ISO-IEC/JTC1/SC29/WG11 MPEG92/
CODING OF MOVING PICTURES AND ASSOCIATED AUDIO

CCITT SGXV Document AVC-302
Working Party XV/1 July, 1992
Experts Group for ATM Video Coding

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TITLE : Simulations with field coding and M=1 for low delay.
PURPOSE: Simulation results.

1. Introduction.

The purpose of this document is twofold:

- To do coding with very low coder/decoder delay.
- To give an example of coding with the "Flexible encoder defined predictions" described in AVC-301.

2. Low coder/decoder delay.

The coding is performed according to TM1 and the "low coding delay profile". The coding is made field based. The coder/decoder delay is therefore practically limited to buffer delay. Accoding to the low delay profile one slice pr field is INTRA coded. This reduces the buffer delay so that the resulting coder/decoder delay becomes very low (see section 4).

3. Encoder defined predictions.

The definition given here is an example of encoder defined predictors. The definition is similar to the definition of FAMC but the weights given to each filter tap is simplified. The definition is generally kept as simple as possible both for clarity and to show that a simple definition may give reasonably good results. The following possibilities have not been exploited:

- The possibility of having all four prediction pixels within one field is not used.
- The vertical weights to the prediction points is limited to (0,1/2,1). No multiplication is therefore needed to do the predictions.

Figure 1 tries to visualise which vertical and horizontal points are used for prediction. Notice the following points in relation to figure 1:

- The vector components are ordered according to "physical" motion even if some predictors are taken from only one field and others from a combination.
- There are predictors that refers only to the last field. This means that the predictor can be used also for the first field after an INTRA field. In this case the second last field is not available for prediction.

The table below defines the predictions from figure 1 using the same parameters used in document AVC-301. Only "even" parameters are given since pure field coding is used. The periodicity seen in the table indicate how the rest of the vectors are defined.

I/J	X_Tab_even(I,0)	X_Tab_even(I,1)	Y_Tab_even(J,0)	Y_Tab_even(J,1)	Y_even0	Y_even1
0	0	0	0	0	0	0
1	1	0	2	0	1	0
2	2	1	2	2	1	1
3	3	1	2	8	1	4
4	4	2	8	8	4	4
5	5	2	6	8	3	4
6	6	3	6	6	3	3
7	7	3	6	16	3	8

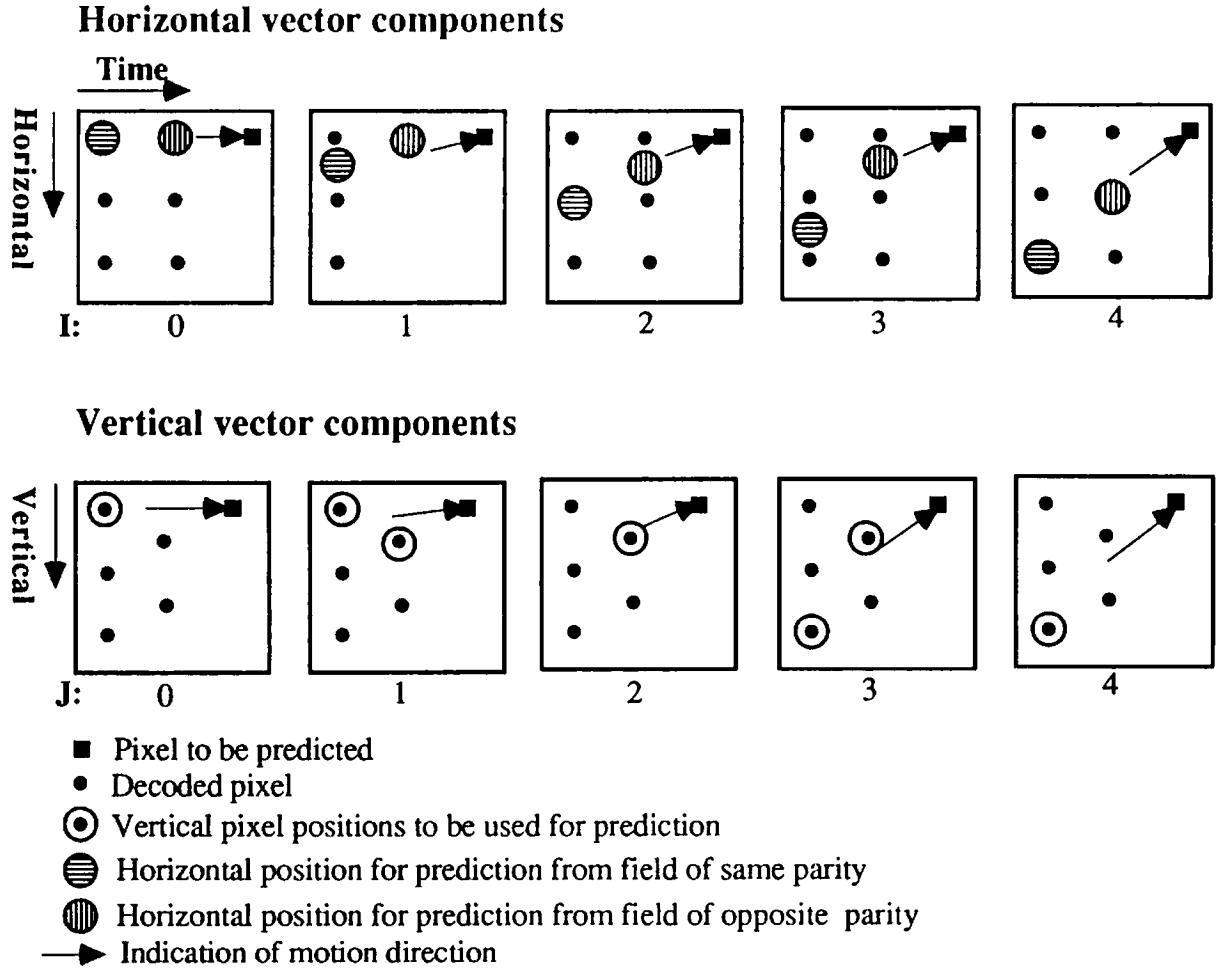

Figure 1. Illustration of predictions for the smallest vectors both in horizontal and vertical directions. The top part of the figure shows which horizontal positions that may be used for various vector components and the bottom part shows which vertical positions are used.
I: indicate the horizontal numbering of the components.
J: indicate the vertical numbering of the components.

4. Simulation results.

Simulations have been performed on the sequences MOBCAL, FLOWERGARDEN and BICYCLE. The 50 first frames of each sequence are used. BICYCLE is a 60 Hz sequence but it is displayed as 50 Hz with black stripes at the top and bottom.

Concerning periodic update the 50 Hz sequences are regularly updated every 18 fields and the 60 Hz sequence is regularly updated every 15 fields. This corresponds to 360 ms and 250 ms which means more frequent update than required for the Kurihama test.

The table below give the resulting luminance SNR and buffer delay. This last quantity is defined as the peak to peak buffer content during the sequnce measured in milliseconds.

Sequence	SNR(dB)	Delay(ms)
MOBCAL	28.41	13
FLOWERGARDEN	30.75	17
BICYCLE	29.10	7