

ΠΡΟΓΡΑΜΜΑΤΙΣΤΙΚΗ ΑΣΚΗΣΗ 2

Ονοματεπώνυμο: Γεώργιος Γιάτσος

ΑΜ: 3202

H.264

IDR PPPPPP....

25*3202

```
----- Average data all frames -----
Total encoding time for the seq. : 52.299 sec (5.74 fps)
Total ME time for sequence      : 26.346 sec

Y { PSNR (dB), cSNR (dB), MSE } : { 34.310, 33.884, 26.58684 }
U { PSNR (dB), cSNR (dB), MSE } : { 39.325, 39.081, 8.03477 }
V { PSNR (dB), cSNR (dB), MSE } : { 39.950, 39.588, 7.14945 }

Total bits                      : 800488 (I 28280, P 771888, NVB 320)
Bit rate (kbit/s) @ 30.00 Hz   : 80.05
Bits to avoid Startcode Emulation : 2436
Bits for parameter sets        : 320
Bits for filler data           : 0
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```

45*3202

```
----- Average data all frames -----
Total encoding time for the seq. : 53.476 sec (5.61 fps)
Total ME time for sequence      : 25.261 sec

Y { PSNR (dB), cSNR (dB), MSE } : { 37.413, 37.097, 12.68730 }
U { PSNR (dB), cSNR (dB), MSE } : { 41.007, 40.809, 5.39702 }
V { PSNR (dB), cSNR (dB), MSE } : { 41.864, 41.566, 4.53437 }

Total bits                      : 1441392 (I 28280, P 1412792, NVB 320)
Bit rate (kbit/s) @ 30.00 Hz   : 144.14
Bits to avoid Startcode Emulation : 2194
Bits for parameter sets        : 320
Bits for filler data           : 0
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65*3202

```
----- Average data all frames -----  
  
Total encoding time for the seq. : 54.432 sec (5.51 fps)  
Total ME time for sequence      : 23.963 sec  
  
Y { PSNR (dB), cSNR (dB), MSE } : { 39.328, 39.107, 7.98737 }  
U { PSNR (dB), cSNR (dB), MSE } : { 42.176, 42.015, 4.08910 }  
V { PSNR (dB), cSNR (dB), MSE } : { 43.150, 42.875, 3.35440 }  
  
Total bits                      : 2081048 (I 28280, P 2052448, NVB 320)  
Bit rate (kbit/s) @ 30.00 Hz   : 208.10  
Bits to avoid Startcode Emulation : 1995  
Bits for parameter sets        : 320  
Bits for filler data           : 0  
  
-----
```

85*3202

```
----- Average data all frames -----  
  
Total encoding time for the seq. : 55.594 sec (5.40 fps)  
Total ME time for sequence      : 23.407 sec  
  
Y { PSNR (dB), cSNR (dB), MSE } : { 40.775, 40.561, 5.71412 }  
U { PSNR (dB), cSNR (dB), MSE } : { 43.159, 42.995, 3.26270 }  
V { PSNR (dB), cSNR (dB), MSE } : { 44.233, 43.945, 2.62183 }  
  
Total bits                      : 2725272 (I 44792, P 2680160, NVB 320)  
Bit rate (kbit/s) @ 30.00 Hz   : 272.53  
Bits to avoid Startcode Emulation : 2118  
Bits for parameter sets        : 320  
Bits for filler data           : 0  
  
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```

IDR BPBPBP. . . .

25*3202

```
----- Average data all frames -----  
  
Total encoding time for the seq. : 56.854 sec (5.28 fps)  
Total ME time for sequence      : 28.639 sec  
  
Y { PSNR (dB), cSNR (dB), MSE } : { 34.942, 34.455, 23.31116 }  
U { PSNR (dB), cSNR (dB), MSE } : { 39.827, 39.559, 7.19709 }  
V { PSNR (dB), cSNR (dB), MSE } : { 40.469, 40.151, 6.28008 }  
  
Total bits                      : 800016 (I 28608, P 617240, B 153848 NVB 320)  
Bit rate (kbit/s) @ 30.00 Hz   : 80.00  
Bits to avoid Startcode Emulation : 2156  
Bits for parameter sets        : 320  
Bits for filler data           : 0  
  
-----
```

45*3202

```
----- Average data all frames -----  
  
Total encoding time for the seq. : 57.998 sec (5.17 fps)  
Total ME time for sequence      : 27.294 sec  
  
Y { PSNR (dB), cSNR (dB), MSE } : { 37.843, 37.424, 11.76732 }  
U { PSNR (dB), cSNR (dB), MSE } : { 41.372, 41.152, 4.98800 }  
V { PSNR (dB), cSNR (dB), MSE } : { 42.253, 41.944, 4.15594 }  
  
Total bits                      : 1441552 (I 28608, P 1069504, B 343120 NVB 320)  
Bit rate (kbit/s) @ 30.00 Hz   : 144.16  
Bits to avoid Startcode Emulation : 2176  
Bits for parameter sets        : 320  
Bits for filler data           : 0  
  
-----
```

65*3202

```
----- Average data all frames -----  
  
Total encoding time for the seq. : 59.291 sec (5.06 fps)  
Total ME time for sequence      : 26.539 sec  
  
Y { PSNR (dB), cSNR (dB), MSE } : { 39.701, 39.390, 7.48235 }  
U { PSNR (dB), cSNR (dB), MSE } : { 42.439, 42.239, 3.88273 }  
V { PSNR (dB), cSNR (dB), MSE } : { 43.494, 43.182, 3.12515 }  
  
Total bits                      : 2081664 (I 28608, P 1503480, B 549256 NVB 320)  
Bit rate (kbit/s) @ 30.00 Hz   : 208.17  
Bits to avoid Startcode Emulation : 2042  
Bits for parameter sets        : 320  
Bits for filler data           : 0  
  
-----
```

85*3202

```
----- Average data all frames -----  
  
Total encoding time for the seq. : 60.405 sec (4.97 fps)  
Total ME time for sequence      : 25.503 sec  
  
Y { PSNR (dB), cSNR (dB), MSE } : { 41.045, 40.802, 5.40551 }  
U { PSNR (dB), cSNR (dB), MSE } : { 43.348, 43.168, 3.13534 }  
V { PSNR (dB), cSNR (dB), MSE } : { 44.448, 44.136, 2.50884 }  
  
Total bits                      : 2722096 (I 44984, P 1851304, B 825488 NVB 320)  
Bit rate (kbit/s) @ 30.00 Hz   : 272.21  
Bits to avoid Startcode Emulation : 1945  
Bits for parameter sets        : 320  
Bits for filler data           : 0  
  
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```

H.265

Low delay

27*3202

```
SUMMARY -----
      Total Frames |   Bitrate   Y-PSNR   U-PSNR   V-PSNR   YUV-PSNR
            300   a      86.8112   36.8506   41.2196   42.1276   37.4251

I Slices-----
      Total Frames |   Bitrate   Y-PSNR   U-PSNR   V-PSNR   YUV-PSNR
            1     i      757.2000   40.7631   43.2671   45.6021   41.6515

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      84.5691   36.8376   41.2127   42.1160   37.4161

RVM: 0.000
Bytes written to file: 108514 (86.811 kbps)
```

47*3202

```
SUMMARY -----
      Total Frames |   Bitrate   Y-PSNR   U-PSNR   V-PSNR   YUV-PSNR
            300   a     149.3664   39.8224   43.0850   44.1657   40.3142

I Slices-----
      Total Frames |   Bitrate   Y-PSNR   U-PSNR   V-PSNR   YUV-PSNR
            1     i     932.1600   42.4157   44.3938   46.7031   43.2016

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     146.7484   39.8137   43.0806   44.1573   40.3072

RVM: 0.000
Bytes written to file: 186708 (149.366 kbps)
```

67*3202

```
SUMMARY -----
      Total Frames |      Bitrate      Y-PSNR      U-PSNR      V-PSNR      YUV-PSNR
              300   a        214.1848    41.7894    44.3835    45.4901    42.2042

I Slices-----
      Total Frames |      Bitrate      Y-PSNR      U-PSNR      V-PSNR      YUV-PSNR
              1    i        1031.5200    43.1829    45.0843    47.1018    43.9306

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

B Slices-----
      Total Frames |      Bitrate      Y-PSNR      U-PSNR      V-PSNR      YUV-PSNR
              299   b        211.4512    41.7848    44.3812    45.4847    42.1994

RVM: 0.000
Bytes written to file: 267731 (214.185 kbps)
```

87*3202

```
SUMMARY -----
      Total Frames |      Bitrate      Y-PSNR      U-PSNR      V-PSNR      YUV-PSNR
              300   a      214.1848   41.7894   44.3835   45.4901   42.2042

I Slices-----
      Total Frames |      Bitrate      Y-PSNR      U-PSNR      V-PSNR      YUV-PSNR
              1    i      1031.5200   43.1829   45.0843   47.1018   43.9306

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

B Slices-----
      Total Frames |      Bitrate      Y-PSNR      U-PSNR      V-PSNR      YUV-PSNR
              299   b      211.4512   41.7848   44.3812   45.4847   42.1994

RVM: 0.000
Bytes written to file: 267731 (214.185 kbps)
```

Random access

27*3202

```
SUMMARY -----
      Total Frames |      Bitrate      Y-PSNR      U-PSNR      V-PSNR      YUV-PSNR
              300   a          87.8160    37.1325    42.0284    42.8757    37.7648

I Slices-----
      Total Frames |      Bitrate      Y-PSNR      U-PSNR      V-PSNR      YUV-PSNR
              10    i          948.5760    40.4370    42.9746    44.2133    40.9882

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          58.1346    37.0185    41.9958    42.8295    37.6870

RVM: 0.000
Bytes written to file: 109770 (87.816 kbps)
```

47*3202

```
SUMMARY -----
      Total Frames |      Bitrate      Y-PSNR      U-PSNR      V-PSNR      YUV-PSNR
           300    a         151.6184      40.0526      43.6652      44.7549      40.6475

I Slices-----
      Total Frames |      Bitrate      Y-PSNR      U-PSNR      V-PSNR      YUV-PSNR
           10    i         1207.9920      42.6253      44.5712      45.9262      43.0275

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

B Slices-----
      Total Frames |      Bitrate      Y-PSNR      U-PSNR      V-PSNR      YUV-PSNR
           290    b         115.1917      39.9638      43.6340      44.7145      40.5848

RVM: 0.000
Bytes written to file: 189523 (151.618 kbps)
```

67*3202

```
SUMMARY -----
      Total Frames |   Bitrate   Y-PSNR   U-PSNR   V-PSNR   YUV-PSNR
          300    a      215.6432   41.9871   44.9656   46.0092   42.5417

I Slices-----
      Total Frames |   Bitrate   Y-PSNR   U-PSNR   V-PSNR   YUV-PSNR
          10    i      1402.1040   44.0308   45.6765   46.8995   44.3347

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      174.7308   41.9166   44.9411   45.9785   42.4913

RVM: 0.000
Bytes written to file: 269554 (215.643 kbps)
```

87*3202

```
SUMMARY -----
      Total Frames |   Bitrate   Y-PSNR   U-PSNR   V-PSNR   YUV-PSNR
          300    a      279.7528   43.4708   45.9462   47.0437   43.9595

I Slices-----
      Total Frames |   Bitrate   Y-PSNR   U-PSNR   V-PSNR   YUV-PSNR
          10    i      1557.0480   45.0896   46.3732   47.6533   45.3677

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      235.7081   43.4150   45.9315   47.0227   43.9183

RVM: 0.000
Bytes written to file: 349691 (279.753 kbps)
```

10)

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BD_PSNR for IDR_PPP_vs_IDR_BPBPB: 0.435948
BD_RATE for IDR_PPP_vs_IDR_BPBPB: -8.05306
BD_PSNR for IDR_PPP_vs_LOWDELAY: 2.22258
BD_RATE for IDR_PPP_vs_LOWDELAY: -34.0148
BD_PSNR for IDR_PPP_vs_RANDOMACCESS: 2.39873
BD_RATE for IDR_PPP_vs_RANDOMACCESS: -36.1776
```

Οι τέσσερις τρόποι συμπίεσης κατά αύξουσα σειρά:

IDR PPPPPP. . . .

IDR BPBPBP. . . .

Low delay

Random access