CCITT SGXV
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Experts Group for ATM Video Coding

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Source: UK
Title: **Spatio-temporal weighted compatible coding core experiment**
Purpose: **Information**

Introduction

This experiment compared a new technique of spatio-temporal weighting compatible coding with the present compatible coding technique documented in TM2.

The present coding technique uses the prediction from the locally decoded base picture. This prediction is switchable on a field by field basis and is signalled by a two bit code.

The new spatio-temporal weighting technique is also switchable on a field by field basis. However this uses selected weightings of the base layer prediction and the top layer prediction. This also is signalled by a two bit code. The weightings are in table 1.

	Field 1		Field 2	
code	base	top	base	top
0 0	1	0	0	1
0 1	0.75	0.25	0.25	0.75
1 0	0.75	0.25	0.5	0.5
1 1	0.5	0.5	0.5	0.5

Table 1: Weightings for Spatio-Temporal core experiment

This weighting table was used for non-intra macroblocks only. For intra macroblocks the compatible prediction was all from the base layer. It can be seen that the present compatible coding technique can be mapped into a similar table, table 2.

	Field 1		Field 2	
code	base	top	base	top
0 0	0	1	0	1
0 1	1	0	0	1
1 0	0	1	1	0
1 1	1	0	1	0

Table 2: equivalent weightings for present compatible coding technique.

Coding Details

The encoder is TM2 with the following prediction modes only:

- Frame/Field adaptive
- Frame based coding
- half pel motion vectors generated from source pictures
- N=12, M=3
- MPEG-1 bit rate 1.5Mbits/s, total bit rate 4Mbits/s
- Compatible prediction from the MPEG-1 locally decoded pictures.

Results

Two simulations each have been performed on Flower Garden, Mobile and Calendar and Table Tennis:

- 4Mbits/s Compatible coding (1.5Mbits SIF + 2.5Mbits CCIR601),
- 4Mbits/s Compatible coding (1.5Mbits SIF + 2.5Mbits CCIR601) with spatio-temporal compatible prediction mode.

The results are in tables 3 and 4.

Conclusions

The new spatio-temporal weighting shows an improvement over the existing compatible coding technique. The main improvement is in the P pictures and ranges from 0.16dB to 0.19dB. The difference in picture quality is small.

The use of a weighting code table provides more flexibility, as shown in tables 1 and 2. The weighting code table should remain. The contents of the weighting table can be left programmable as an encoder option.

	Compatible Weightings		Pic Type	Flower	Table	Calendar
	Field 1	Field 2				
SNR for Y			I P B	29.02dB 27.98dB 27.69dB	32.14dB 31.49dB 31.41dB	27.38dB 27.04dB 27.09dB
Quantizer			I P B	11.99 11.71 16.74	7.28 7.25 10.26	12.39 12.21 17.07
no compatibility	0	0	I B P	26 503 1059	84 745 983	45 1091 1129
field 1 compatible	1	0	I B P	0 927 308	0 580 243	0 306 80
field 2 compatible	0	1	I B P	0 25 8	0 25 7	0 27 8
all compatible	1	1	I B P	1557 98 18	1499 197 14	1538 147 22

Table 3: TM2 compatible prediction mode results for 124 pictures (11 I, 31 P, 82 B)

	Compatible Weightings		Pic Type	Flower	Table	Calendar
	Field 1	Field 2				
SNR for Y			I P B	29.08dB (+0.06) 28.17dB (+0.19) 27.76dB (+0.07)	32.19dB (+0.05) 31.61dB (+0.12) 31.48dB (+0.07)	27.39dB (+0.01) 27.20dB (+0.16) 27.13dB (+0.04)
Quantizer			I P B	11.83 11.57 16.63	7.20 7.36 10.26	12.34 12.23 17.15
no compatibility	0	0	I B P	26 364 959	84 551 856	45 865 1051
	1	0	I B P	0 440 178	0 240 145	0 84 26
	0.75	0.25	I B P	0 467 150	0 289 122	0 256 60
	0.75	0.5	I B P	0 98 36	0 146 41	0 90 36
	0.5	0.5	I B P	0 155 76	0 213 84	0 214 67
all compatible	1	1	I B P	1557 36 1	1499 108 2	1538 66 4

Table4: New compatible prediction mode results for 124 pictures (11 I, 31 P, 82 B)