CCITT SGXV
Working Party XV/1
Experts Group for ATM Video Coding

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SOURCE: Japan
TITLE: Simulation result of compatibility core experiment
PURPOSE: Proposal

1. Introduction

The same comparison between two compatible coding methods was carried out within the framework of TM2 core experiment, as was described in AVC-277 (MPEG 92/257).
One of the compared methods was prediction from the base layer and the other was prediction for the prediction error. The simulation parameters were as follows.

frame structure, M=3, N=15
prediction mode : Fr / Fi
sequences; Football (new), Flower Garden (2 seconds)
MPEG1 layer : SM3 1.15 Mbps Total bit rate : 4 Mbps
rate control : TM2 based (including step 3)

Motion vector search range
base layer ± 7.5 pels/frame (Flower Garden), ± 15 pels/frame (Football)
upper layer ± 15 pels/frame (Flower Garden), ± 30 pels/frame (Football)

mode selection;
compared the power of prediction error for all possible prediction modes simultaneously, and selected the one which gave the smallest error

2. Simulation result

The simulation result is shown in Table 1. The table shows the SNR and the percentage of compatible mode selection for simulcast, prediction from the base layer mode, prediction for the prediction error mode (described in TM2 Appendix G), and modified prediction for the prediction error mode. The last one is the same method as was described in the previous document as a new method, in which the prediction error is re-made in the base layer according to the prediction mode selected in the upper layer.
The SNR and the percentage of compatible mode selection is shown in the form of;

SNR for a whole sequence (SNR for I pictures; SNR for P pictures; SNR for B pictures)

and

the percentage of compatible mode selection for I pictures; the same for P pictures; the same for B pictures.

Comparing the prediction from the base layer mode and the prediction for the prediction error mode, the result shows that the former performs better. A 1.31 dB higher SNR was obtained for " Football " and a 0.67 dB higher SNR was obtained for " Flower Garden " when the former mode was applied. The modified prediction for the prediction error mode gave better performance than the prediction for the prediction error mode described in TM2, but still it cannot reach the performance of the prediction from the base layer mode.

3. Conclusion

Prediction from the base layer mode and prediction for the prediction error mode were compared again within the TM2 framework. The same tendency as that of the previous document (AVC-277) was obtained. The conclusion is that the prediction from the base layer with a switchable compatible type for each field is better than the prediction for the prediction error as a candidate for the compatible mode from the coding efficiency point of view.

END

Table 1 Simulation result

Football

	SNR (I; P; B)	compatible mode (%)
Simulcast (2.85 Mbps)	33.45 (34.42; 33.42; 33.38)	
prediction from base layer	35.31 (35.76; 35.82; 35.08)	100; 76.9; 41.0
pred. for pred. error (TM2)	34.00 (34.38; 34.32; 33.85)	100; 43.5; 9.4
pred. for pred. error (mod)	34.49 (34.92; 34.71; 34.36)	100; 61.8; 37.3

Flower Garden

	SNR (I; P; B)	compatible mode (%)
Simulcast (2.85 Mbps)	27.92 (28.38; 27.65; 27.99)	
prediction from base layer	28.79 (28.55; 28.72; 28.85)	99.9; 52.5; 15.2
pred. for pred. error (TM2)	28.12 (28.12; 27.88; 28.22)	99.9; 12.7; 4.5
pred. for pred. error (mod)	28.30 (28.25; 28.04; 28.41)	99.9; 29.8; 25.0