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

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SOURCE : JAPAN
TITLE : Layered interframe coding system based on motion quantity
PURPOSE: Information

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1. Introduction

In this document a new layered interframe coding system which is compatible with H.261 is presented as a possible technique.

2. Characteristic functions

In this system the following functions are characteristically performed.

1) Full-band interframe prediction is used at normal state.
2) Even after cell loss, the interframe prediction is used.
3) The large movement blocks are assigned to the higher priority cells, and small movement blocks are assigned to the lower priority cells.

These characteristic functions are realized by using two frame memories. One frame memory is used for full video signals including the lower priority blocks. Another one is used for the higher priority blocks. When H.261 compatible coding is required, either one of the frame memories can be used by selecting operating parameters.

3. Block diagram of the interframe coding system

Figure 1 shows the block diagram of the interframe coding system.

3.1 Incompatible coding

In Figure 1, extremely small interframe difference signals consisting of noise are first forcedly set to zero at the Sig/Insig circuit (significant/insignificant block decision circuit). After this process, when the interframe difference signals are larger than a threshold value, the block is decided as a higher priority block, and otherwise as a lower priority block, at H.Pri/L.Pri circuit (higher priority/lower priority block decision circuit). On the higher priority blocks SW1 connects the higher priority terminal, namely output signal of FM2, while on the other blocks SW1 connects the lower priority terminal, namely output signal of FM1. SW2 and SW3 behave synchronously with SW1. At the PCT (packetizer) the data of higher priority block are assigned to the higher priority cells, and the data of lower priority block are assigned to the lower priority cells.

When the threshold value is 0, all blocks are given higher priority. When the threshold value is 255, all blocks are given lower priority.

3.2 H.261 compatible coding

For H.261 compatible coding, either of FM1 or FM2 output will do in stationary use according to the setting of threshold (255 or 0), because Sig/Insig circuit is not essential to H.261 codec.

4. Frame memory refresh method

FM1 can be cyclically refreshed by interframe coding using output signals of FM2.

5. Simulation results

Figure 2 shows the interframe prediction error at normal state when operated in open loop with step size 2. Figure 3 shows the interframe prediction error after all the lowe priority cells have been lost. On No.5 frame, only FM2 output is used for prediction of not only higher priority blocks but also lower priority blocks.

Table 1 shows SNR of decoded video signals after the cell loss has occurred. On No.5 frame, only FM2 is used for prediction as same as Figure 3.

6. Conclusions

An H.261 compatible layered interframe coding system has been presented, which utilizes motion quantity based layering and high/low cell priorities. In this system interframe prediction can be used even after cell loss.

Simulation results show that good performance because of the full band interframe prediction. Especially cell loss resilience is improved by using intraframe prediction instead of interframe prediction even after cell loss occurring.

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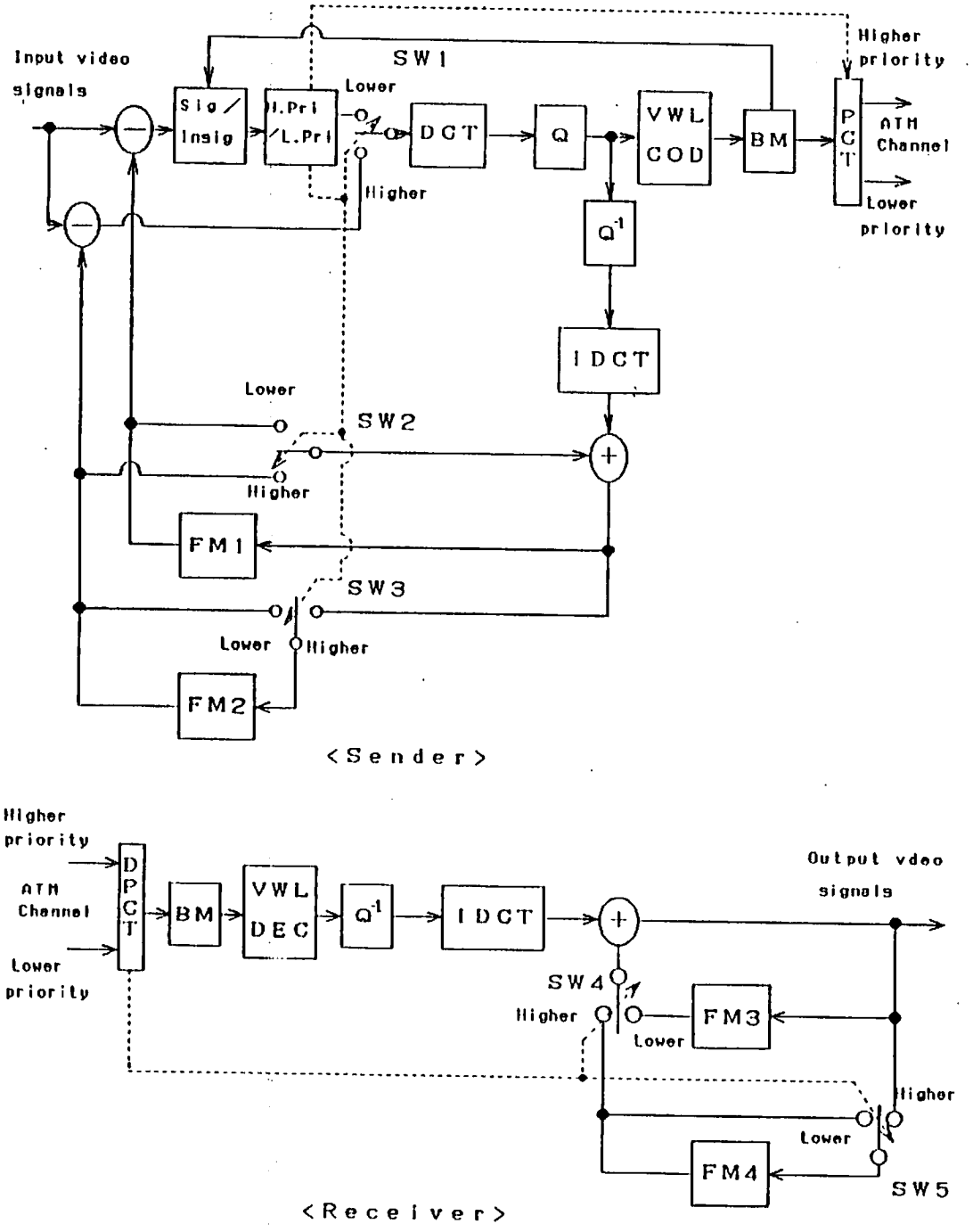


Figure 1 The block diagram of the interframe coding system.

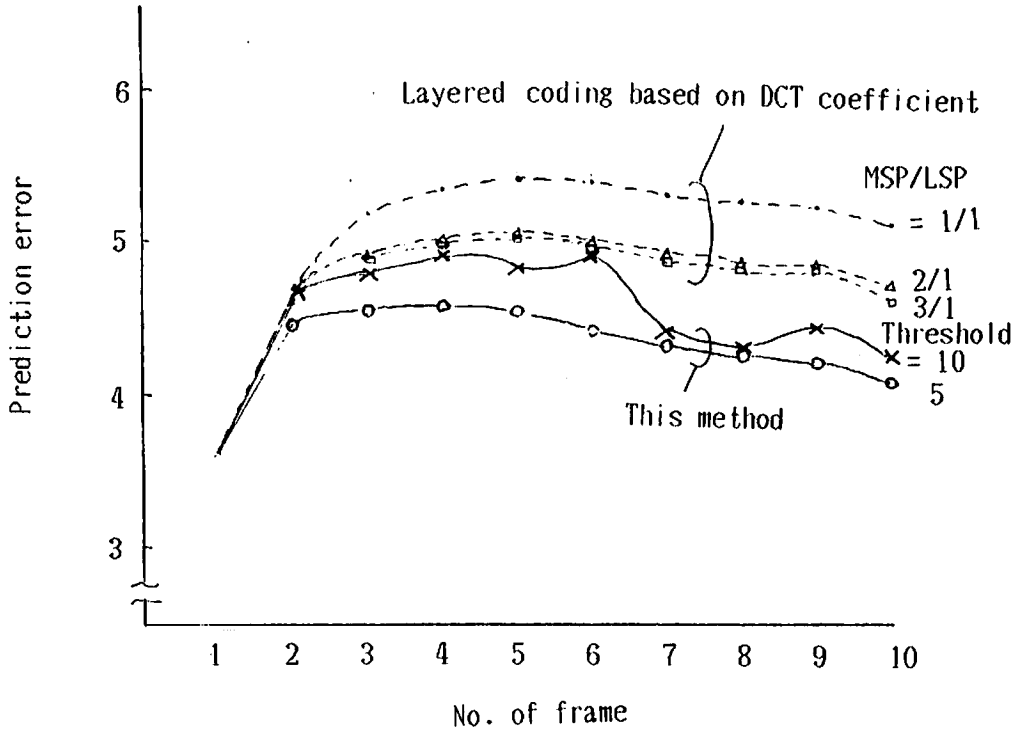


Figure 2 The interframe prediction error at normal state.

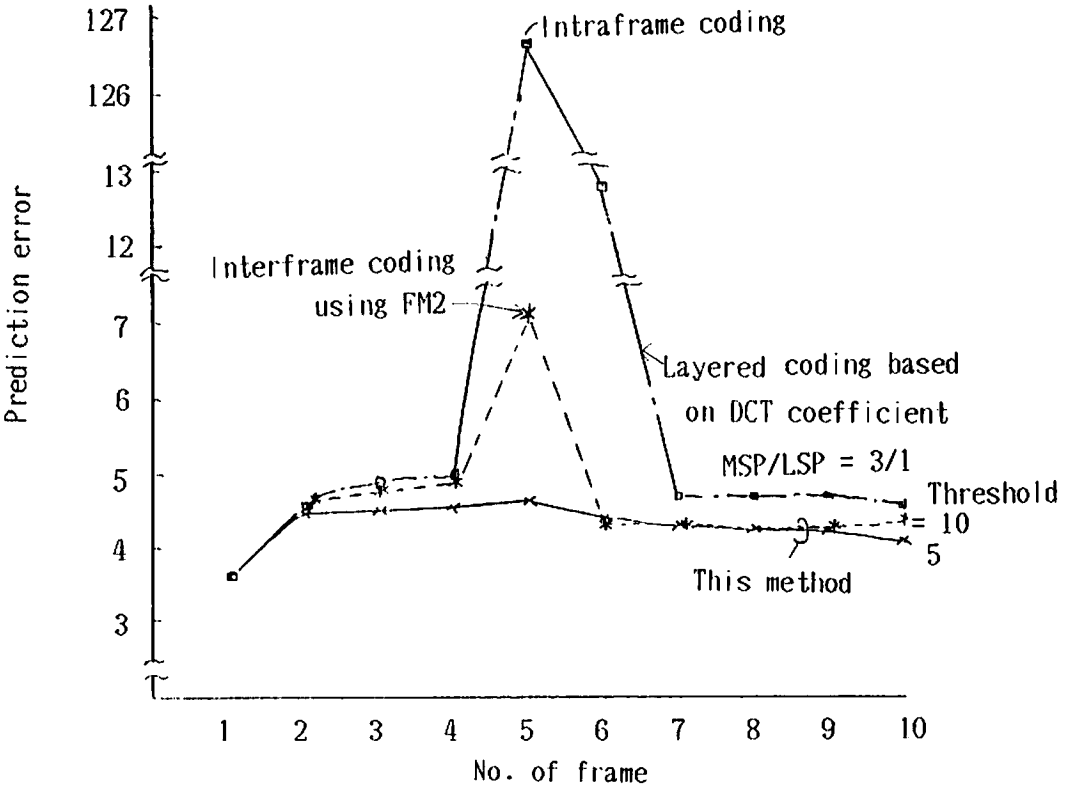
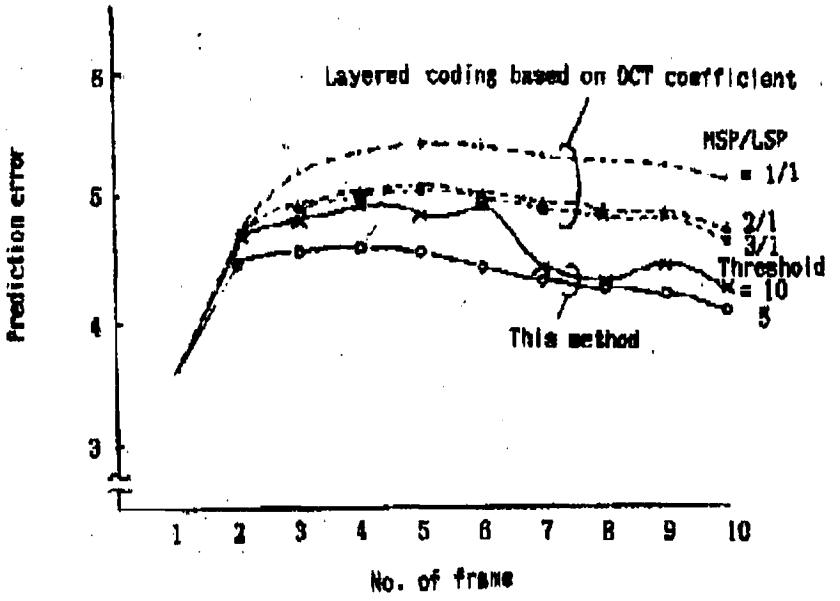


Figure 3 The interframe prediction error after cell loss occuring.

Table 1 SNR of decoded video signals after cell loss occuring.
(100% Cell loss occurs on No.5 frame)

[dB]

No. of frame	Threshold 5	Threshold 10
1	41.2	41.2
2	39.4	39.4
3	38.8	38.8
4	38.4	38.4
5	38.0	36.5



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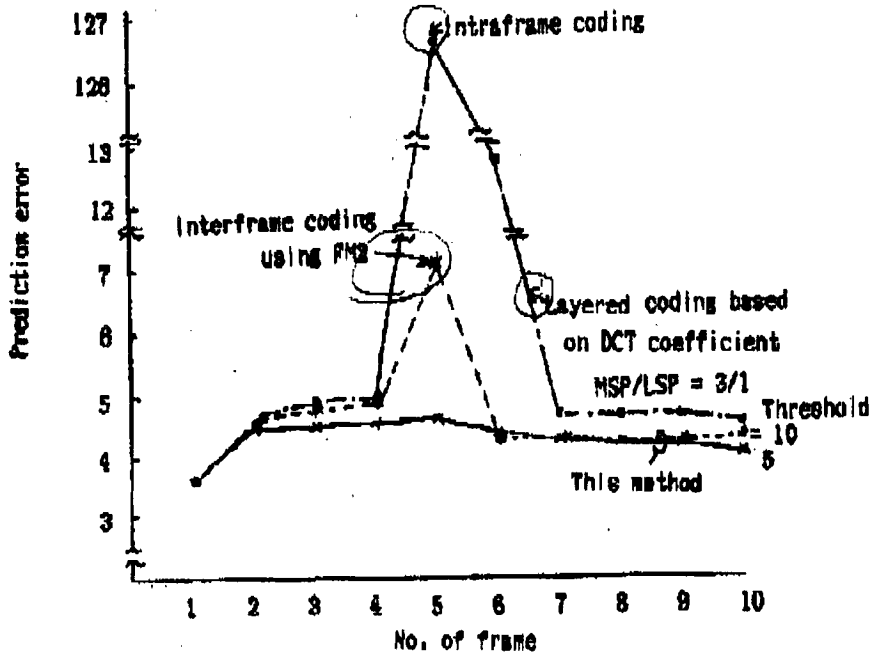

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