

Πολυμέσα Αναφορά / Multimedia Report

Αντωνίου Σεραφείμ-Ηλίας AM: 2640

Experiment Results:

#4 - IDR PPPPPP Encoding (H.264 | B = 0):

Bitrate = 30 * AM = 30 * 2640 = 79200

----- Average data all frames -----

Total encoding time for the seq. : 37.137 sec (8.08 fps)

Total ME time for sequence : 17.422 sec

Y { PSNR (dB), cSNR (dB), MSE } : { 34.272, 33.852, 26.78253 }

U { PSNR (dB), cSNR (dB), MSE } : { 39.314, 39.049, 8.09373 }

V { PSNR (dB), cSNR (dB), MSE } : { 39.929, 39.567, 7.18360 }

Total bits : 791936 (I 28280, P 763336, NVB 320)

Bit rate (kbit/s) @ 30.00 Hz : 79.19

Bits to avoid Startcode Emulation : 2394

Bits for parameter sets : 320

Bits for filler data : 0

Bitrate = 50 * AM = 50 * 2640 = 132000

----- Average data all frames -----

Total encoding time for the seq. : 38.927 sec (7.71 fps)

Total ME time for sequence : 17.205 sec

Y { PSNR (dB), cSNR (dB), MSE } : { 36.954, 36.600, 14.22568 }

U { PSNR (dB), cSNR (dB), MSE } : { 40.716, 40.492, 5.80574 }

V { PSNR (dB), cSNR (dB), MSE } : { 41.561, 41.226, 4.90312 }

Total bits : 1321232 (I 28280, P 1292632, NVB 320)

Bit rate (kbit/s) @ 30.00 Hz : 132.12

Bits to avoid Startcode Emulation : 2242

Bits for parameter sets : 320

Bits for filler data : 0

Bits for filler data : 0

Bitrate = 70 * AM = 70 * 2640 = 184800

----- Average data all frames -----

Total encoding time for the seq. : 41.403 sec (7.25 fps)

Total ME time for sequence : 17.383 sec

Y { PSNR (dB), cSNR (dB), MSE } : { 38.714, 38.421, 9.35313 }

U { PSNR (dB), cSNR (dB), MSE } : { 41.796, 41.612, 4.48634 }

V { PSNR (dB), cSNR (dB), MSE } : { 42.738, 42.435, 3.71149 }

Total bits : 1848056 (I 28280, P 1819456, NVB 320)

Bit rate (kbit/s) @ 30.00 Hz : 184.81

Bits to avoid Startcode Emulation : 2202

Bits for parameter sets : 320

Bits for filler data : 0

Bitrate = 90 * AM = 90 * 2640 = 237600

----- Average data all frames -----

Total encoding time for the seq. : 41.002 sec (7.32 fps)

Total ME time for sequence : 16.699 sec

Y { PSNR (dB), cSNR (dB), MSE } : { 40.028, 39.787, 6.82991 }

U { PSNR (dB), cSNR (dB), MSE } : { 42.653, 42.468, 3.68344 }

V { PSNR (dB), cSNR (dB), MSE } : { 43.668, 43.344, 3.01107 }

Total bits : 2377400 (I 44792, P 2332288, NVB 320)

Bit rate (kbit/s) @ 30.00 Hz : 237.74

Bits to avoid Startcode Emulation : 2069

Bits for parameter sets : 320

Bits for filler data : 0

#5 - IDR BBPBBPBBP Encoding (H.264 | B = 2):

Bitrate = 30 * AM = 30 * 2640 = 79200

----- Average data all frames -----

Total encoding time for the seq. : 44.299 sec (6.77 fps)

Total ME time for sequence : 21.250 sec

Y { PSNR (dB), cSNR (dB), MSE } : { 34.428, 33.766, 27.32195 }

U { PSNR (dB), cSNR (dB), MSE } : { 39.730, 39.421, 7.42992 }

V { PSNR (dB), cSNR (dB), MSE } : { 40.345, 39.960, 6.56332 }

Total bits : 788568 (I 28488, P 463976, B 295784 NVB 320)

Bit rate (kbit/s) @ 30.00 Hz : 78.86

Bits to avoid Startcode Emulation : 2209

Bits for parameter sets : 320

Bits for filler data : 0

Bitrate = 50 * AM = 50 * 2640 = 132000

----- Average data all frames -----

Total encoding time for the seq. : 45.601 sec (6.58 fps)

Total ME time for sequence : 20.823 sec

Y { PSNR (dB), cSNR (dB), MSE } : { 37.015, 36.411, 14.85809 }

U { PSNR (dB), cSNR (dB), MSE } : { 41.005, 40.723, 5.50561 }

V { PSNR (dB), cSNR (dB), MSE } : { 41.912, 41.541, 4.56014 }

Total bits : 1316208 (I 28488, P 757280, B 530120 NVB 320)

Bit rate (kbit/s) @ 30.00 Hz : 131.62

Bits to avoid Startcode Emulation : 2178

Bits for parameter sets : 320

Bits for filler data : 0

Bitrate = 70 * AM = 70 * 2640 = 184800

----- Average data all frames -----

Total encoding time for the seq. : 46.944 sec (6.39 fps)

Total ME time for sequence : 20.609 sec

Y { PSNR (dB), cSNR (dB), MSE } : { 38.264, 37.917, 10.50436 }

U { PSNR (dB), cSNR (dB), MSE } : { 41.584, 41.389, 4.72269 }

V { PSNR (dB), cSNR (dB), MSE } : { 42.625, 42.289, 3.83887 }

Total bits : 1855448 (I 28488, P 870744, B 955896 NVB 320)

Bit rate (kbit/s) @ 30.00 Hz : 185.54

Bits to avoid Startcode Emulation : 2160

Bits for parameter sets : 320

Bits for filler data : 0

Bitrate = 90 * AM = 90 * 2640 = 237600

----- Average data all frames -----

Total encoding time for the seq. : 47.979 sec (6.25 fps)

Total ME time for sequence : 20.329 sec

Y { PSNR (dB), cSNR (dB), MSE } : { 39.853, 39.563, 7.19151 }

U { PSNR (dB), cSNR (dB), MSE } : { 42.599, 42.378, 3.76079 }

V { PSNR (dB), cSNR (dB), MSE } : { 43.685, 43.305, 3.03813 }

Total bits : 2376024 (I 45088, P 1132064, B 1198552 NVB 320)

Bit rate (kbit/s) @ 30.00 Hz : 237.60

Bits to avoid Startcode Emulation : 1913

Bits for parameter sets : 320

Bits for filler data : 0

#8 - FILE: encoder_lowdelay_main.cfg:

TargetBitRate = 30 * AM = 30 * 2640 = 79200

SUMMARY -----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
300	a	79.6552	36.3848	40.9628	41.8210	36.9725

I Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
1	i	739.6800	40.5012	43.3589	45.5465	41.4425

P Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
0	p	nan	nan	nan	nan	nan

B Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
299	b	77.4478	36.3710	40.9548	41.8086	36.9632

RVM: 0.000

Bytes written to file: 99569 (79.655 kbps)

Total Time: 143.149 sec.

TargetBitRate = 50 * AM = 50 * 2640 = 132000

SUMMARY -----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
300	a	131.3272	39.1300	42.5828	43.5820	39.6286

I Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
1	i	900.9600	42.0586	44.0839	46.3694	42.8523

P Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
0	p	nan	nan	nan	nan	nan

B Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
299	b	128.7532	39.1202	42.5778	43.5727	39.6210

RVM: 0.000

Bytes written to file: 164159 (131.327 kbps)

Total Time: 166.581 sec.

TargetBitRate = 70 * AM = 70 * 2640 = 184800

SUMMARY -----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
300	a	184.9856	40.9719	43.8437	44.8915	41.4056

I Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
1	i	990.4800	42.8662	44.7634	47.0470	43.6338

P Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
0	p	nan	nan	nan	nan	nan

B Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
299	b	182.2916	40.9656	43.8406	44.8843	41.3997

RVM: 0.000

Bytes written to file: 231232 (184.986 kbps)

Total Time: 188.394 sec.

TargetBitRate = 90 * AM = 90 * 2640 = 237600

SUMMARY -----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
300	a	236.9824	42.3070	44.7384	45.8588	42.7306

I Slices-----

	Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
1	i		1104.9600	43.6140	45.5036	47.5841	44.3643

P Slices-----

	Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
0	p		nan	nan	nan	nan	nan

B Slices-----

	Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
299	b		234.0795	42.3026	44.7358	45.8530	42.7261

RVM: 0.000

Bytes written to file: 296228 (236.982 kbps)

Total Time: 204.586 sec.

#9 - FILE: encoder_randomaccess_main.cfg:

TargetBitRate = 30 * AM = 30 * 2640 = 79200

SUMMARY -----

	Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
300	a		81.2032	36.7155	41.7897	42.6017	37.3636

I Slices-----

	Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
10	i		904.8000	39.9720	42.6396	43.8612	40.5877

P Slices-----

	Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
0	p		nan	nan	nan	nan	nan

B Slices-----

	Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
290	b		52.8033	36.6032	41.7604	42.5582	37.2858

RVM: 0.000

Bytes written to file: 101504 (81.203 kbps)

Total Time: 109.720 sec.

TargetBitRate = 50 * AM = 50 * 2640 = 132000

SUMMARY -----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
300	a	133.0712	39.3328	43.2531	44.2361	39.9477

I Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
10	i	1141.2480	42.1291	44.1652	45.4573	42.5297

P Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
0	p	nan	nan	nan	nan	nan

B Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
290	b	98.3065	39.2364	43.2216	44.1940	39.8811

RVM: 0.000

Bytes written to file: 166339 (133.071 kbps)

Total Time: 132.796 sec.

TargetBitRate = 70 * AM = 70 * 2640 = 184800

SUMMARY -----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
300	a	186.0912	41.1632	44.3808	45.4824	41.7405

I Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
10	i	1310.6160	43.4029	45.1502	46.5294	43.7648

P Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
0	p	nan	nan	nan	nan	nan

B Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
290	b	147.3145	41.0859	44.3543	45.4462	41.6851

RVM: 0.000

Bytes written to file: 232614 (186.091 kbps)

Total Time: 150.814 sec.

TargetBitRate = 90 * AM = 90 * 2640 = 237600

SUMMARY -----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
300	a	238.7528	42.5744	45.3117	46.3818	43.1116

I Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
10	i	1459.7040	44.4638	45.8730	47.1536	44.7712

P Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
0	p	nan	nan	nan	nan	nan

B Slices-----

Total Frames		Bitrate	Y-PSNR	U-PSNR	V-PSNR	YUV-PSNR
290	b	196.6510	42.5092	45.2923	46.3552	43.0643

RVM: 0.000

Bytes written to file: 298441 (238.753 kbps)

Total Time: 166.430 sec.

Octave Results

BD-PSNR1	-0.012440
BD-RATE1	0.039076
BD-PSNR2	2.1894
BD-RATE2	-33.621
BD-PSNR3	2.4202
BD-RATE3	-36.654

Συνεπώς παρατηρώ ότι:

$$\text{BD-RATE3} < \text{BD-RATE2} < \text{BD-RATE1}$$

και

$$\text{BD-PSNR3} > \text{BD-PSNR2} > \text{BD-PSNR1}$$

Άρα η αύξουσα σειρά αποδοτικότητας είναι:

I. H.264 | B = 2

II. H.264 | B = 0

III. H.265 | encoder_lowdelay_main

IV. H.265 | encoder_randomaccess_main

Σας ευχαριστώ πολύ για τον χρόνο σας.

Σεραφείμ-Ηλίας Αντωνίου (AM: 2640)