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Sent: Friday, September 27, 2002 3:05 AM
To: jvt-experts@mail.imtc.org
Cc: anaka@flab.fujitsu.co.jp
Subject: [jvt-experts] Re: Software for Chroma Vector Shift

Dear Experts,

> I have started the simulation with frame/field adaptivity.
I have complete the simulation of chroma vector shift with frame/field adaptivity.

When the frame/field adaptivity is used, we can get almost the similar gain to the field coding mode.

***** Conditions *****

Except the field/frame condition, simulation conditions are the same as the previous simulation.

*Software: JM3.9a based(already delivered to the experts) *Coding mode: GOP structure, GOP size = 15, I:P:B = 1:4:10
(IBBPBBPBBPBBPBB)(IBBPBBPBBPBBPBB).....
(Considering from the existing system,
this structure is more realistic)

*QP: 40, 26, 32, 28

Sequences: Mobile, Football, Canoa Valsesia, F1 car, Rugby(VCEG-N85r1)

Reference: Set NumberRefereceFrames=1

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Simulation Results

In my previous e-mail, I have mainly reported the gain of the first bottom field in GOP, where only the reference with difference parity is available.

In this simulaiton, the gain of the first frame in GOP is mesured instead, because it is not pssible to evaluate the field PSNR itself.

1) Intra Frame

This is the gain of the first frame in GOP
(I-frame, or Top I-field and Bottom P-field)

== BDSNR gain ==
Y U V
mobile 0.04 0.34 0.44
Football 0.01 0.12 0.05
CanoaValsesia 0.02 0.13 0.18
F1Car 0.01 0.12 0.22
Rugby 0.01 0.08 0.08
Average 0.018 0.158 0.194

The gain of chroma in a Frame is up to 0.34-0.44dB,
and avarage is 0.16 - 0.19 dB.

Heare, I would like to emphasize that the gain can be

derived from the Bottom Field only.

I have also measured the ratio of Field Coding mode in the first frame of GOP.

== Ratio of Field mode ==		
	FCD	Chroma Vector Shift
mobile	81.94%	95.83%
Football	100.00%	100.00%
CanoaValsesia	100.00%	100.00%
F1Car	100.00%	100.00%
Rugby	100.00%	100.00%

From this result, the most frames are coded with field coding mode. Except mobile&calendar, the ratio of field coding mode is 100%!

In mobile&Calendar, the ratio of Field coding mode in FCD is about 82%. If chroma vector shift is enabled, the ratio increases up to 96%!!

This means that chroma vector shift can improve the coding efficiency of Field coding mode effectively, then the chance to use the filed mode is increased.

From this,

- In most cases, field coding mode is more effective in the first frame of GOP.
- In such fields, chroma vector shift is important, and can improve the coding efficiency of the first frame of GOP.

2)Overall PSNR in Field/Frame Adaptivity

BDSNR gain				
	Y	U	V	
Mobile&Calendar	0.03	0.17	0.21	
Football	0.01	0.07	0.03	
Canoa Valsesia	0.00	0.06	0.06	
F1 car	0.00	0.07	0.11	
Rugby	0.01	0.03	0.03	
Average	0.01	0.08	0.088	

Overall peformance(I,P,B) is very similar to the field coding mode. The gain is up to 0.17-0.21dB, and 0.08 - 0.088dB in average.

(In field mode, up to 0.19-0.23dB, and 0.086-0.09dB in average).

Never loss.

* Conclusion

In H.264, the accuracy of chroma vector is 1/8 pel in order to form the complete parallel vector with luma.

However, predictive coding is perfomed between fields

with different parities, the chroma vector is shifted by
+/- 1/4 pel from the ideal vector.

Chroma vector shift can effectively recover the potential
loss of Chroma component.

Best Regards,
Akira Nakagawa

P.S.

I couldn't have time to summarize the result.

Please excuse me for the late report.

> I will report the result in a few days(maybe it will take a few days).

The use of the jvt-experts list is intended only for the video coding standardization work conducted by the Joint Video Team (JVT) of ISO/IEC JTC1/SC29/WG11 (MPEG) and ITU-T SG16 Q.6 (VCEG).

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