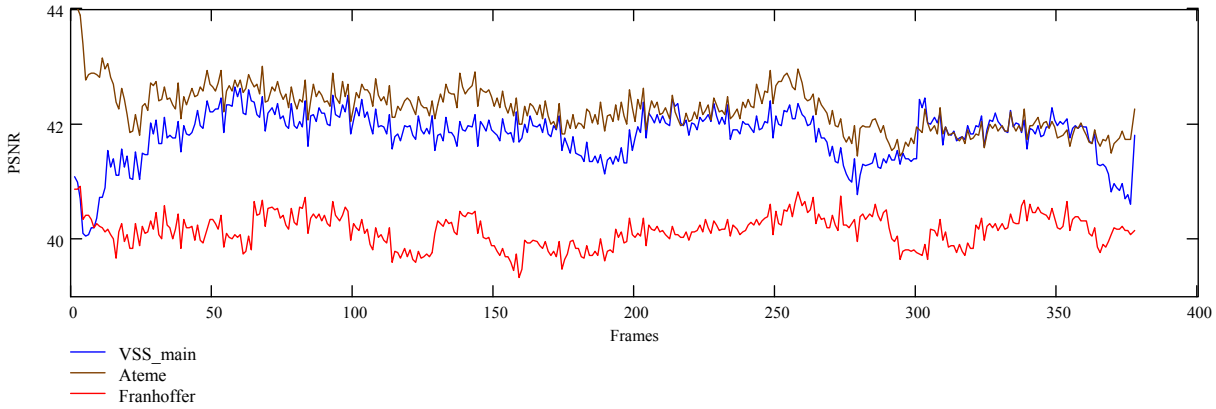
Bankomatdi sequence

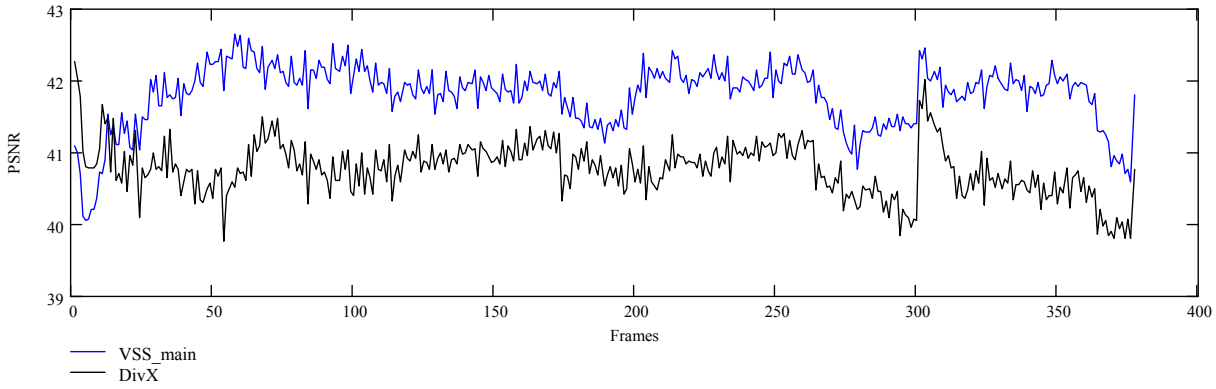
Bit rate = 100 Kb/sec



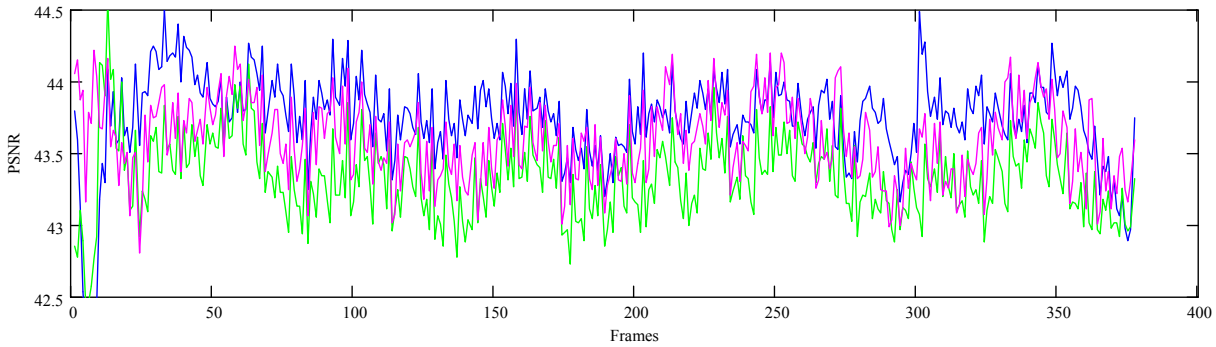
Bit rate = 700 Kb/sec

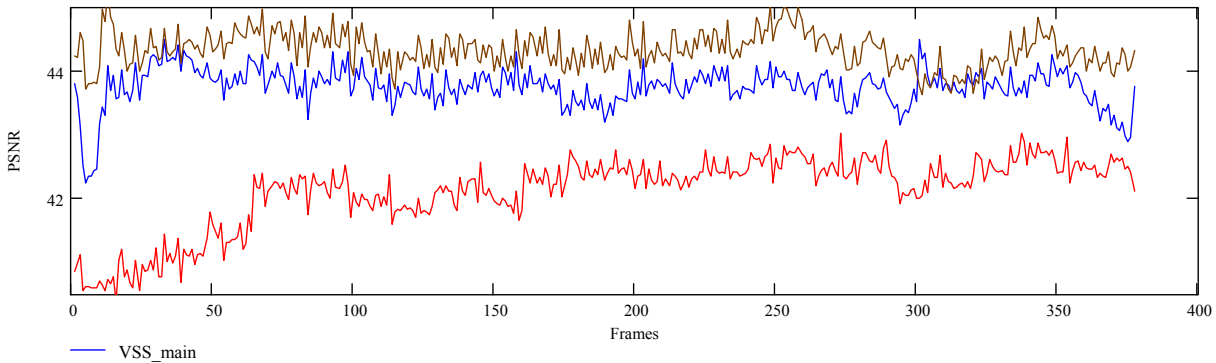


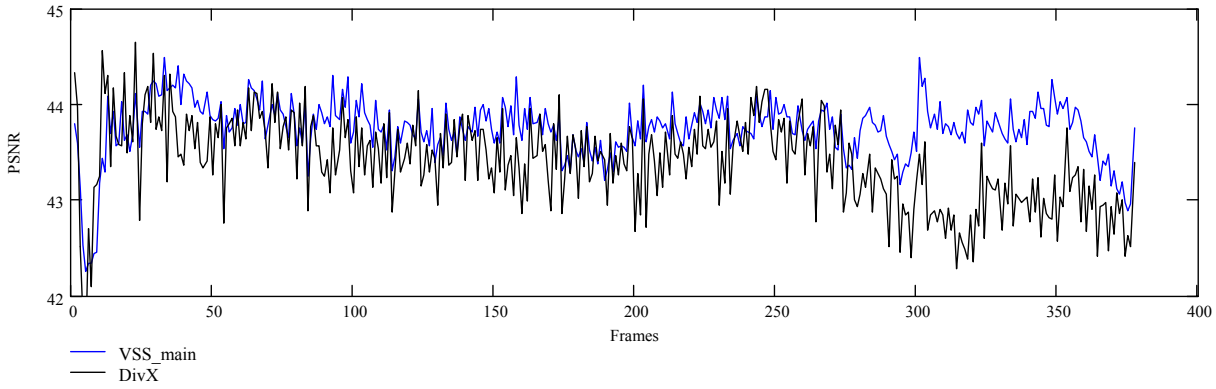




Bit rate = 2340 Kb/sec

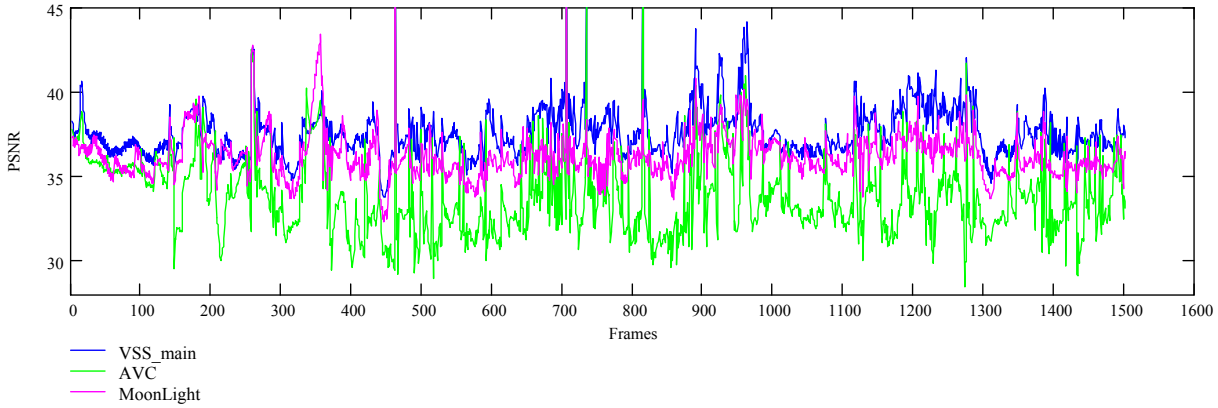


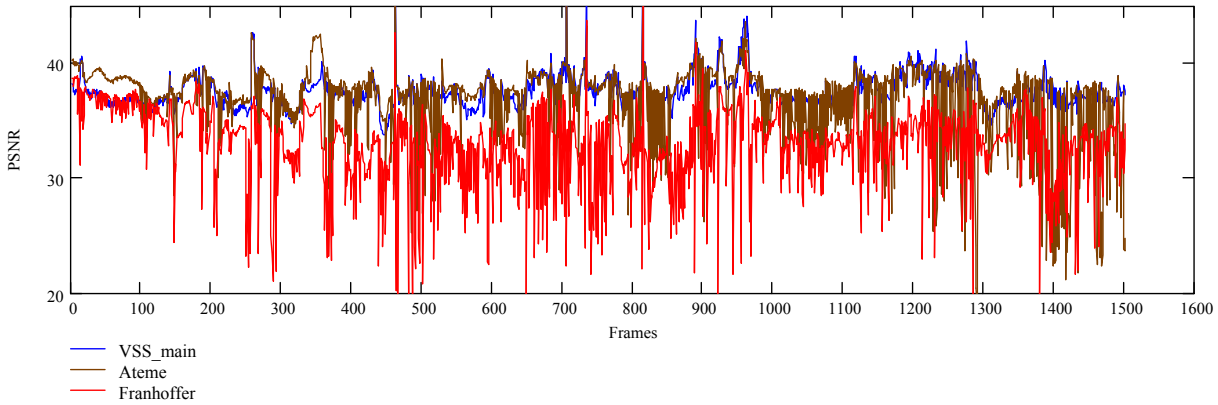


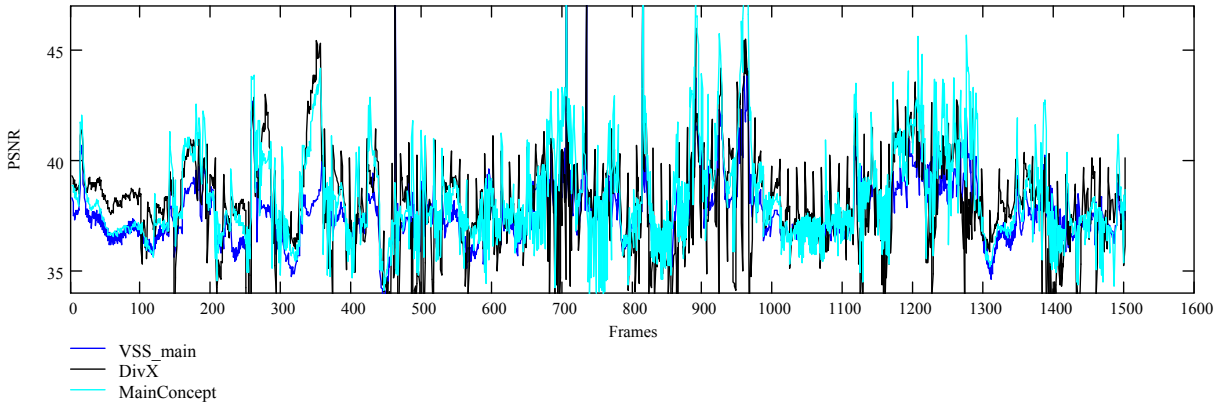


Battle sequence

Bit rate = 100 Kb/sec

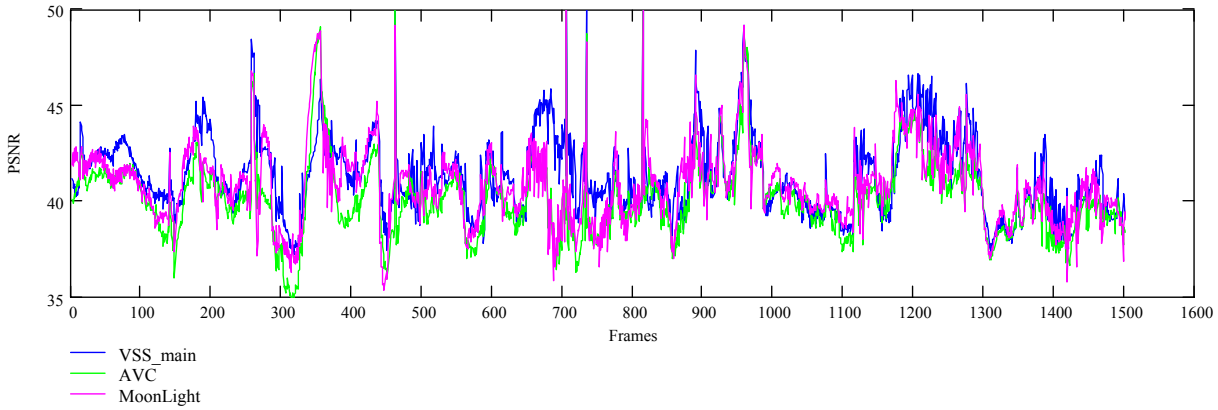


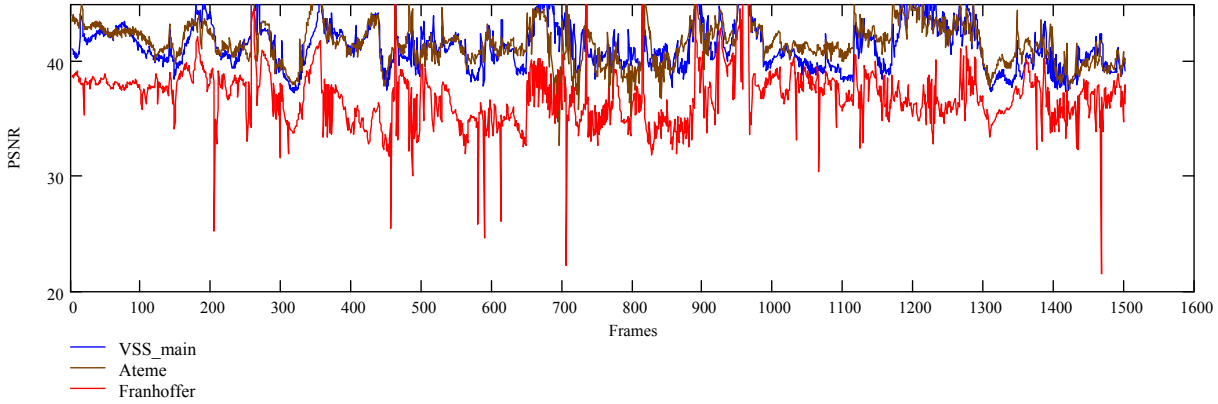


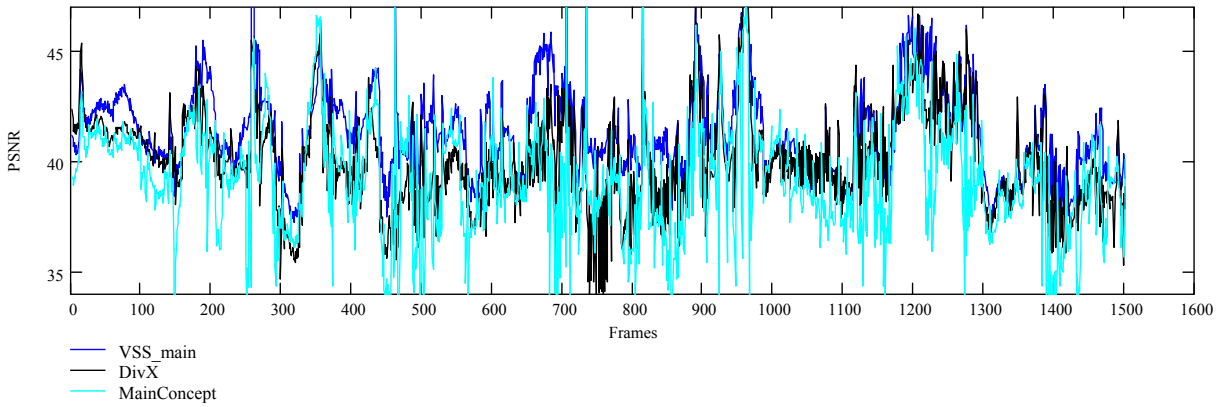


http://www.compression.ru/video/

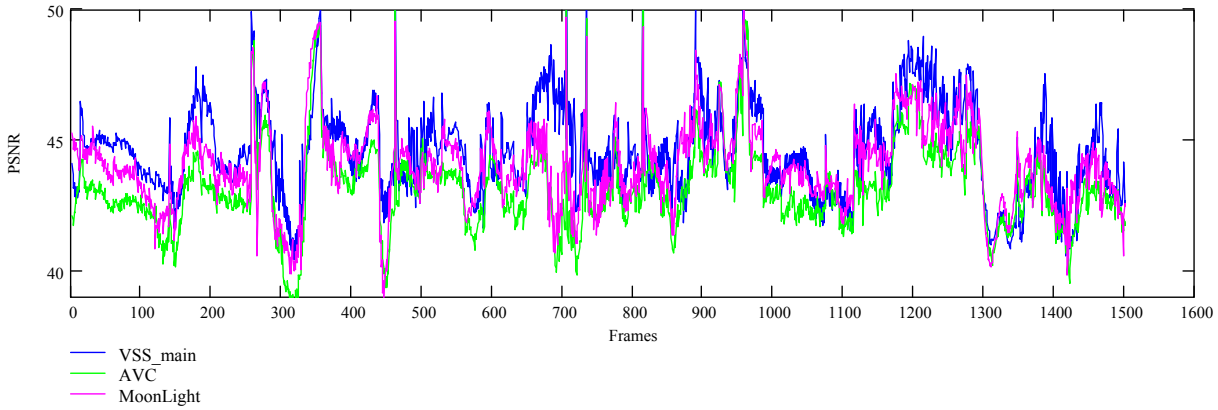
Bit rate = 700 Kb/sec

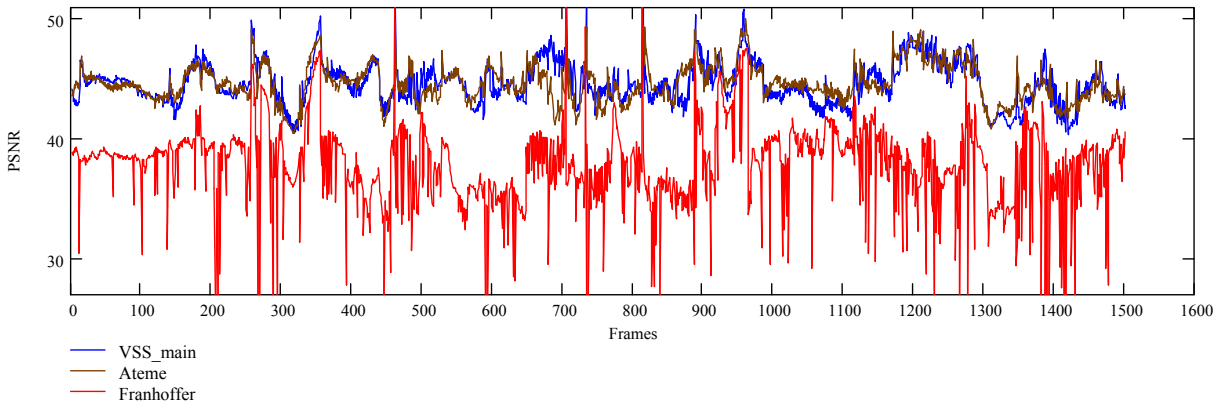


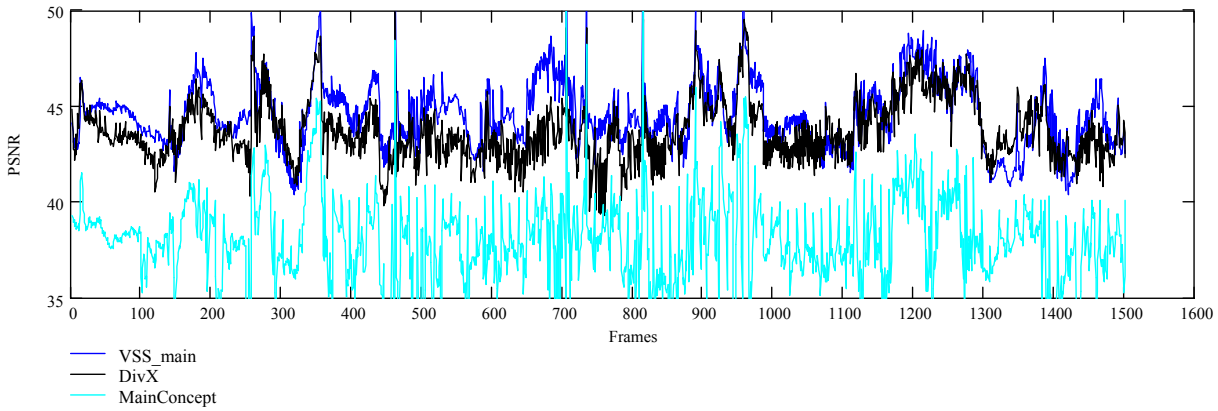




Bit rate = 2340 Kb/sec

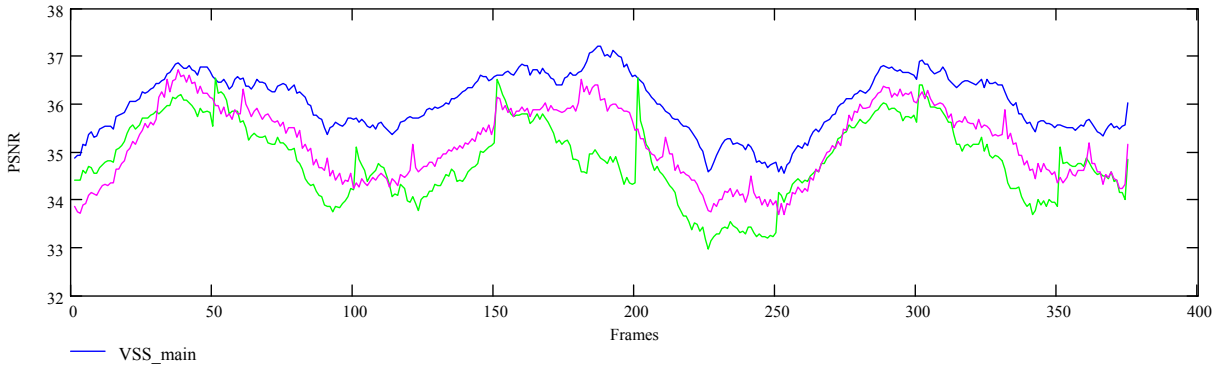


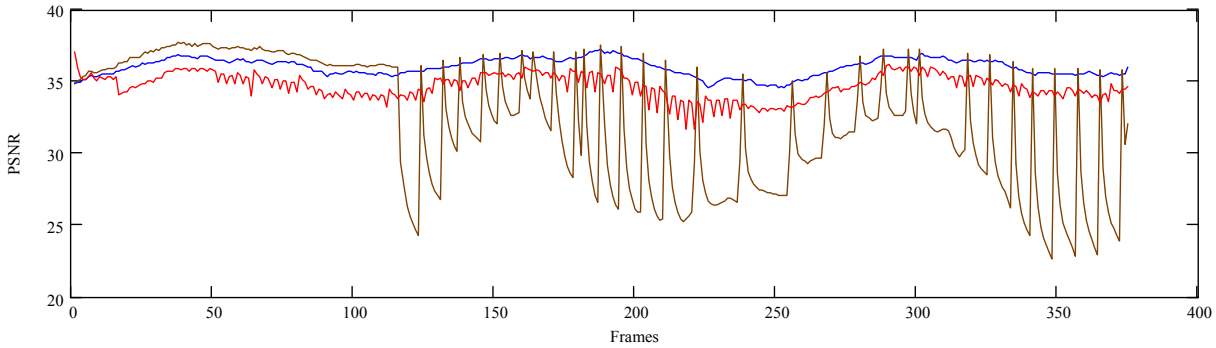


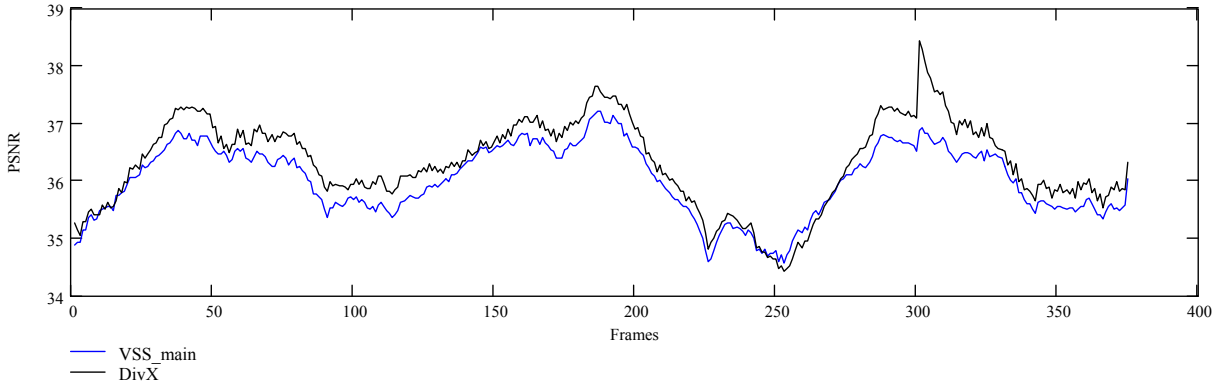


Bbc3di sequence

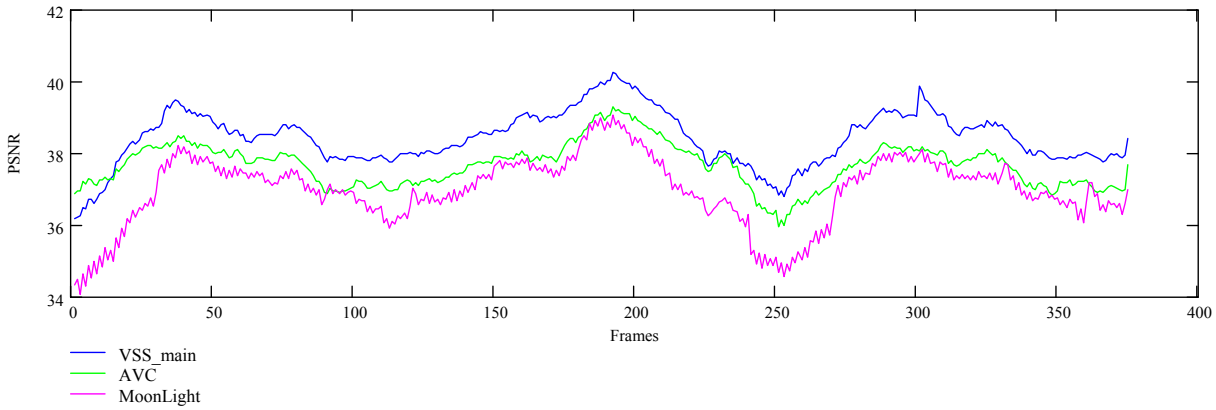
Bit rate = 100 Kb/sec

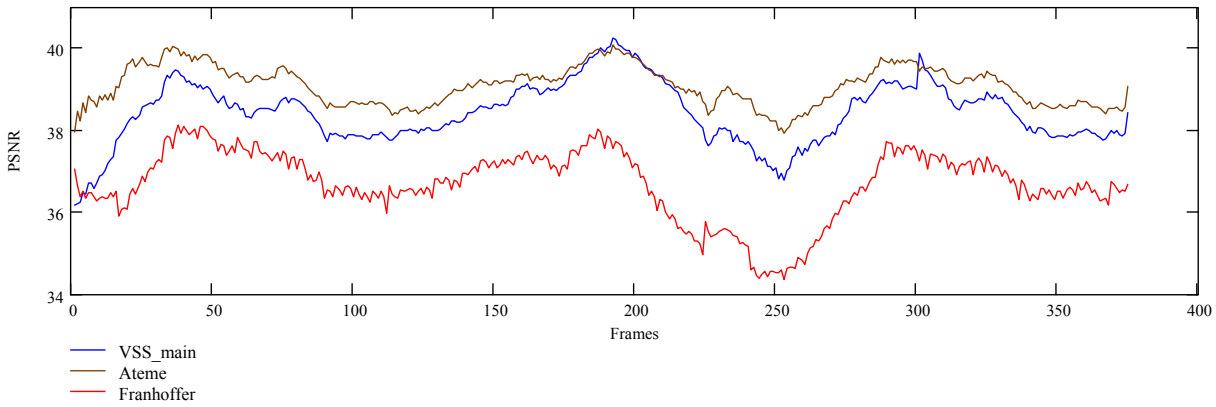


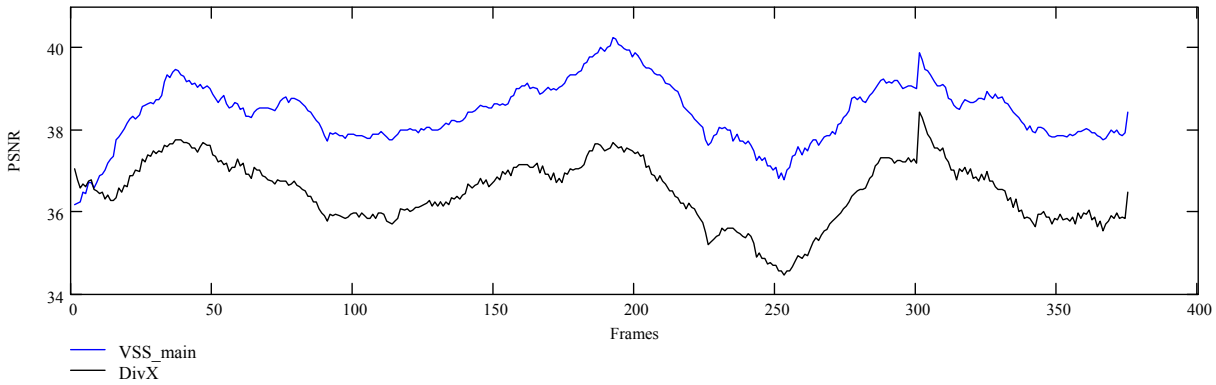




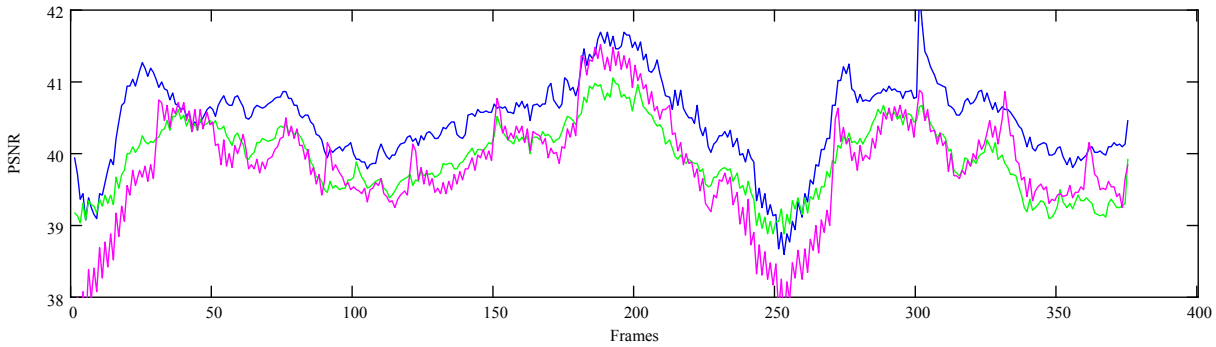
Bit rate = 700 Kb/sec

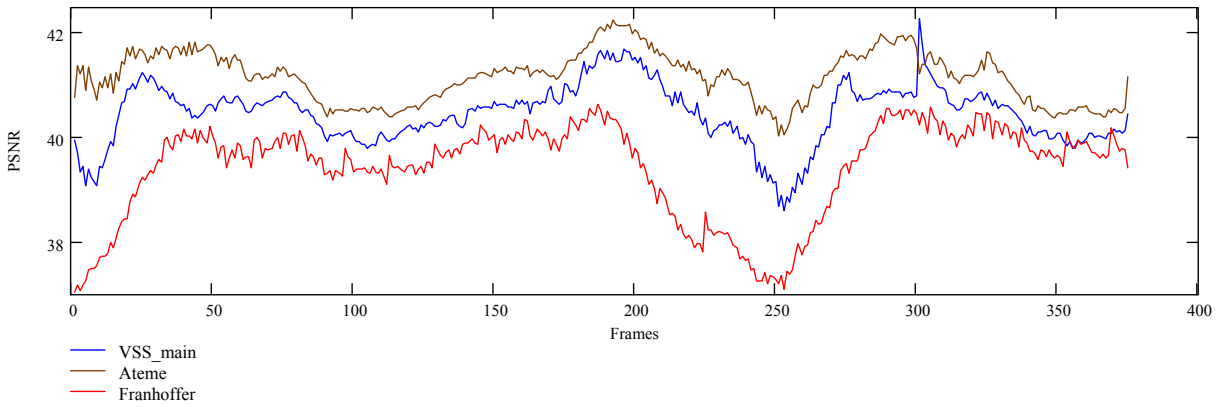


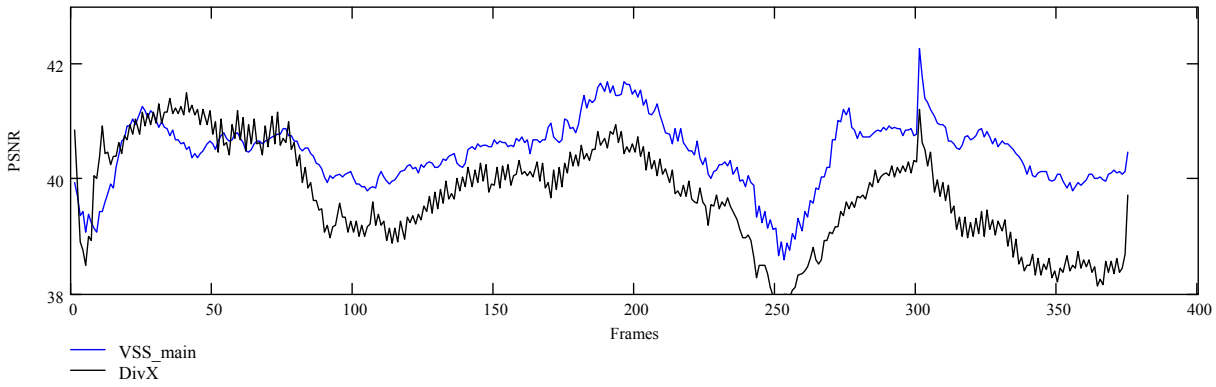




Bit rate = 2340 Kb/sec

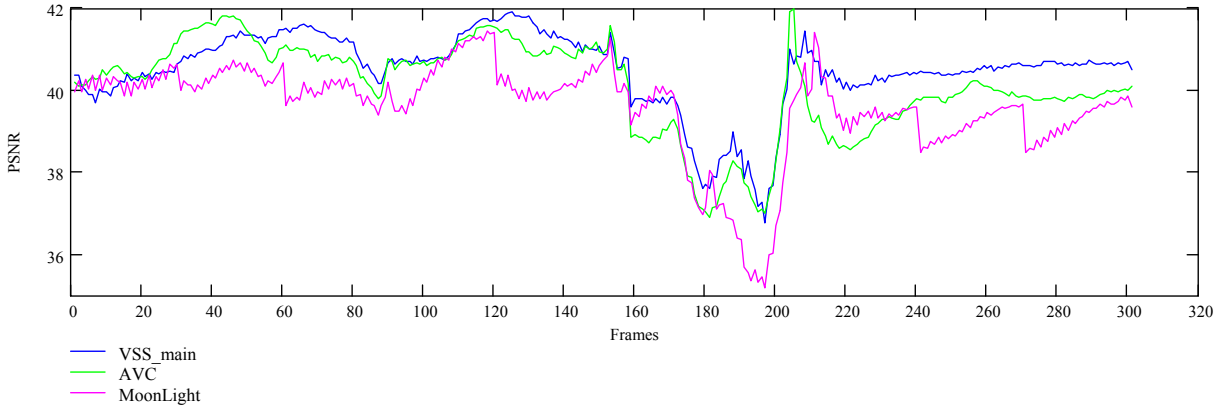


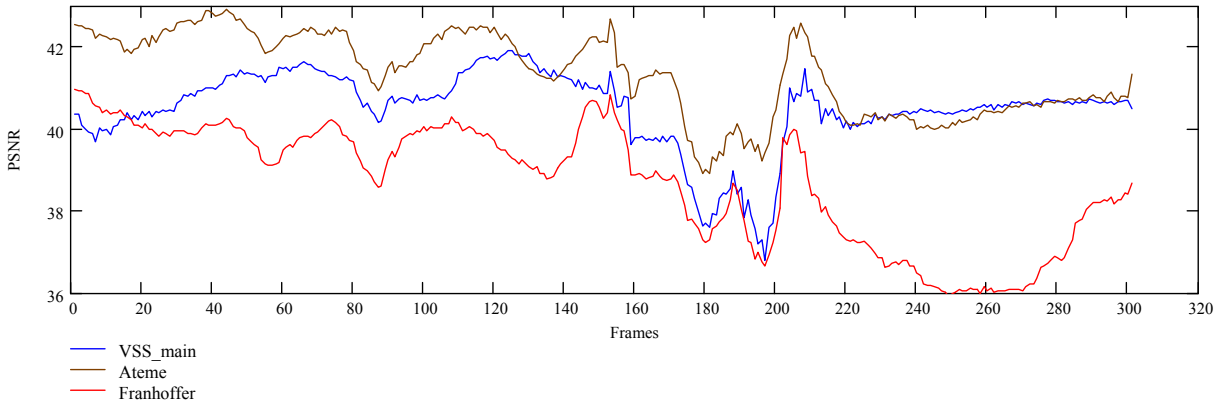


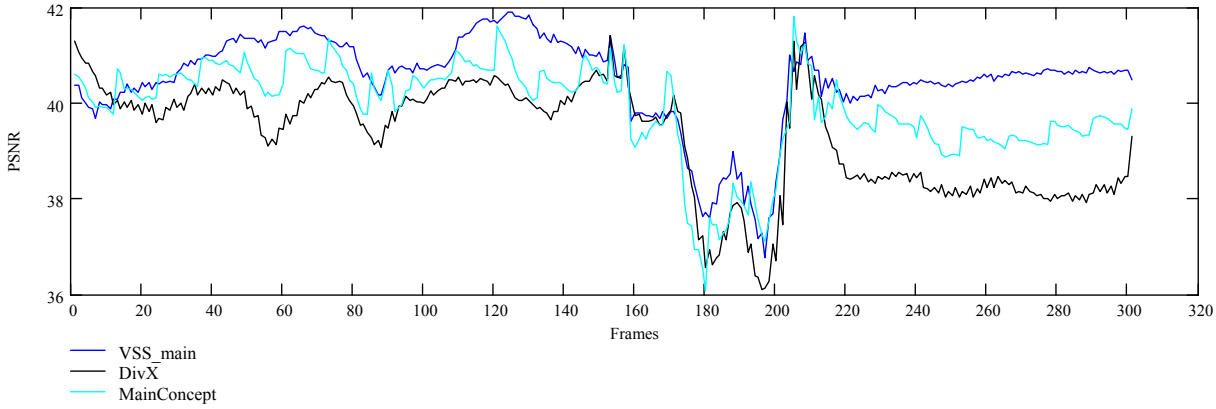


Foreman sequence

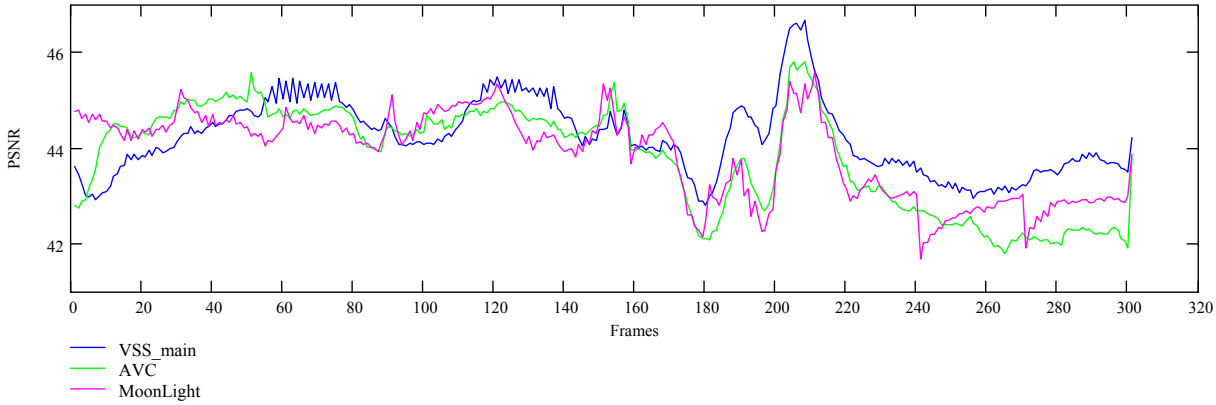
Bit rate = 100 Kb/sec

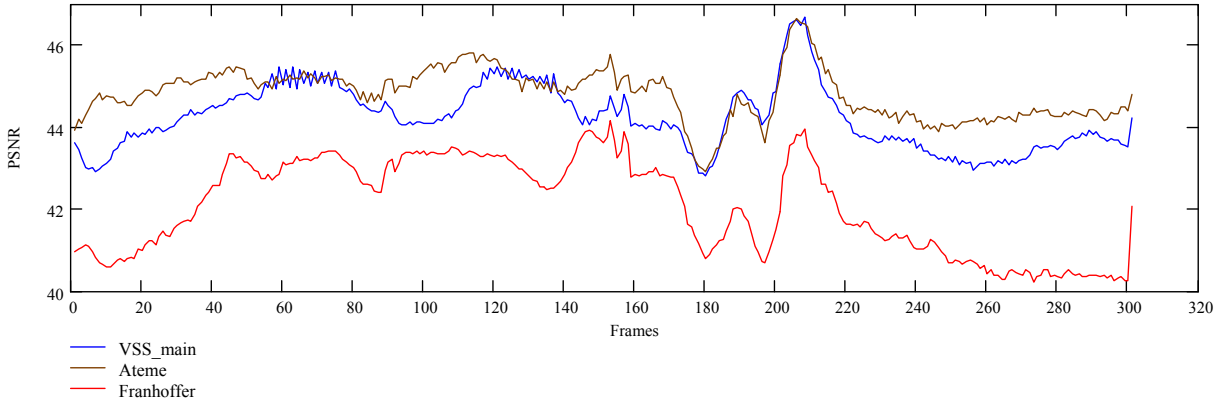


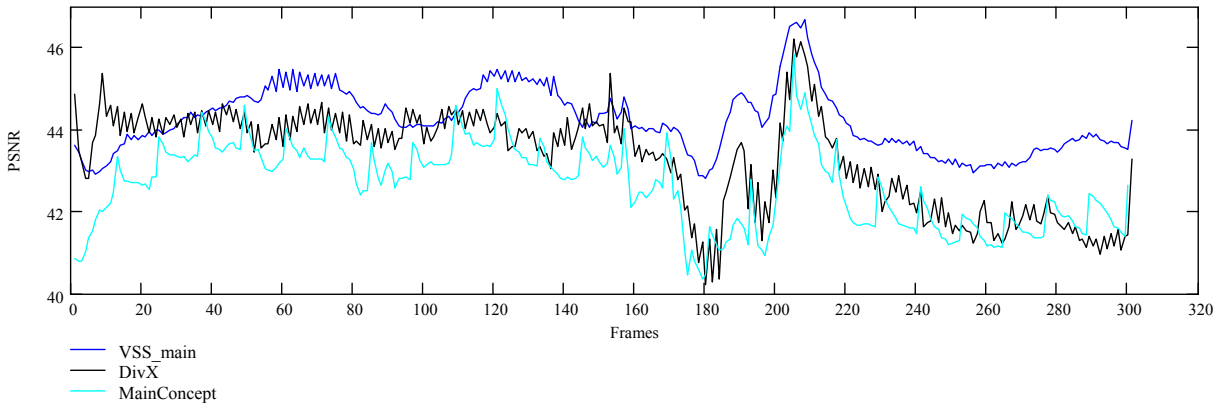




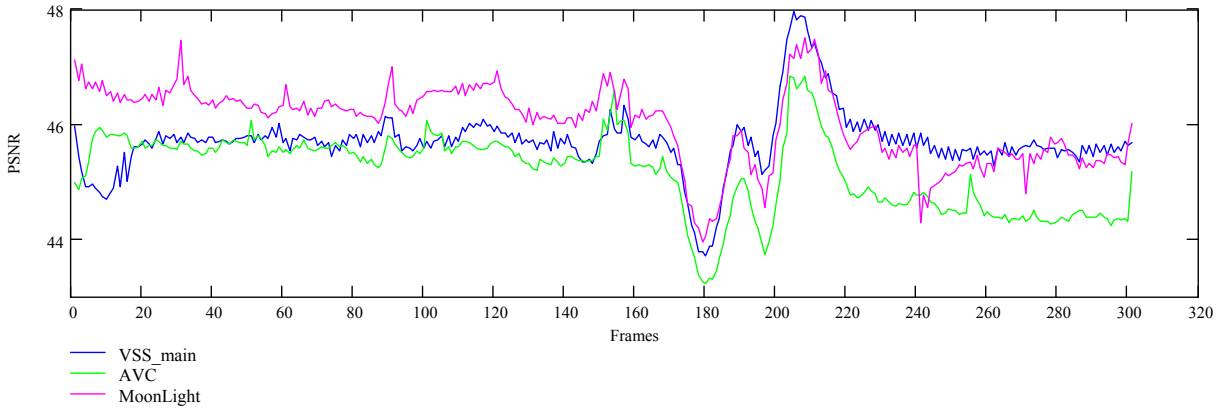
Bit rate = 700 Kb/sec

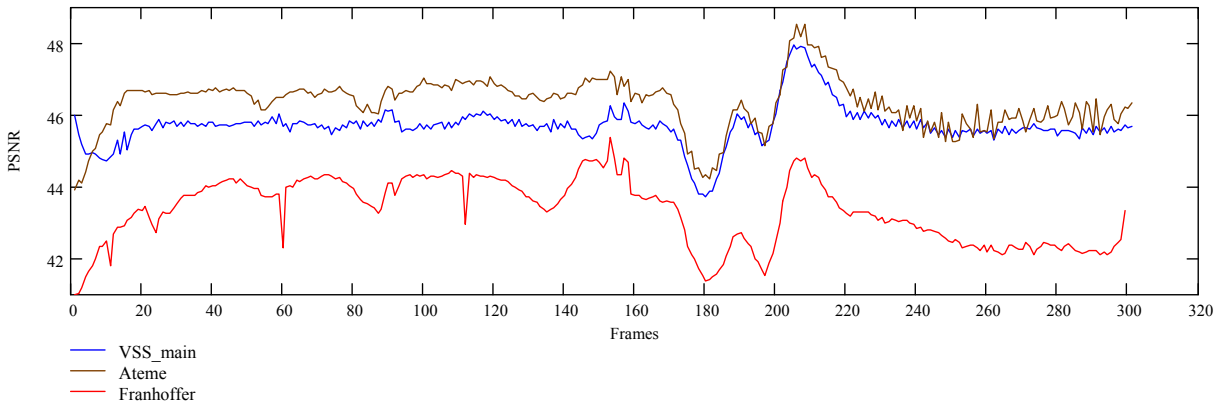


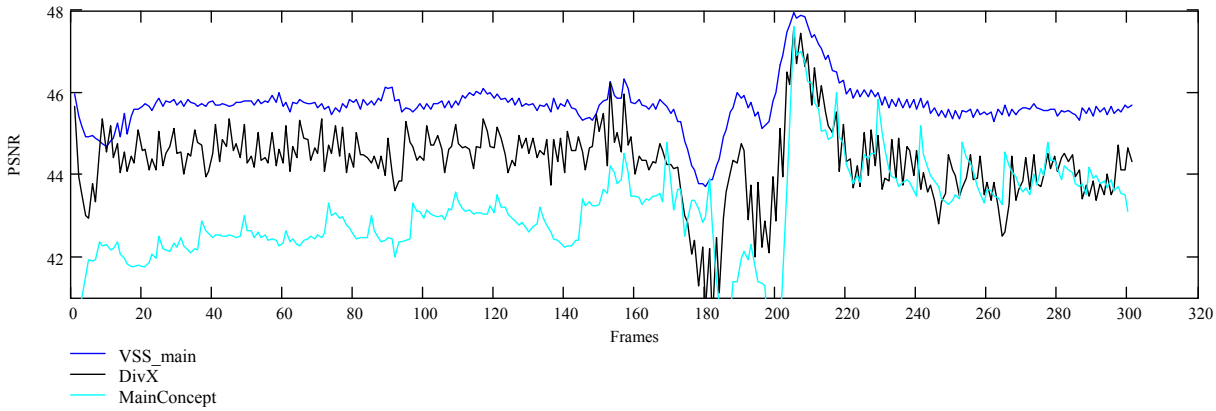




Bit rate = 2340 Kb/sec

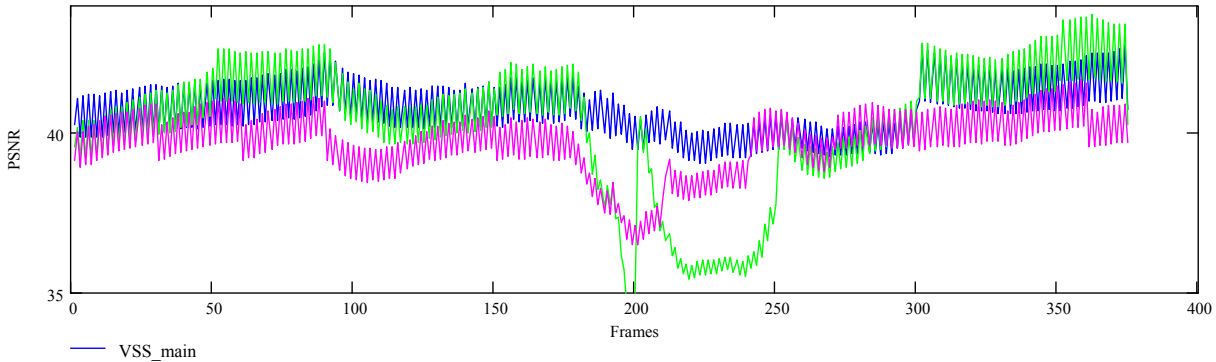


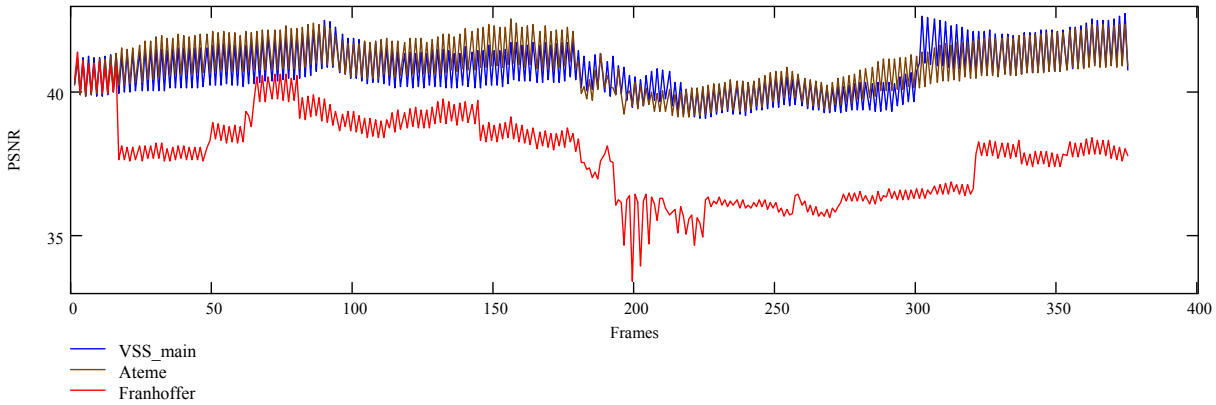


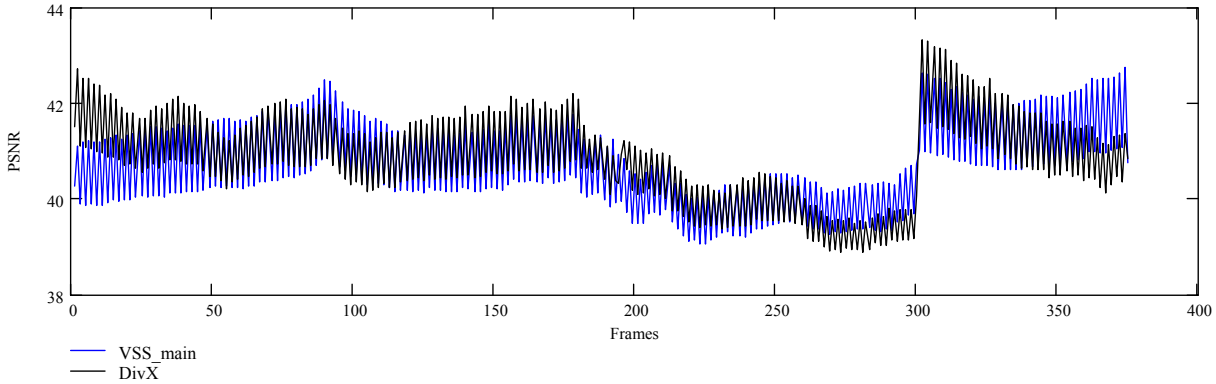


Susidi sequence

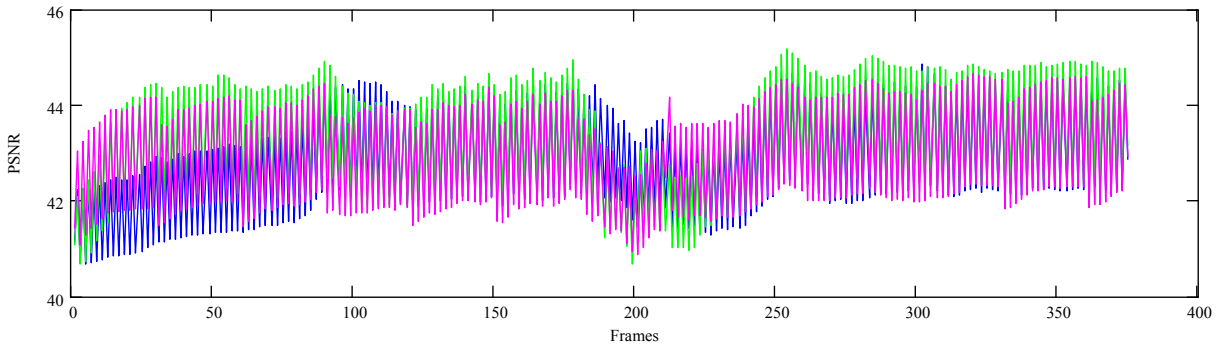
Bit rate = 100 Kb/sec

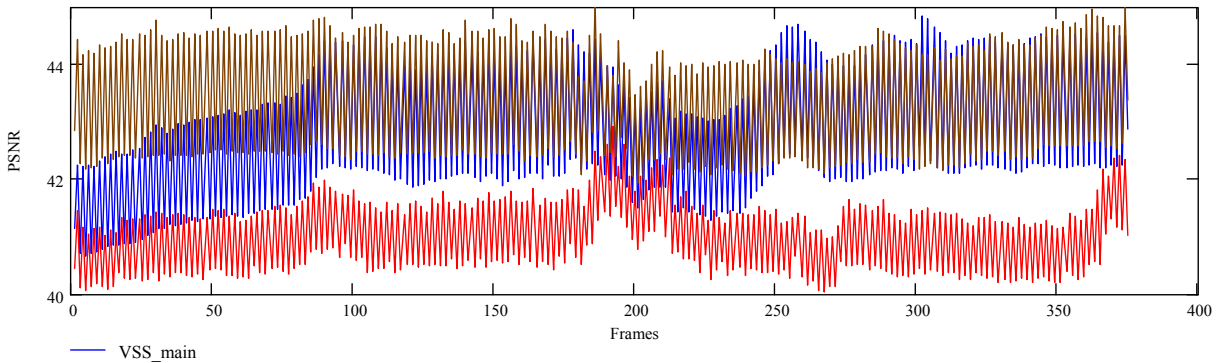


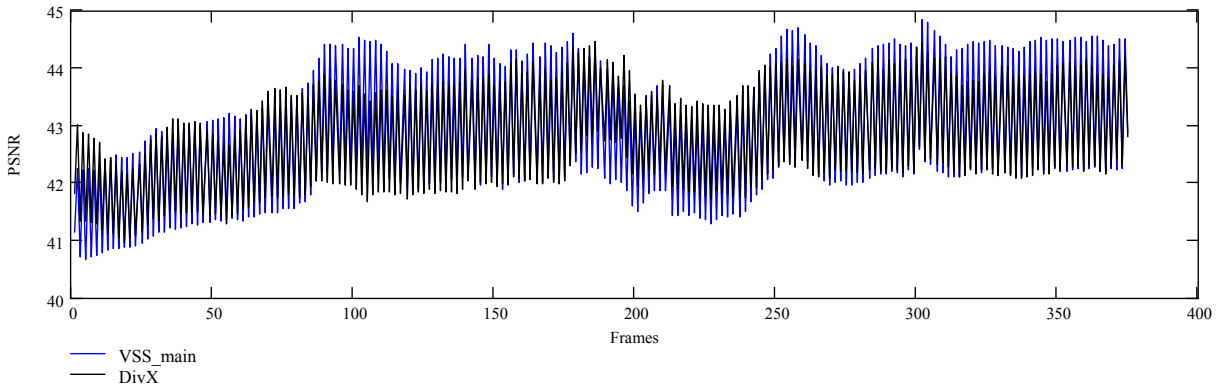




Bit rate = 700 Kb/sec

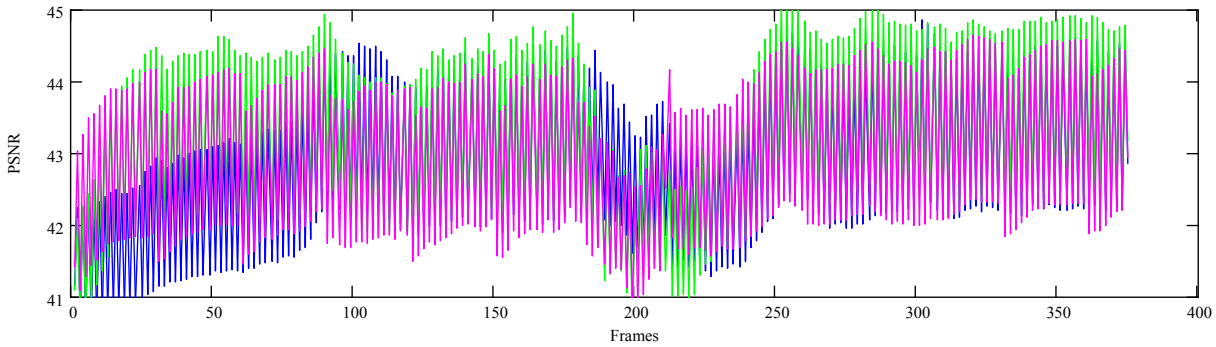


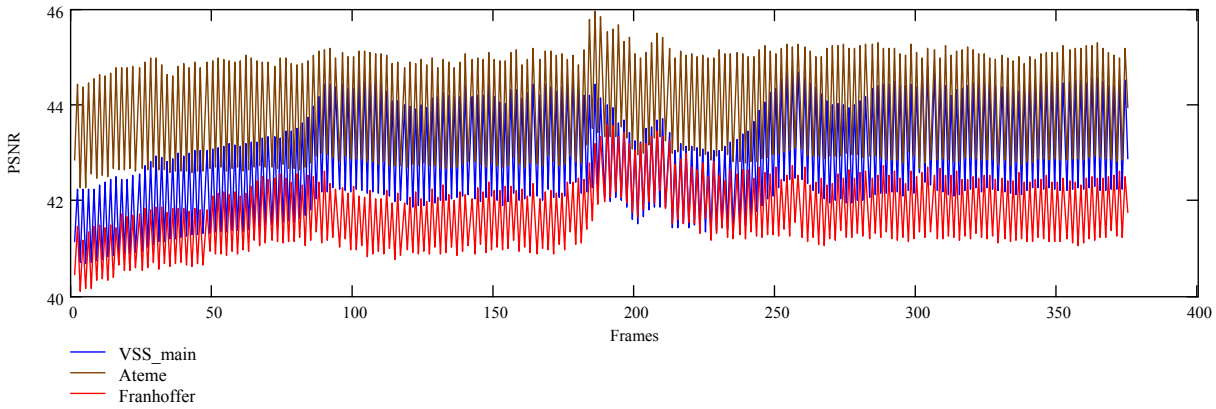


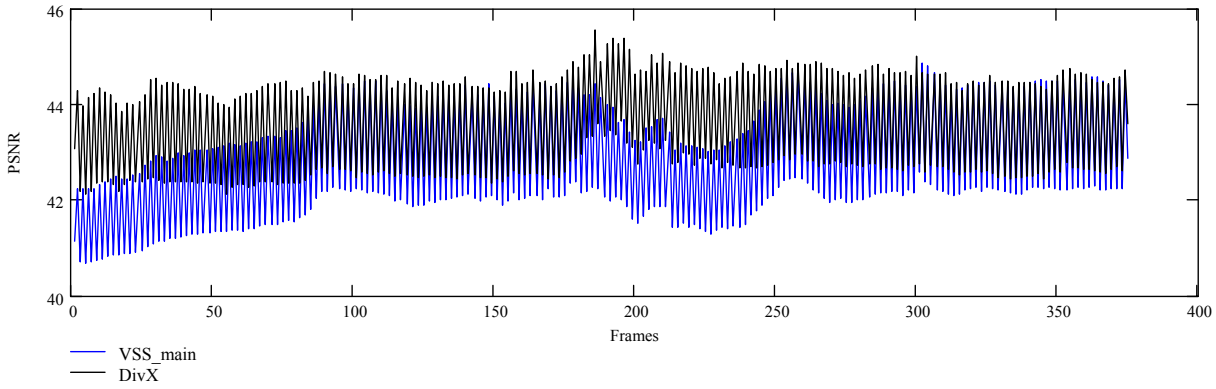


http://www.compression.ru/video/

Bit rate = 2340 Kb/sec







Visual comparison of H.264 and DivX codecs

- Comparison was performed between the Ateme and DivX codecs.
- Bit rate was set to 700 Kb/sec.
- Bbc2di and foreman video sequences were used.

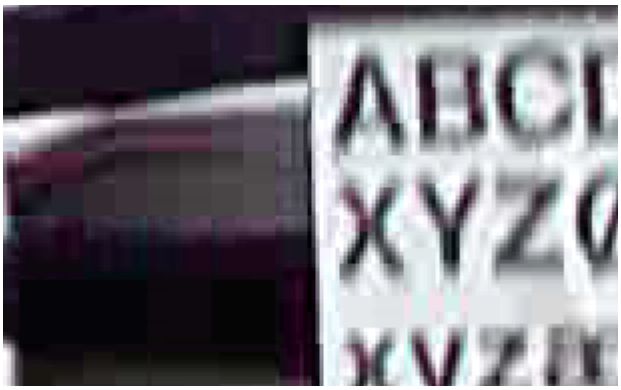
Bbc3di sequence, frame 280

The following examples demonstrate better image quality after compression with the H.264 codec in comparison with DivX.

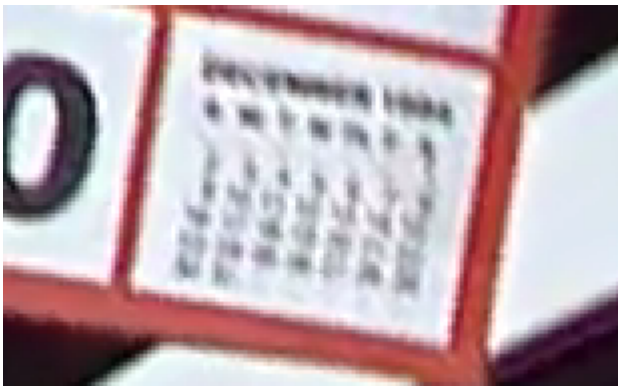
Picture 46. Bbc3di frame 280. Ateme

Picture 47. Bbc3di frame 280. DivX

Picture 48. Bbc3di frame 280. Ateme



Picture 49. Bbc3di frame 280. DivX



Picture 50. Bbc3di frame 280. Ateme

Picture 51. Bbc3di frame 280. DivX

Foreman sequence, frames 282 и 9

The following examples demonstrate better image quality after compression with the H.264 codec in comparison with DivX.

Picture 52. Foreman frame 282. Ateme

Picture 53. Foreman frame 282. DivX

Picture 54. Foreman frame 282. Ateme

Picture 55. Foreman frame 282. DivX

Picture 56. Foreman frame 282. Ateme

Picture 57. Foreman frame 282. DivX

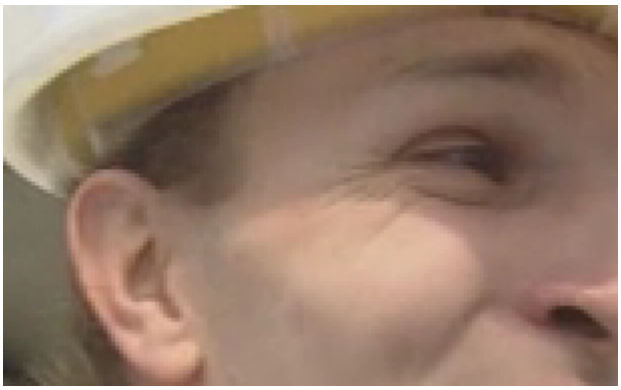
Conclusion:

- On similar PSNR values H.264 standard codecs show significantly better visual quality than previous standard codecs.
- Most of tested codecs are optimized for maximum speed on current day computers and do not implement all possibilities of H.264 format

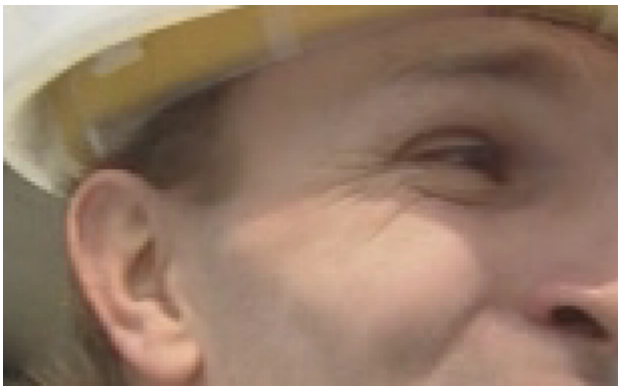
The following examples demonstrate close results from the image quality point of view for DivX and H.264.

Picture 58. Foreman frame 9. Ateme

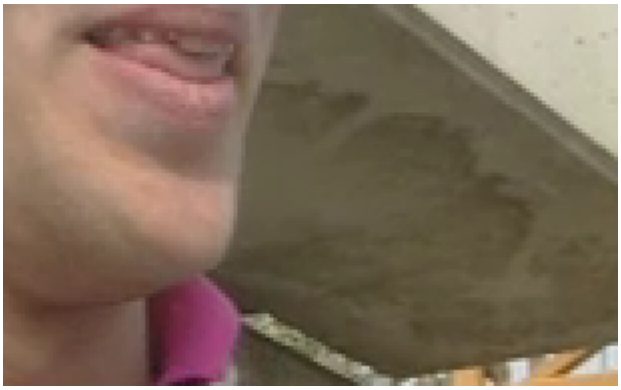
Picture 59. Foreman frame 9. DivX



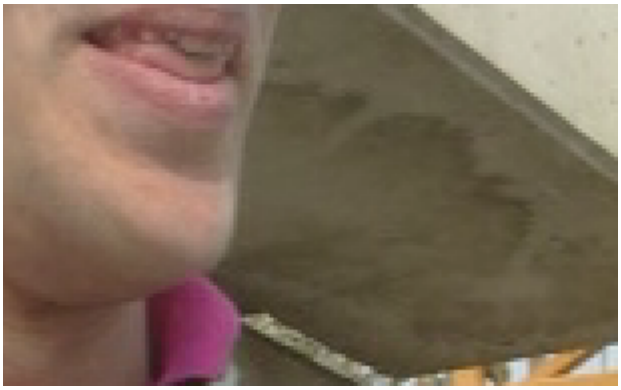
Picture 60. Foreman frame 9. Ateme



Picture 61. Foreman frame 9. DivX



Picture 62. Foreman frame 9. Ateme



Picture 63. Foreman frame 9. DivX

Informal codecs comparison

As one can see on the diagrams above different codecs show significantly different results for different sequences. That happens because all the represented sequences have different character (motion, noise e.t.c.). This fact allows to define which codecs do well with any kind of video sequences and which provide good results only for some class of sequences. However it would be interesting to find out general characteristics of each codec on the whole testing set.

We decided that averaging resulting values for all the sequences won't be correct and suggested an informal estimation where every codec is given some score depending on the results of its measurement.

Informal comparison rules

- If some codec is stably better than all the others in more than one point it is given score 3 regardless of other results.
- If some codec is worse than all the others in more than one point it is given score 1.
- Otherwise score 2 is assigned.
- Y-PSNR, U-PSNR, V-PSNR and Y-difference parameters are estimated using this method.

Informal comparison results

	bankomatdi	battle	bbc3di	foreman	susidi	total	place
Ateme	3	3	3	2	3	14	1
DivX	2	2	2	2	3	11	2
Fraunhofer	1	2	2	2	1	8	4,5
MainConcept	-	1	-	1	-	2	n/a
Moonlight	1	2	1	2	2	8	4,5
MpegableAVC	2	2	2	2	2	10	3
Videosoft	2	2	2	3	1	10	3

Picture 64. Table of informal comparison results for Y

	bankomatdi		battle		bbc3di		foreman		susidi		total	place
	U	V	U	V	U	V	U	V	U	V		
Ateme	3	3	3	3	3	3	3	3	3	3	30	1
DivX	1	1	2	2	1	1	2	1	2	1	14	5,6
Fraunhofer	1	2	1	1	2	2	1	2	1	1	14	5,6
MainConcept	-	-	2	2	-	-	2	2	-	-	8	n/a
Moonlight	2	2	2	2	2	2	2	2	2	2	20	3
MpegableAVC	2	1	2	2	2	2	2	1	2	1	17	4
Videosoft	2	2	2	2	2	2	2	3	2	2	21	2

Picture 65. Table of informal comparison results for U and V

	bankomatdi	battle	bbc3di	foreman	susidi	Y-diff	Y	UV/2	total	place
	Y-diff	Y-diff	Y-diff	Y-diff	Y-diff					
Ateme	3	2	2	1	2	10	14	15	39	1
DivX	3	3	3	3	3	15	11	7	33	2
Fraunhofer	1	2	2	2	1	8	8	7	23	6
MainConcept	-	3	-	2	-	5	2	4	11	n/a
Moonlight	2	2	2	2	2	10	8	10	28	5
MpegableAVC	2	2	3	2	1	10	10	8.5	28.5	4
Videosoft	2	1	2	2	2	9	10	10.5	29.5	3

Picture 66. General table of informal comparison results including Y, U, V and Y-difference

Common conclusion

- Standard was adopted not long ago - in the end of 2003. At the same time H.264 algorithm is significantly more complex, than previous standards and requires more tuning time. As a result many codecs, used in this comparison, are works in progress, that require much time before achieving product quality
- In the test start we planned to compare different codec compatibility in between and standard conformance. But simple tests shown that currently it is too early to test codec compatibility.
- Codecs that participated in our testing were optimized for maximum performance on current day computers, and do not employ all H264 format possibilities. Afterward with computers performance growth it would be possible to show better results even without data format changes. We could suggest following analogy: current H264 codecs are approximately on a level of DivX 2.0 - so they are not ready for mass distribution. But if quality increase in next versions would be similar to increase from DivX 3 to DivX 5 than format advantages would be noticeable.

If you are interested in your codecs' testing or tuning, please write to us at videocodec-testing@graphics.cs.msu.ru

About us (Graphics & Media Lab Video Group)

Graphics & Media Lab Video Group is a part of Graphics & Media Lab of Computer Science Department in Moscow State University. The history of Graphics Group began at the end of 1980's. Graphics & Media Lab was officially founded in 1998. Main research directions of the lab lie in different areas of Computer Graphics, Computer Vision and Media Processing (audio, image and video processing). Some of research results were patented, other results were presented in a number of publications.

Main research directions of Graphics & Media Lab Video Group are video processing (pre-, post- and video analysis filters) and video compression (codecs' testing and tuning, quality metrics research, development of codecs).

Our main achievements in **video processing:**

- High quality industrial filters for format conversion including high quality deinterlacing, high quality frame rate conversion, new fast practical super resolution, etc.
- Methods for modern TV-sets: big family of up-sampling methods, smart brightness and contrast control, smart sharpening, etc.
- Artifacts' removal methods: family of denoising methods, flicking removal, video stabilization with frame edges restoration, scratches, spots, drop-outs removal, etc.
- Specific methods like: subtitles removal, construction of panorama image from video, video to high quality photo, video watermarking, video segmentation, practical fast video deblur, etc.

Our main achievements in **video compression:**

- Well-known public comparisons of JPEG, JPEG-2000, MPEG-2 decoders, MPEG-4 and annual H.264 codec's testing; also we provide tests for "weak and strong points of codec X" for companies with bugreports and codec tuning recommendations.
- Our own video quality metrics research, public part is MSU Video Quality Measurement Tool and MSU Perceptual Video Quality Tool.
- We have internal research and contracts on modern video compression and publish our MSU Lossless Video Codec and MSU Screen Capture Video Codec – codecs with ones of the highest compression ratios.

We are really glad to work many years with companies like Intel, Samsung, RealNetworks and others.

A mutual collaboration in areas of video processing and video compression is always interesting for us.
E-mail: video@graphics.cs.msu.ru

MSU Video Quality Measurement Tool

MSU Graphics & Media Lab. Video Group.

GRAPHICS & MEDIA LAB VIDEO GROUP

Main Features

1. 12 Objective Metric + 5 Plugins

PSNR several versions,
MSAD,
Delta,
MSE,
SSIM Fast,
SSIM Precise,
VQM,
MSU Blurring Metric,
MSU Brightness Flicking Metric,
MSU Brightness Independent PSNR,
MSU Drop Frame Metric,
MSU Noise Estimation Metric,
MSU Scene Change Detector,
MSU Blocking Metric.

2. More Than 30 Supported Formats, Extended Color Depth Support

*.AVI,
*. YUV:
YUV,
YV12,
IYUV,
UYVY,
Y,
YUY2,
*.BMP,
*.AVS:
*.MOV,
*.VOB,
*.WMV,
*.MP4,
*.MPG,
*.MKV,
*.FLV,
etc.,

Extended Color Depth:
P010, P014,
P016, P210,
P214, P216,
P410, P414,
P416,
P410_RGB,
P414_RGB,
P416_RGB.

3. Multi-core Processors Support

MMX, SSE and OpenMP Optimizations

4. Comparative Analysis

Comparison of 3 files at a time

5. ROI Support

Metric calculation for ROI (Region of Interest)

6. GUI & Batch Processing

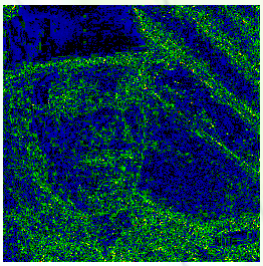
GUI and command line tools

7. Plugins Interface

You can easily develop your own metric

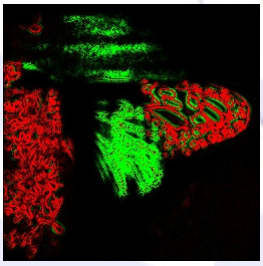
Visualization Examples

Allows easily detect where codec/filter fails

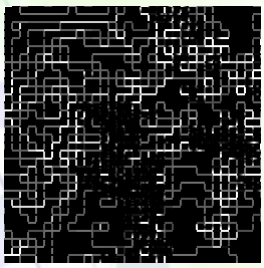


Y-YUV PSNR

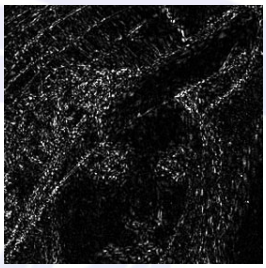
Y-YUV Delta



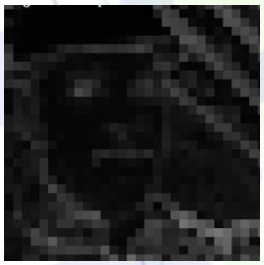
MSU Blurring Metric



MSU Blocking Metric



Y-YUV MSE



VQM

8. Universal Format of Results

Results are saved in *.csv files

9. HDTV Support

10. Open-Source Plugins Available

11. Metric Visualization

Fast problem analysis, see examples above.

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

Tool was downloaded more than 100 000 times!

Free and Professional versions are available

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