CCITT SGXV
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TITLE: Simulation result on compatibility
PURPOSE: Information

1. Introduction

Two sets of simulations were carried out on the compatibility in the TM0 based coding framework with a new method of preparing a prediction method and the syntax described in TM1 concerning compatibility. The simulation parameters were as follows.

M=3, N=12, Fr/Fi
sequences; Football, Flower Garden (2 seconds)
MPEG1 layer : SM3 1.15 Mbps Total bit rate : 4 Mbps
with compatible type switching for each field (by a newly proposed 2 bit flag at the MB layer)

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

2. Prediction from the base layer

A simulation was carried out to reconfirm the effect of a prediction from the decoded base layer picture in the frame work prepared in TM1. Table 1 shows a comparison between a prediction from the base layer with and without a switchable compatible type for each field. The table shows the SNR and the percentage of compatible mode selection 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.

The results show that a 1.52 dB higher SNR was obtained for " Football " and a 0.56 dB higher SNR was obtained for " Flower Garden " when compatible type switching for each field was applied. This improvement in the SNR was larger than that reported before in case of TM0 (0.50 dB up for " Football " and 0.27 dB up for " Flower Garden ". See AVC-234 or MPEG 92/104). One of the reasons is that compatible type switching is also applied to the INTRA mode and the coding efficiency improved there.

3. Prediction for the prediction error mode (TM1 experiment 1)

The effect of prediction for the prediction error described in TM1 Appendix G Experiment 1 was investigated. In this method (TM1 method), the prediction error in the base layer was applied as a prediction signal for the prediction error in the upper layer, regardless of the prediction mode selected in the upper layer. Another method of prediction for the prediction error seems to be possible which re-makes the prediction

signal for the prediction error in upper layer from decoded frames in the base layer according to the prediction mode selected in the upper layer (new method). In this method, for example, when a bi-directional mode is selected in the upper layer, the same bi-directional mode is applied to re-make the prediction error in the base layer, even when a bi-directional mode is not selected for coding in the base layer.

The simulation result is shown in Table 2. The result shows that the latter method gives a better SNR, but comparing this result with the result in Table 1, prediction from the base layer gives a still better SNR than these. One of the reasons seems that the motion vector information is not necessary for predicting from the base layer. The result also shows that the percentage for compatible mode selection is lower in the prediction for prediction error than in the prediction from the base layer. The prediction for the prediction error does not seem to give efficient prediction.

4. Conclusion

Prediction from the base layer mode and prediction for the prediction error mode were compared as candidates for the compatible mode in the framework of compatible type switching for each field newly prepared in TM1. The results showed that prediction from the base layer mode had a better coding efficiency. This concludes that the prediction from the base layer with a switchable compatible type for each field is appropriate as a candidate for the compatible mode at this moment.

END

Table 1 Prediction from base layer

Football

	SNR (I; P; B)	compatible mode (%)
without switching	34.73 (36.03; 34.92; 34.52)	71.05; 29.52; 4.79
with switching	36.25 (38.04; 36.65; 35.94)	100; 78.87; 49.44

Flower Garden

	SNR (I; P; B)	compatible mode (%)
without switching	28.35 (28.34; 28.09; 28.45)	88.88; 9.83; 2.07
with switching	28.91 (28.68; 28.86; 28.96)	99.98; 52.34; 14.62

Table 2 Prediction for prediction error

Football

	SNR (I; P; B)	compatible mode (%)
TM1 method	35.39 (36.84; 35.77; 35.11)	100; 42.43; 8.64
new method	35.60 (36.95; 35.88; 35.35)	100; 64.23; 41.41

Flower Garden

	SNR (I; P; B)	compatible mode (%)
TM1 method	28.38 (28.39; 28.13; 28.48)	99.98; 11.72; 2.88
new method	28.56 (28.50; 28.31; 28.67)	99.98; 32.45; 24.91