

# Video Codecs Comparison

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## Part 4: Visual Comparison

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**9 testing sequences!**

**11 days (260 hours) total compression time!**

**33 tested codecs!**

**2430 resulting sequences!**

May 2003

CS MSU Graphics&Media Lab

Video Group

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

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# Video Codecs Comparison

## Part 4: Visual Comparison

15 May 2003

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**Bbbc3di 1494 kbps – frame 64**

Divx 3.1 fm, Divx 4.02, Divx 5.02, Xvid 2.1, Microsoft v3



Picture 1. Original



Picture 2. Divx 3.1 fm(+9%)



Picture 3. Div 4.02(+7%)



Picture 4. Divx 5.02

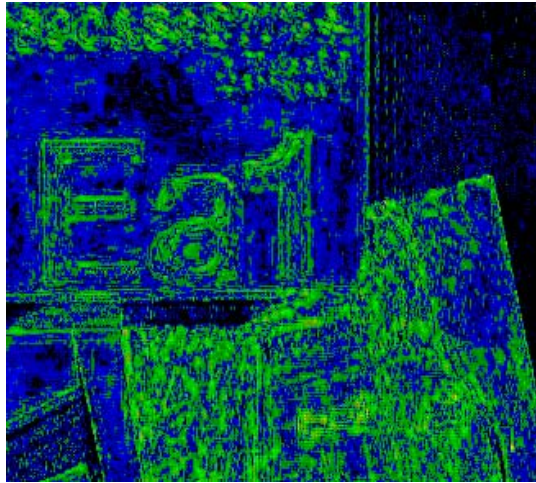


Picture 5. Xvid 2.1(+2%)

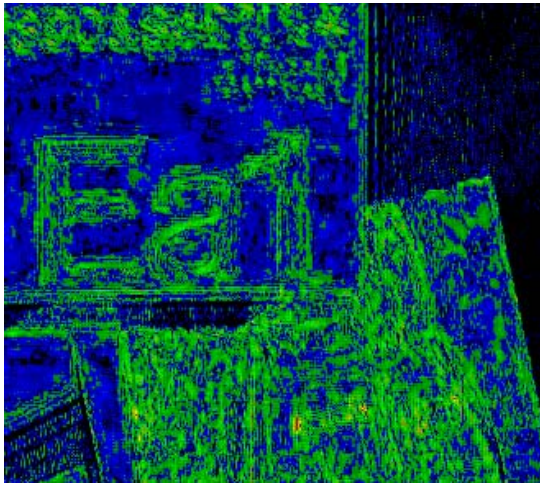


Picture 6. Microsoft v3 (+5%)

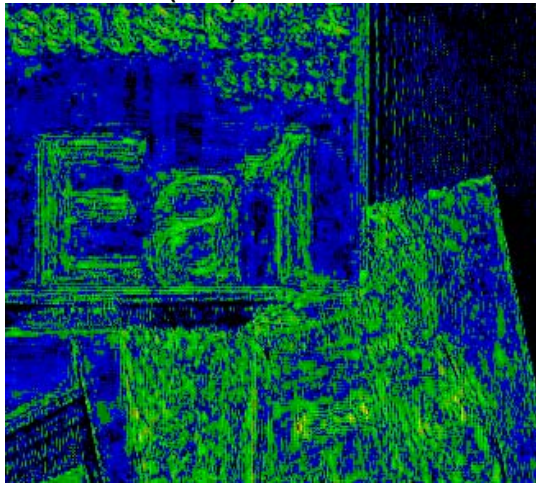




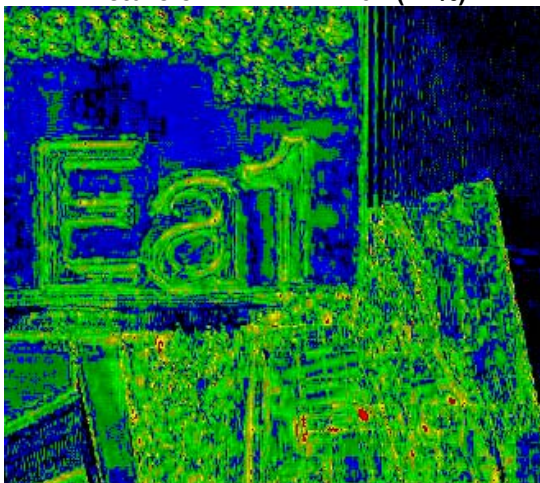
Picture 7. Divx 3.1 fm (+9%)



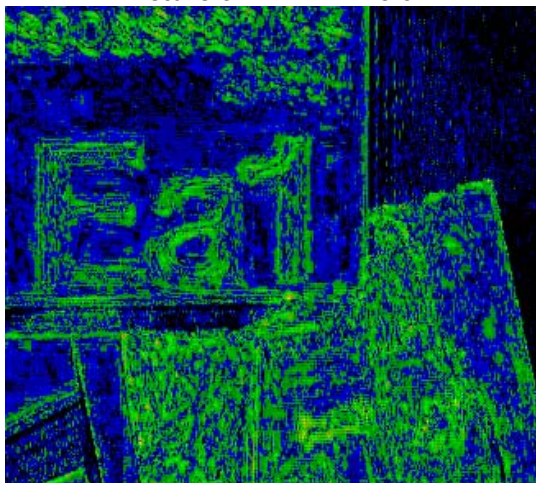
Picture 8. Divx 4.02 (+7%)



Picture 9. Divx 5.02



Picture 10. Xvid 2.1 (+2%)



Picture 11. Microsoft v3 (+5%)

Conclusions:

- Quality of the frame after Xvid 2.1 is noticeably worse than the others.
- Quality of the frame after Divx 4.02 is also not very good; especially well it is seen on the fragment with the locomotive.
- Superiority of Microsoft v3 and Divx 3.1 fm is well seen on the fragment with the "Ea" letters (above them), but at the same time these codecs exceed the bitrate while Divx 5.02 does not do it.

**Battle 1225 kbps – frame 135**

3IVX D4, Divx 3.1 fm, Divx 3.1 Im, Divx 4.02, Divx 5.02



Picture 12. Original



Picture 13. 3IVX D4 (+1%)



Picture 14. Divx 3.1 fm



Picture 15. Divx 3.1 Im (+2%)

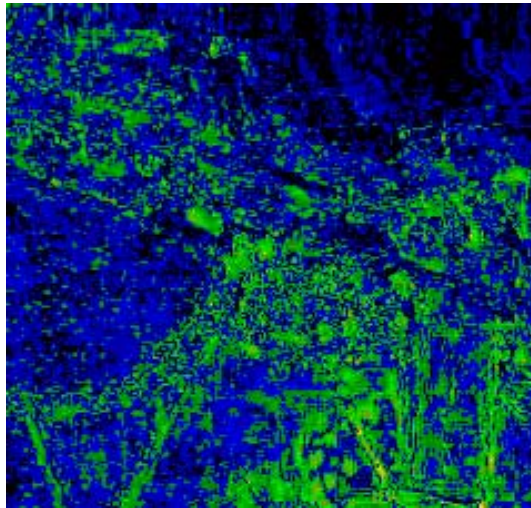


Picture 16. Divx 4.02 (+4%)

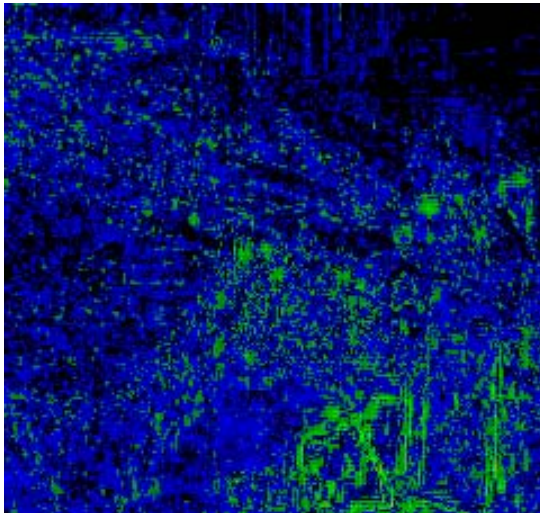


Picture 17. Divx 5.02 (+3%)

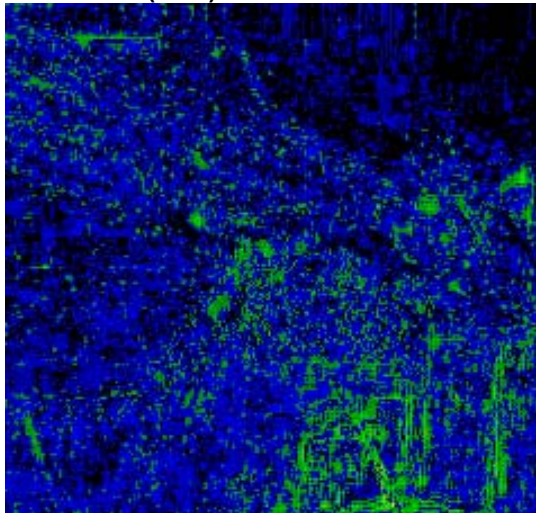




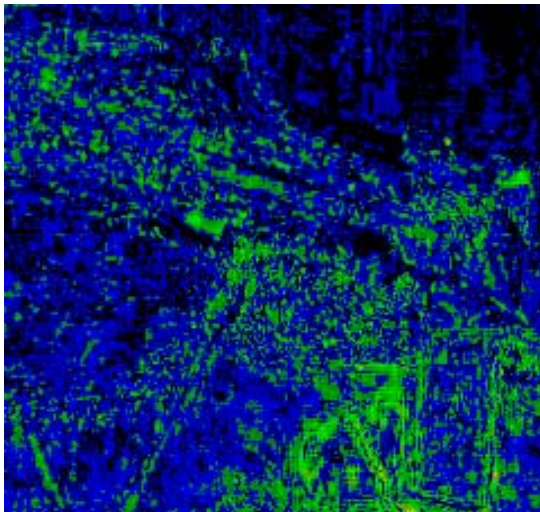
**Picture 18. 3IVX D4 (+1%)**



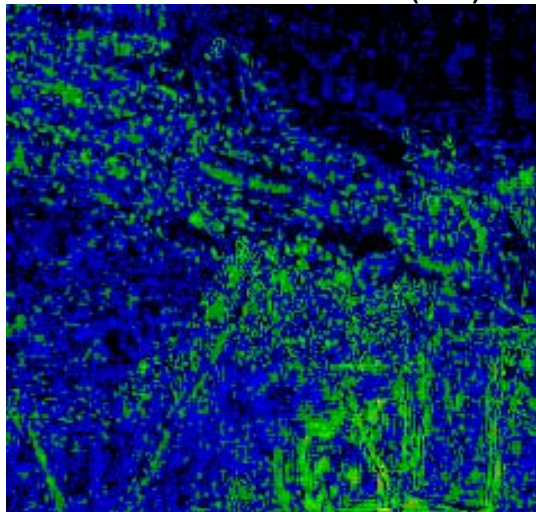
**Picture 19. Divx 3.1 fm**



**Picture 20. Divx 3.1 lm (+2%)**



**Picture 21. Divx 4.02 (+4%)**



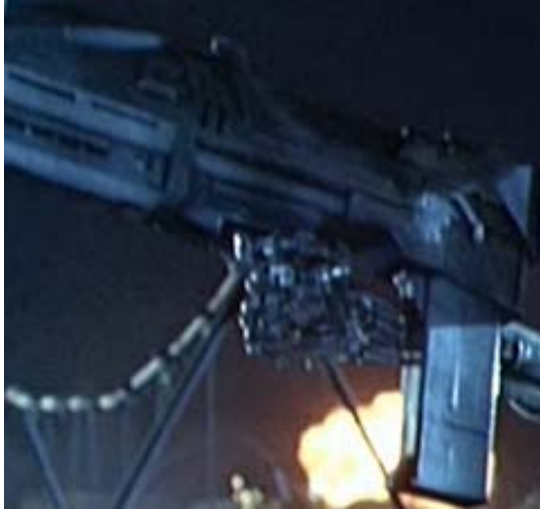
**Picture 22. Divx 5.02 (+3%)**

Conclusions:

- It's easy to see that the frame after Divx 3.1 has the best quality. Its superiority is well seen on the fragment with the weapon barrel.
- Divx 3.1 fm works best in the corners.

**Battle 743 kbps – frame 135**

VSS H.264, Microsoft v3, Xvid 2.1, Divx 3.1 fm, Divx 5.02



Picture 23. Original



Picture 24. VSS H.264



Picture 25. Microsoft v3 (+3%)



Picture 26. Xvid 2.1

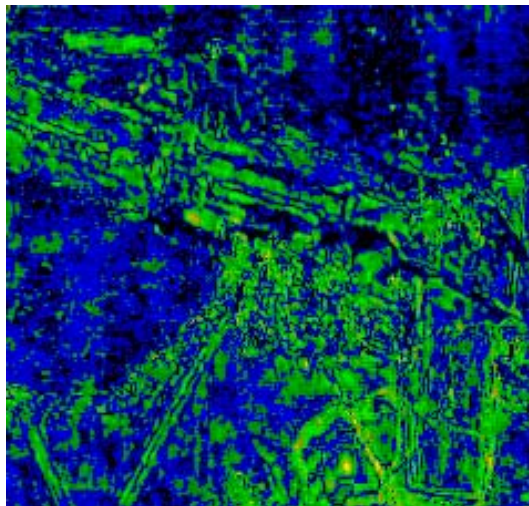


Picture 27. Divx 3.1 fm (+3%)

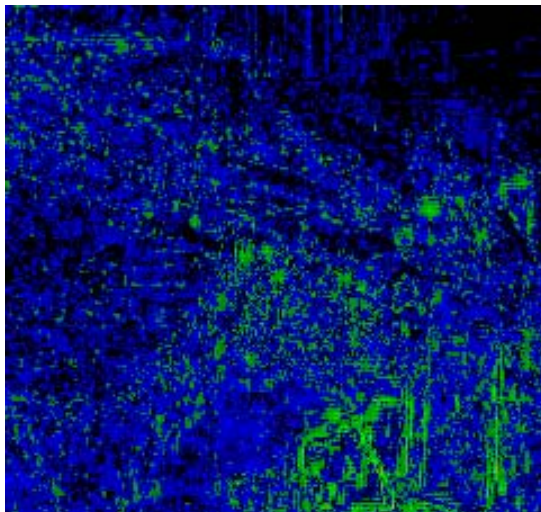


Picture 28. Divx 5.02 (+9%)

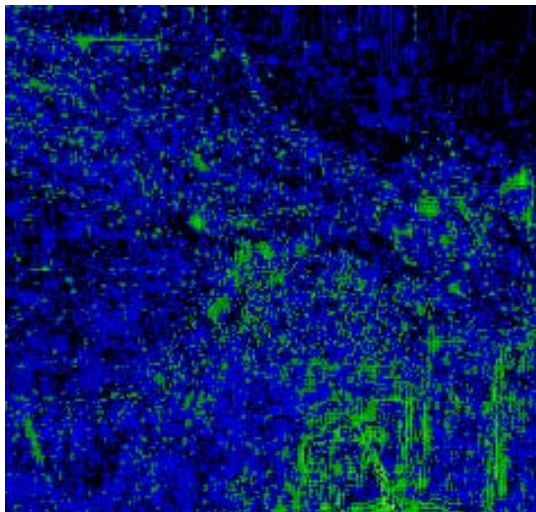




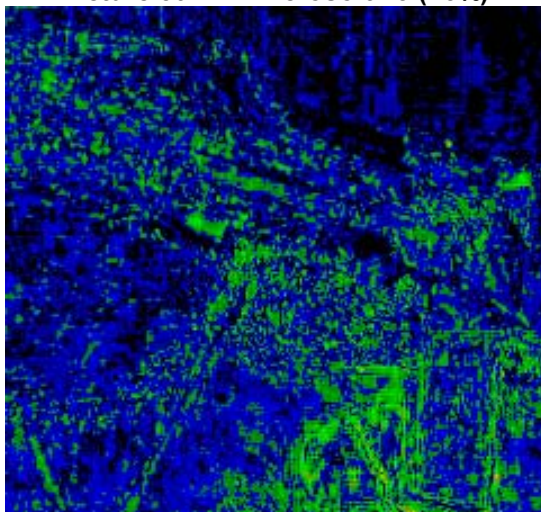
**Picture 29. VSS H.264**



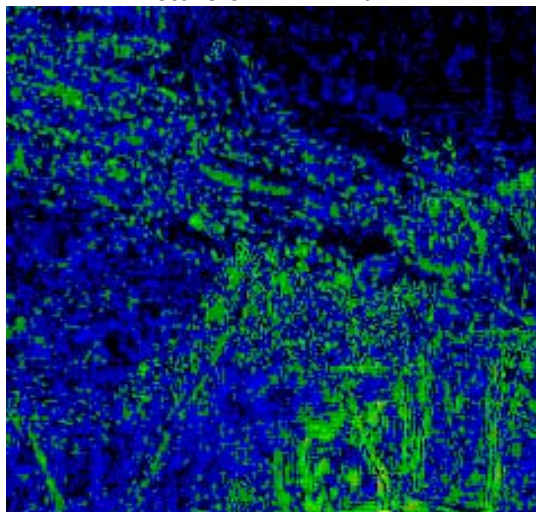
**Picture 30. Microsoft v3 (+3%)**



**Picture 31. Xvid 2.1**



**Picture 32. Divx 3.1 fm (+3%)**



**Picture 33. Divx 5.02 (+9%)**



**Battle 941 kbps – frame 135**

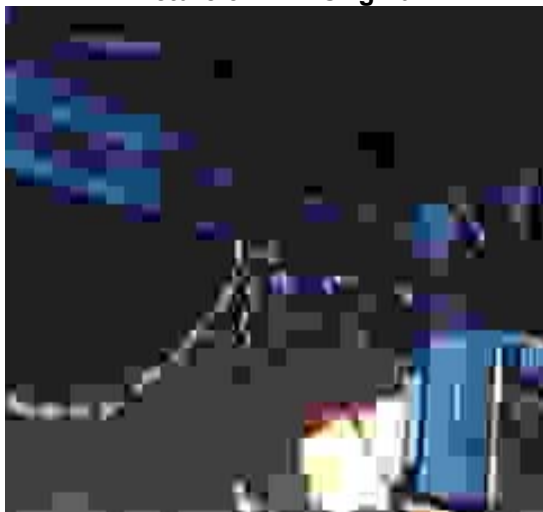
MM JPEG2000, MM JPEG v2, Microsoft v3, Divx 3.1 fm, Visicron J



Picture 34. Original



Picture 35. MM JPEG2000 (+4%)



Picture 36. MM JPEG v2



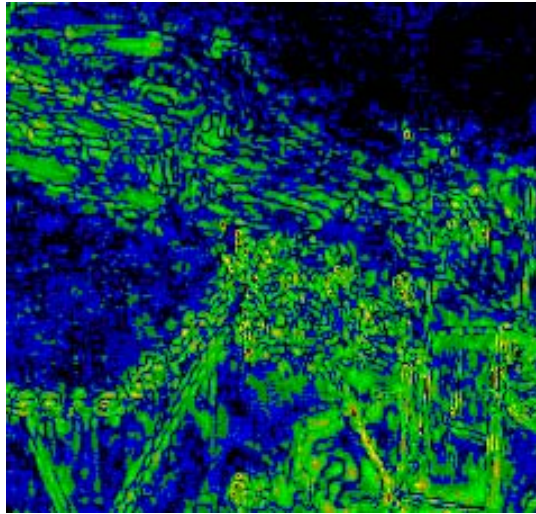
Picture 37. Microsoft v3 (+8%)



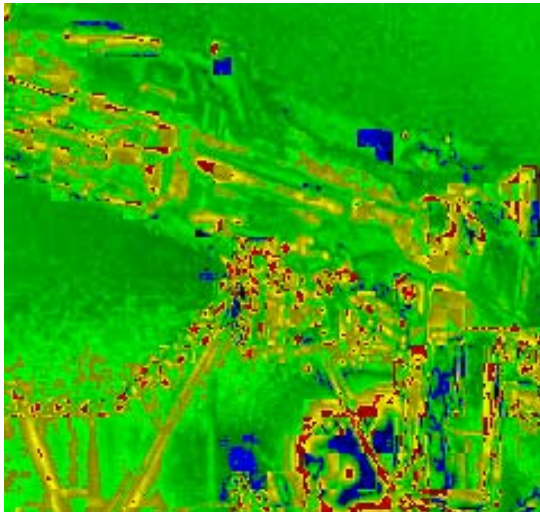
Picture 38. Divx 3.1 fm (+8%)



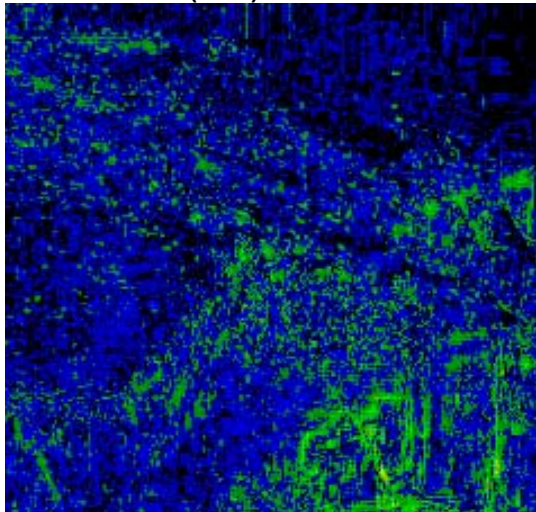
Picture 39. Visicron J (+7%)



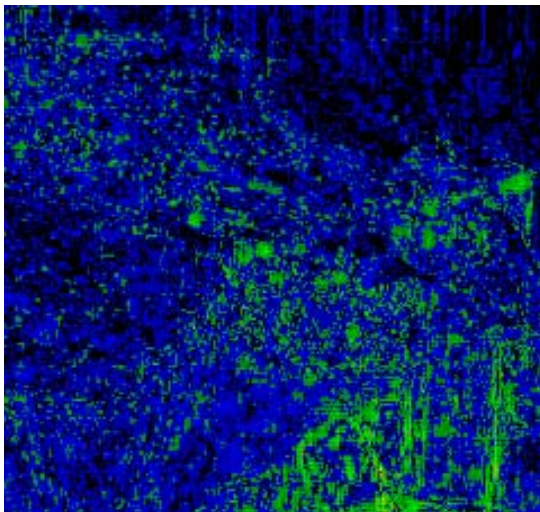
**Picture 40. MM JPEG2000 (+4%)**



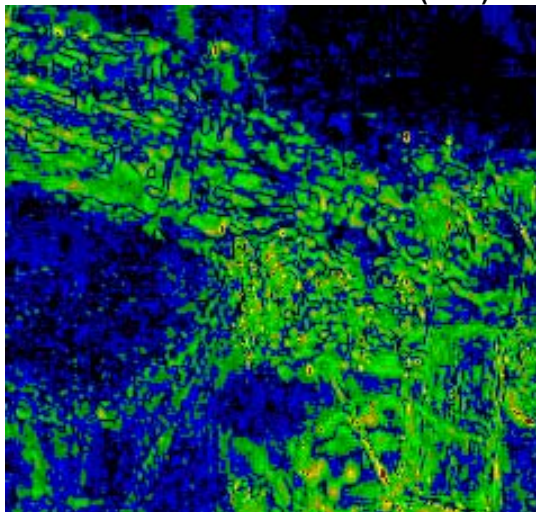
**Picture 41. MM JPEG v2**



**Picture 42. Microsoft v3 (+8%)**



**Picture 43. Divx 3.1 fm (+8%)**



**Picture 44. Visicron J (+7%)**

Conclusions:

- Loss of quality after almost all JPEG codecs can be seen by sight.
- Quality of the frames after Divx 3.1 fm and Microsoft v3 is almost the same; however there is some difference in the upper and bottom left corners.



**Tensdi 2576 kbps – frame 205**

Divx 3.1 fm, Divx 3.1 Im, Divx 4.02, Divx 5.02, 3IVX D4



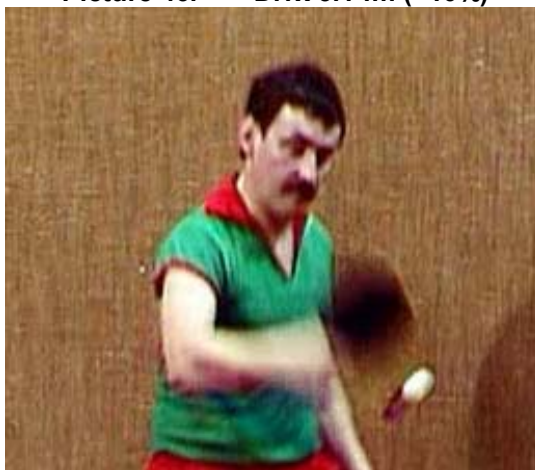
Picture 45. Original



Picture 46. Divx 3.1 fm (+10%)



Picture 47. Divx 3.1 Im (+10%)



Picture 48. Divx 4.02

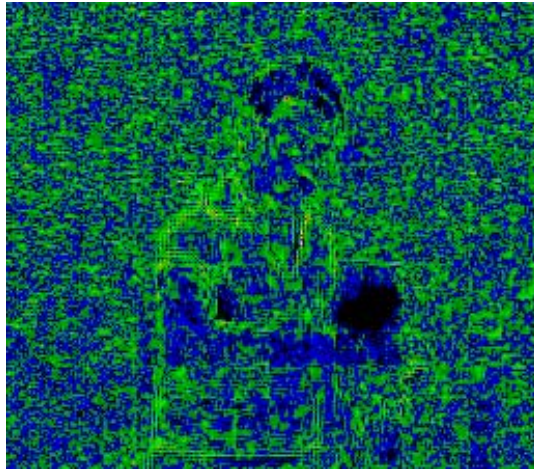


Picture 49. Divx 5.02

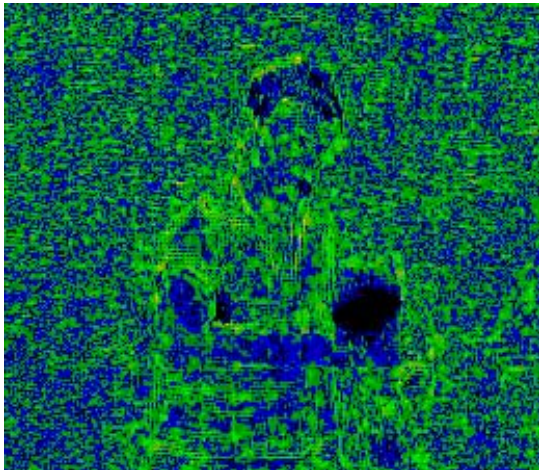


Picture 50. 3IVX D4 (+15%)

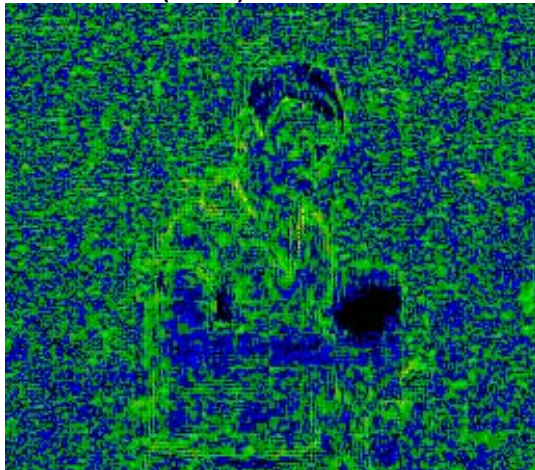




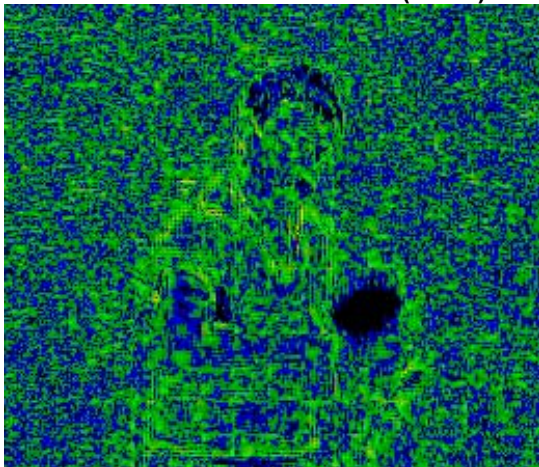
**Picture 51. Divx 3.1 fm (+10%)**



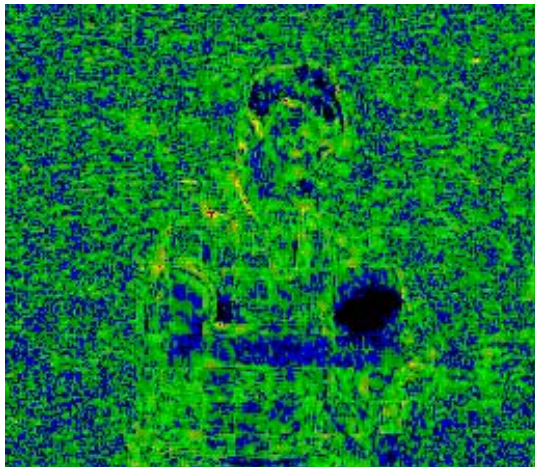
**Picture 52. Divx 3.1 Im (+10%)**



**Picture 53. Divx 4.02**



**Picture 54. Divx 5.02**



**Picture 55. 3IVX D4 (+15%)**

Conclusions:

- Loss of quality after 3IVX D4 is well seen: there are increases of brightness and smoothness in the background.
- Quality of this frame after other codecs is approximately the same; there is just a small difference above the racket and to the left of it.

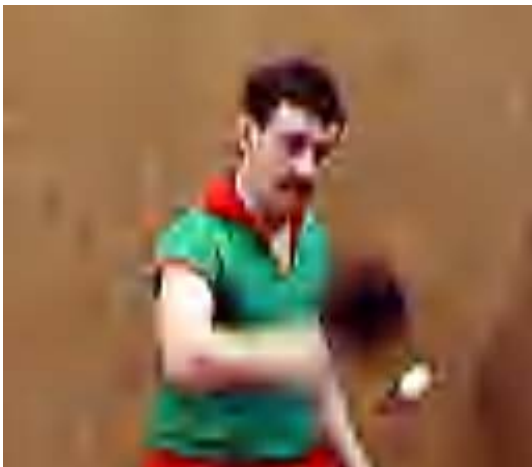


**Tensdi 1264 kbps – frame 205**

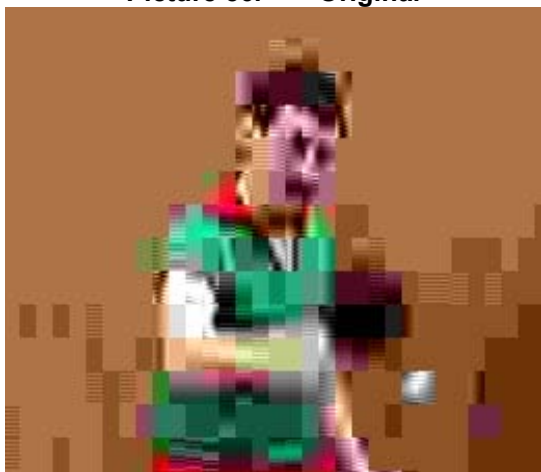
Microsoft v3, MMJPEG2000, MMJPEG v2, Xvid 2.1, Visicron J-mode



Picture 56. Original



Picture 57. MM JPEG2000 (+7%)



Picture 58. JPEG v2 (+138%)



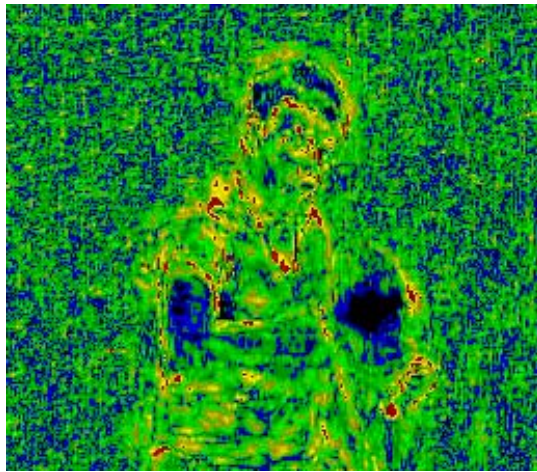
Picture 59. Microsoft v3 (+6%)



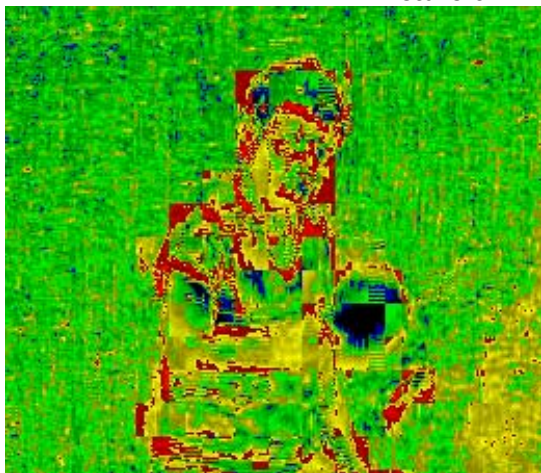
Picture 60. Xvid 2.1



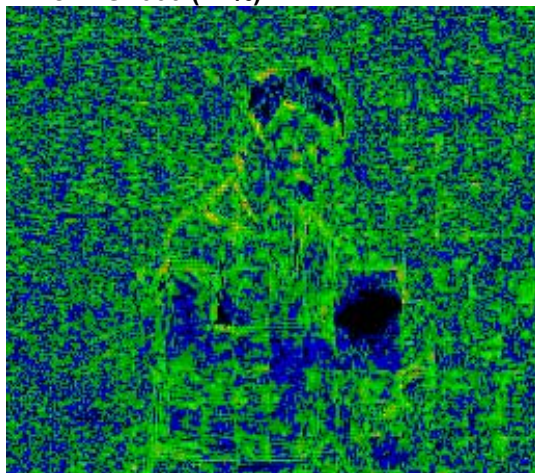
Picture 61. Visicron J-mode (+8%)



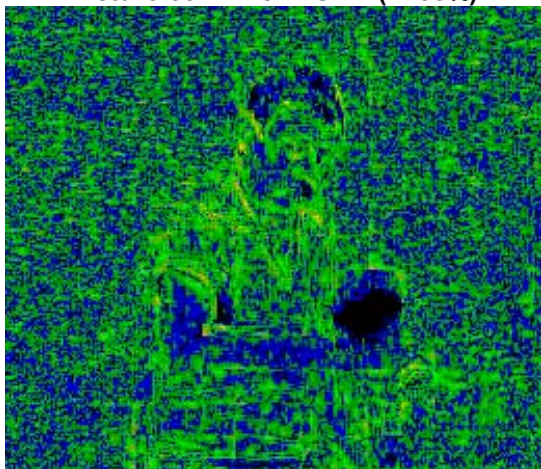
Picture 62. MM JPEG2000 (+7%)



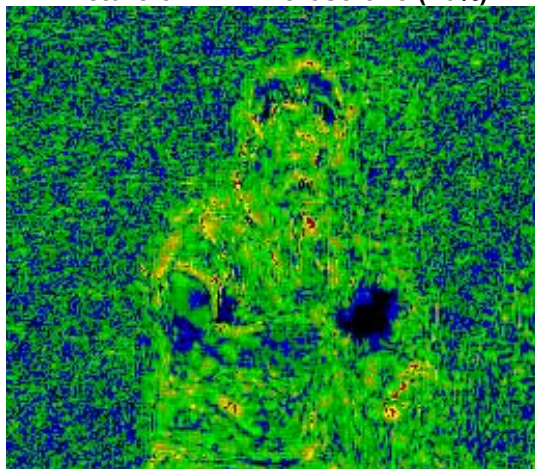
Picture 63. JPEG v2 (+138%)



Picture 64. Microsoft v3 (+6%)



Picture 65. Xvid 2.1  
Conclusions:



Picture 66. Visicron J-mode (+8%)

- Visicron J has some superiority among the other JPEG codecs.
- Microsoft v3 and Xvid 2.1 keep the quality almost in the same way.



**Bankomatdi 1430 kbps – frame 239**

Ligos 4.5, Ligos 5.11, VP 3.1, Motion Wavelets, VSS 1.2



Picture 67. Original



Picture 68. Ligos 4.5 (+9%)



Picture 69. Ligos 5.11 (+8%)



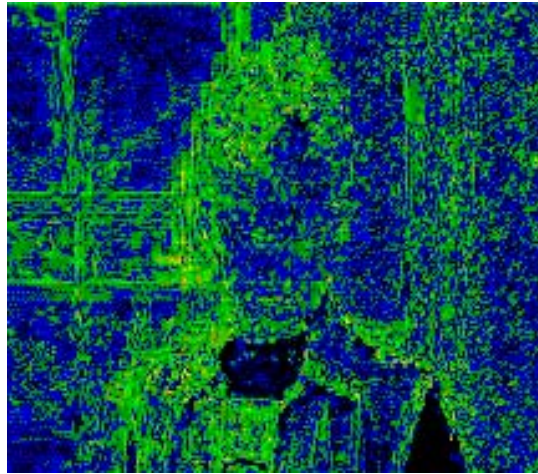
Picture 70. VP 3.1 (+5%)



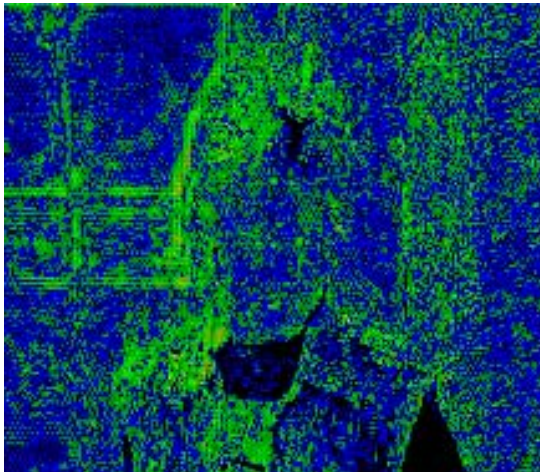
Picture 71. Motion Wavelets (+5%)



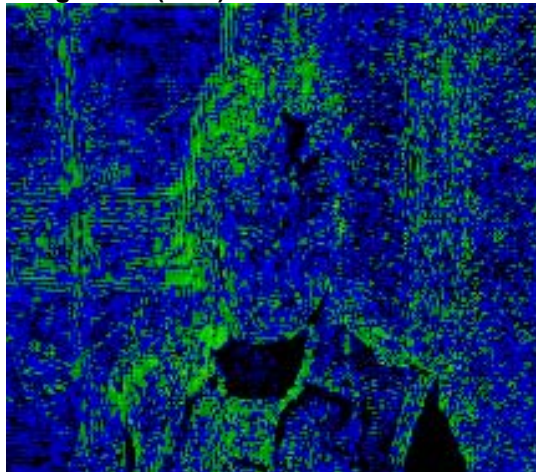
Picture 72. VSS 1.2



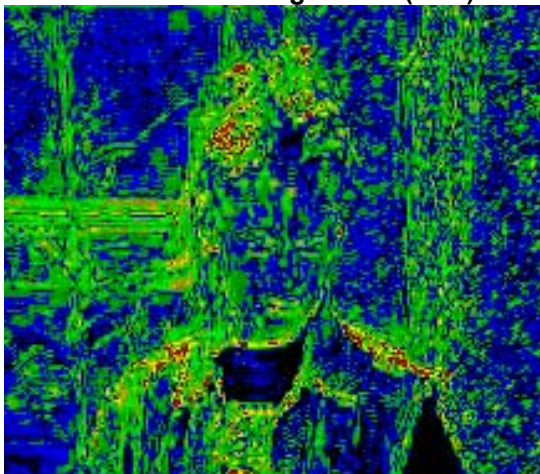
Picture 73. Ligos 4.5 (+9%)



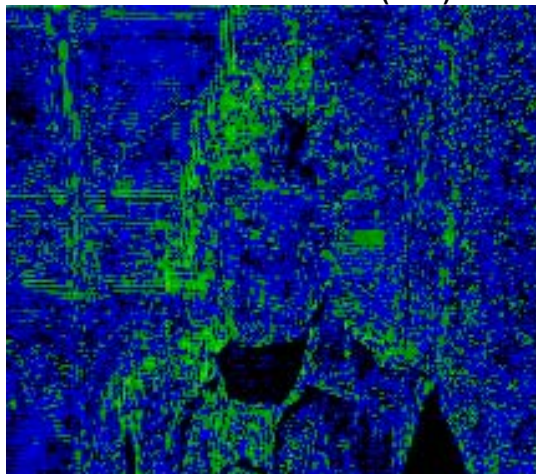
Picture 74. Ligos 5.11 (+8%)



Picture 75. VP 3.1 (+5%)



Picture 76. Motion Wavelets (+5%)



Picture 77. VSS 1.2

Conclusions:

- Turning of the head represents motion in this frame, that's why there is some loss of quality on the left part of the face.
- It's easy to see that VP3.1 and VSS1.2 have the least losses of quality but VP3.1 has a higher bitrate.



**Bus 578 kbps – frame 81**

Ligos 4.5, Ligos 5.11, VP 3.1, Motion Wavelets, VSS 1.2



Picture 78. Original



Picture 79. Ligos 4.5 (+9%)



Picture 80. Ligos 5.11 (+8%)



Picture 81. VP 3.1 (+12%)

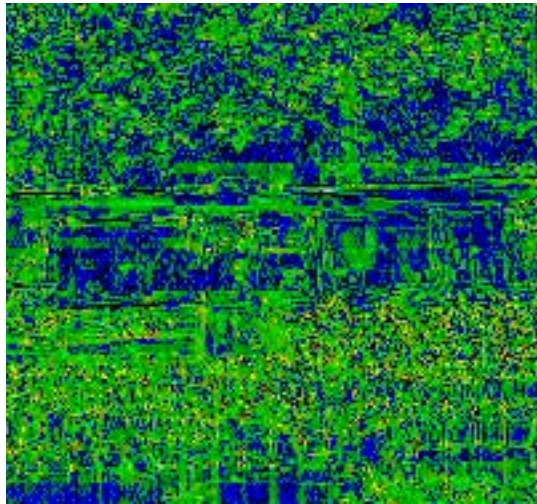


Picture 82. Motion Wavelets (+6%)

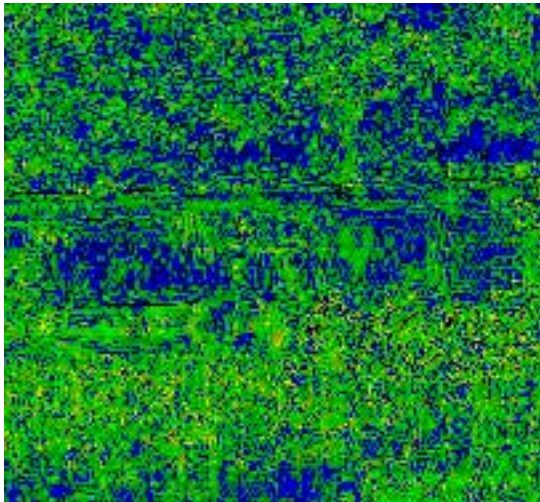


Picture 83. VSS 1.2

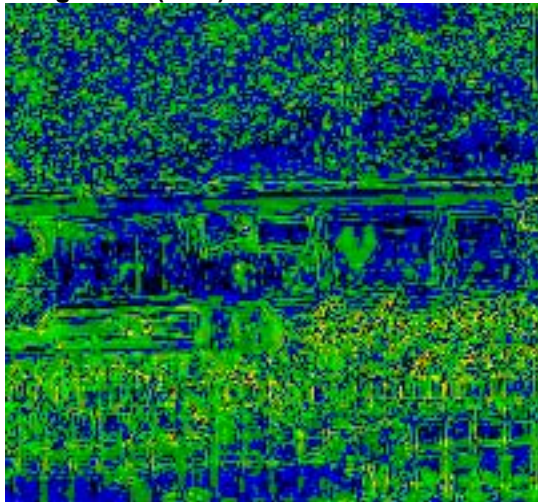




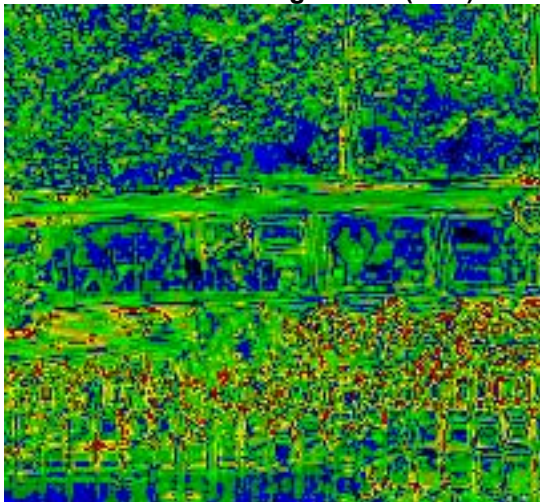
**Picture 84. Ligos 4.5 (+9%)**



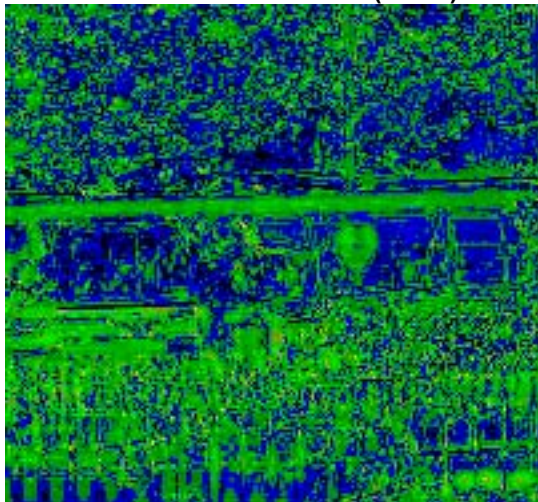
**Picture 85. Ligos 5.11 (+8%)**



**Picture 86. VP 3.1 (+12%)**



**Picture 87. Motion Wavelets (+6%)**



**Picture 88. VSS 1.2**

This frame is good for codecs' visual comparison. Conclusions:

- Motion Wavelets and Ligos 4.5 have big losses of the background; the trees almost turn into one spot.
- Frame after Ligos 5.11 has the Gibbs effect.
- Quality of VP 3.1 and VSS 1.2 is rather good.



**Nddp7di 1731 kbps – frame 32**

Ligos 4.5, Ligos 5.11, VP 3.1, 3IVX D4, VSS 1.2



Picture 89. Original



Picture 90. Ligos 4.5 (+9%)



Picture 91. Ligos 5.11 (+7%)



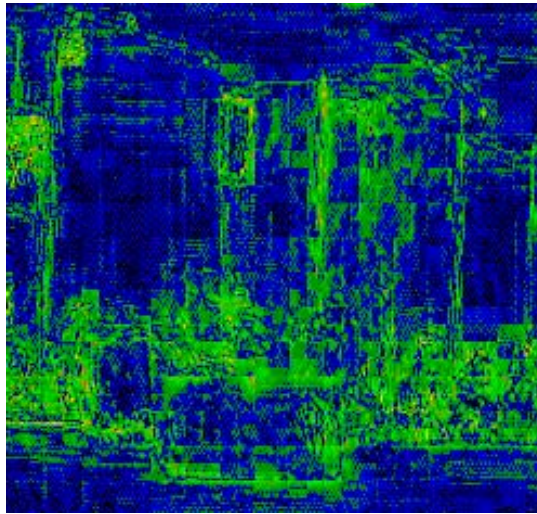
Picture 92. VP 3.1



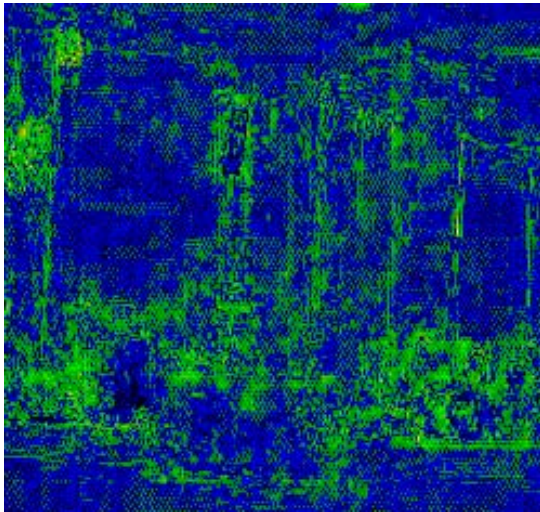
Picture 93. 3IVX D4 (+1%)



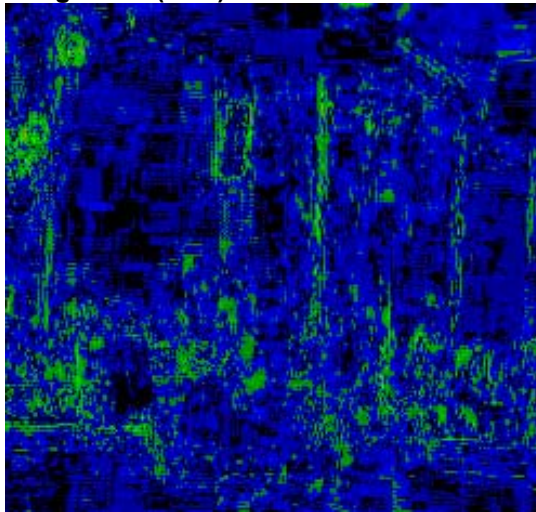
Picture 94. VSS 1.2 (+5%)



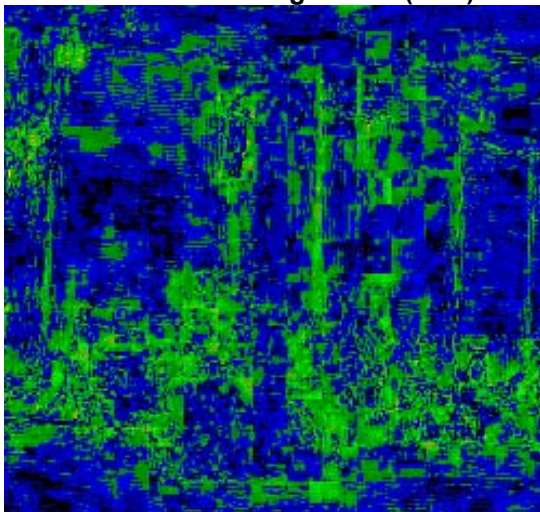
**Picture 95. Ligos 4.5 (+9%)**



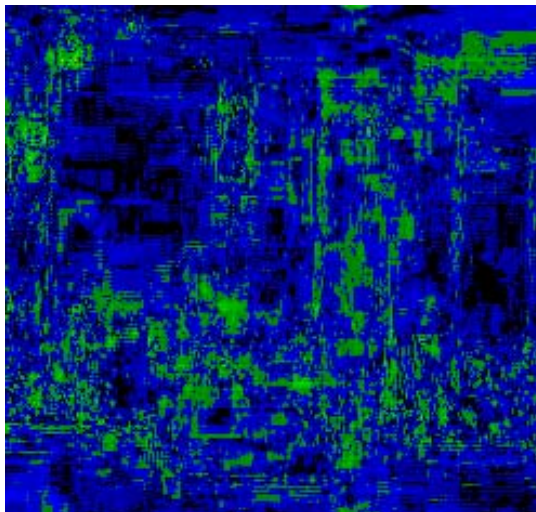
**Picture 96. Ligos 5.11 (+7%)**



**Picture 97. VP 3.1**



**Picture 98. 3IVX D4 (+1%)**



**Picture 99. VSS 1.2 (+5%)**

Conclusions:

- Frames after Ligos 4.5 and 3IVX D4 have the clearly seen block effect.
- Frame after Ligos 5.11 has the Gibbs effect.
- The difference between VSS 1.2 and VP 3.1 is well seen in the bottom left and upper right corners.



**Foreman 534 kbps – frame 128**

Ligos 3.2, Ligos 4.5, Ligos 5.11, Intel I.263, VSS 1.2



Picture 100. Original



Picture 101. Ligos 3.2



Picture 102. Ligos 4.5 (+11%)



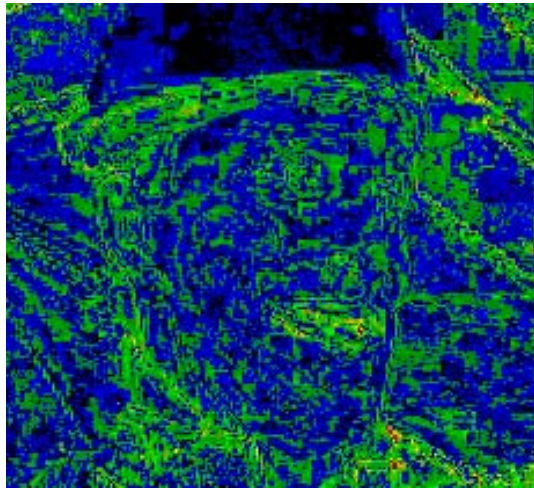
Picture 103. Ligos 5.11 (+10%)



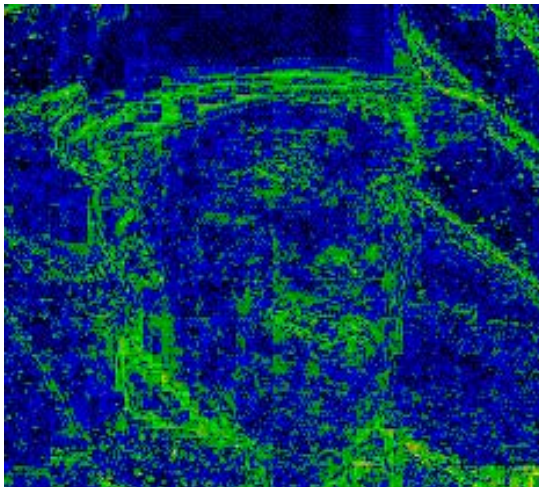
Picture 104. Intel I.263 (+4%)



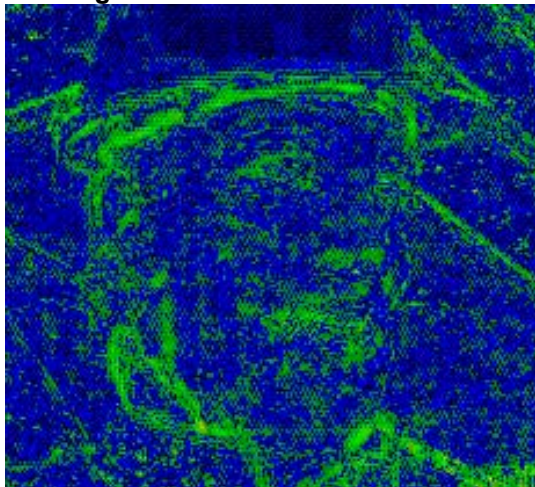
Picture 105. VSS 1.2 (+6%)



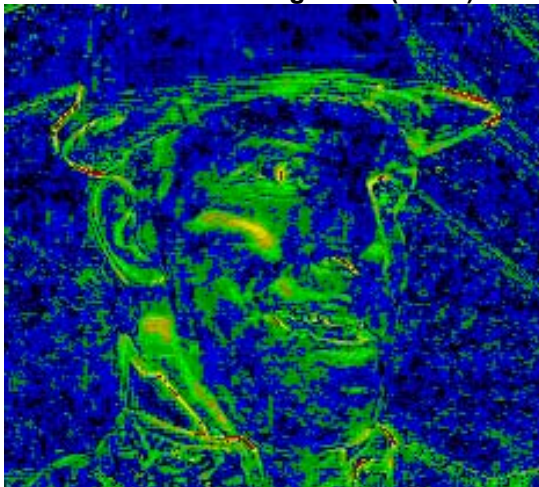
Picture 106. Ligos 3.2



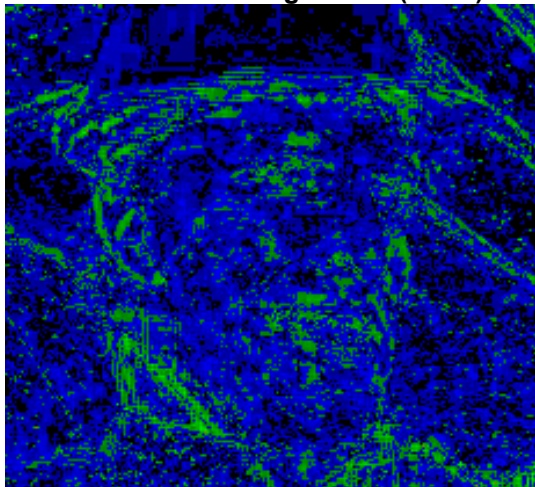
Picture 107. Ligos 4.5 (+11%)



Picture 108. Ligos 5.11 (+10%)



Picture 109. Intel I.263 (+4%)



Picture 110. VSS 1.2 (+6%)

Conclusions:

- Despite the fact that the frame after Intel I.263 has a worse metric than the frame after Ligos 3.2, the former one is better by sight, because the latter greatly changes colors.
- Frame after Ligos 4.5 has the block and the Gibbs effects. To a lesser degree this also can be said concerning Ligos 5.11.
- Frame after VSS 1.2 is the best one considering both metric and visual impression.



**Bus 194 kbps – frame 81**

Visicron J, Intel I.263, Ligos 4.5, Ligos 5.11, VSS 1.2



Picture 111. Original



Picture 112. Visicron J (+7%)



Picture 113. Intel I.263



Picture 114. Ligos 4.5 (+18%)

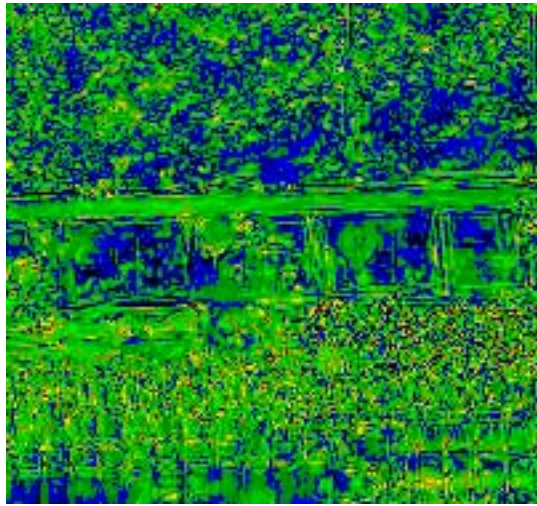


Picture 115. Ligos 5.11 (+18%)

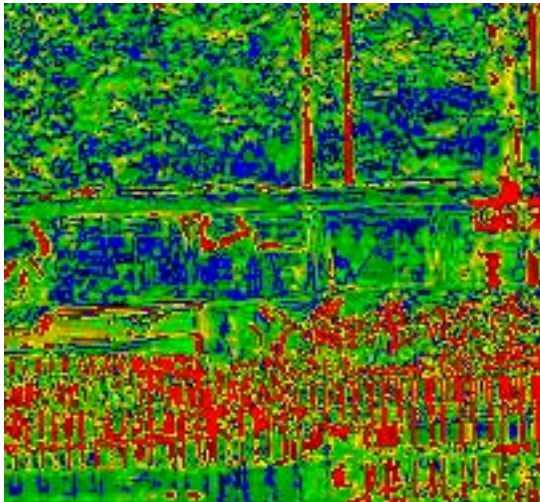


Picture 116. VSS 1.2 (+24%)

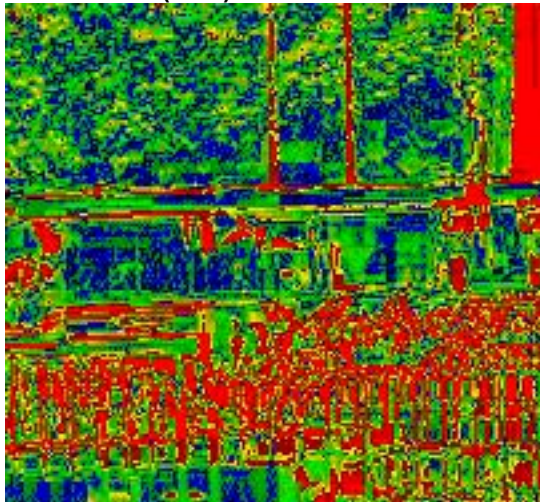




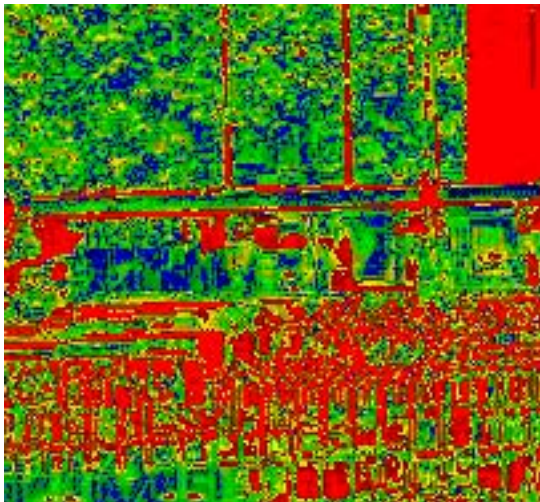
**Picture 117. Visicron J (+7%)**



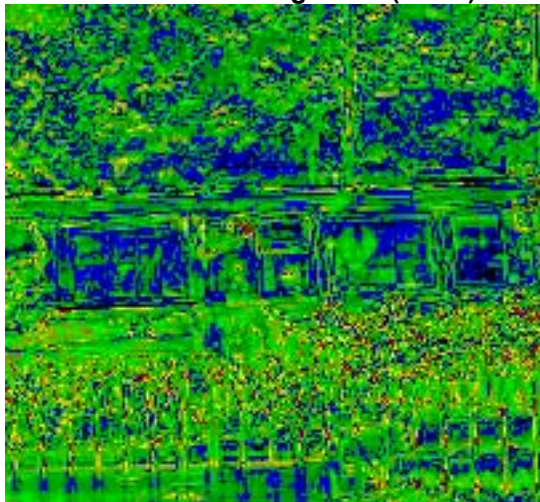
**Picture 118. Intel I.263**



**Picture 119. Ligos 4.5 (+18%)**



**Picture 120. Ligos 5.11 (+18%)**



**Picture 121. VSS 1.2 (+24%)**

Conclusions:

- This frame is a drop frame for all the codecs except for VSS 1.2 and Visicron J. This explains the big difference in PSNR.
- Frames after VSS 1.2 and Visicron J show big losses of quality, which usually happens on low bitrate.



## Outline

Video Codecs Comparison consists of the following sections:

- Part 1: Methodology
- Part 2: PSNR Diagrams For All Video Codecs
- Part 3: Frame-accurate Comparison
- **Part 4: Visual Comparison – *this document***

**NOTE: These files contain only a VERY SMALL PART of the processed and measured data.**

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