ISO/IEC JTC1/SC29/WG11
MPEG92/
September 1992

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

Document AVC-328
September 1992

SOURCE : JAPAN
TITLE : Scene change handling without picture skipping in low delay mode
PURPOSE: Information

1.Introduction

In order to reduce buffer delay, forced intra slice is a very efficient technique. However, when scene change takes place, temporal or spatial picture quality of the first picture in the new scene is degraded(AVC-275) :

a) picture skipping occurs to maintain the picture quality
b) picture quality is degraded to maintain the temporal resolution (without picture skipping)

In this document, the low delay coding 'without picture skipping' (item "b") is considered.

2.Encoding system

The coding model is shown in Fig.1. The first pictures of new scenes are forced to I-picture by scene change detector. The other pictures are set to P-picture. Target number of bits for a I-picture (Ti) is set to the same number of bits in VBV buffer. The target for P-picture is calculated according to AVC-275 ANNEX 2.

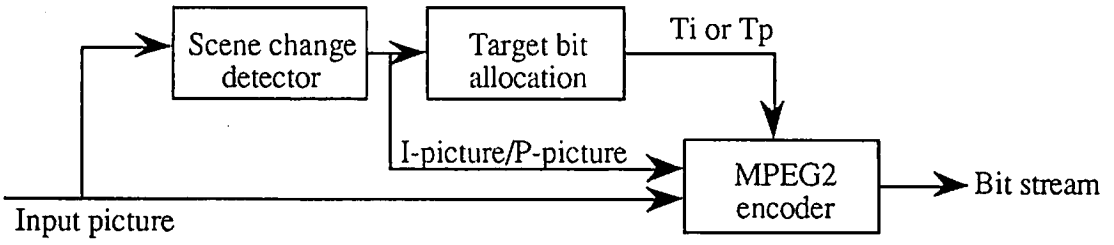

Fig.1 encoding system in low delay mode

3.Simulation

The simulation is based on TM1. S/N ratio of the 120 frames after scene change is computed for several Ti's (Ti=133kbit,200kbit,300kbit,450kbit). The buffering delay is derived from Ti as follows:

Buffering_delay = max((Ti - Bit_rate/Picture_rate)/ Bit_rate , 0)

The specifications of the simulation is shown in Table 1.

Table 1 Specifications of the Simulation

Coding structure	frame structure, M=1,N=150
Prediction	frame/field adaptive
MC range	Mobile : 15.5 x 15.5, Football : 31.5 x 31.5
Rate control	step 1 (Ti) : 133k/200k/300k/450k (Tp) : AVC-275 ANNEX 2 (Nsc=150) step 2 : TM1
Refresh	Intra slices
Sequence	Mobile : 60 frames, Football : 60 frames
Bitrate	4Mbps

4.Results

The simulation results are shown in Table 2 and Fig.2. A little visual degradation is exhibited when Ti is 200kbit in Mobile sequence.

5.Conclusion

Bit allocation for a I-picture influences the picture quality of the I-pictue and following P-pictures. However, the influence fades out in about 300ms (10frames). In the worst cases such as Ti=200k bits in Mobile sequence, visual degradation is detected. It is recommended that Ti should be lager than 2*(bit_rate/frame_rate) (=270kbits at 4Mbps) in the low delay coding system without picture skipping. The buffering delay of the system is approximately 33ms.

Table 2 Simulation results

sequence	Number of bits (bit/frame)			Buffering Delay (ms)	S/N for Y (dB)	
	Ti	I-picture	P-picture		I-picture	P-picture
Mobile	200k	243k	131k	27.5	23.7	26.5
	300k	293k	131k	40.0	24.7	26.5
	450k	432k	130k	74.8	27.1	26.5
Football	133k	119k	132k	0	29.8	31.4
	200k	163k	132k	7.5	31.1	31.4
	300k	269k	131k	34.0	33.4	31.4
	450k	418k	130k	79.3	35.8	31.4

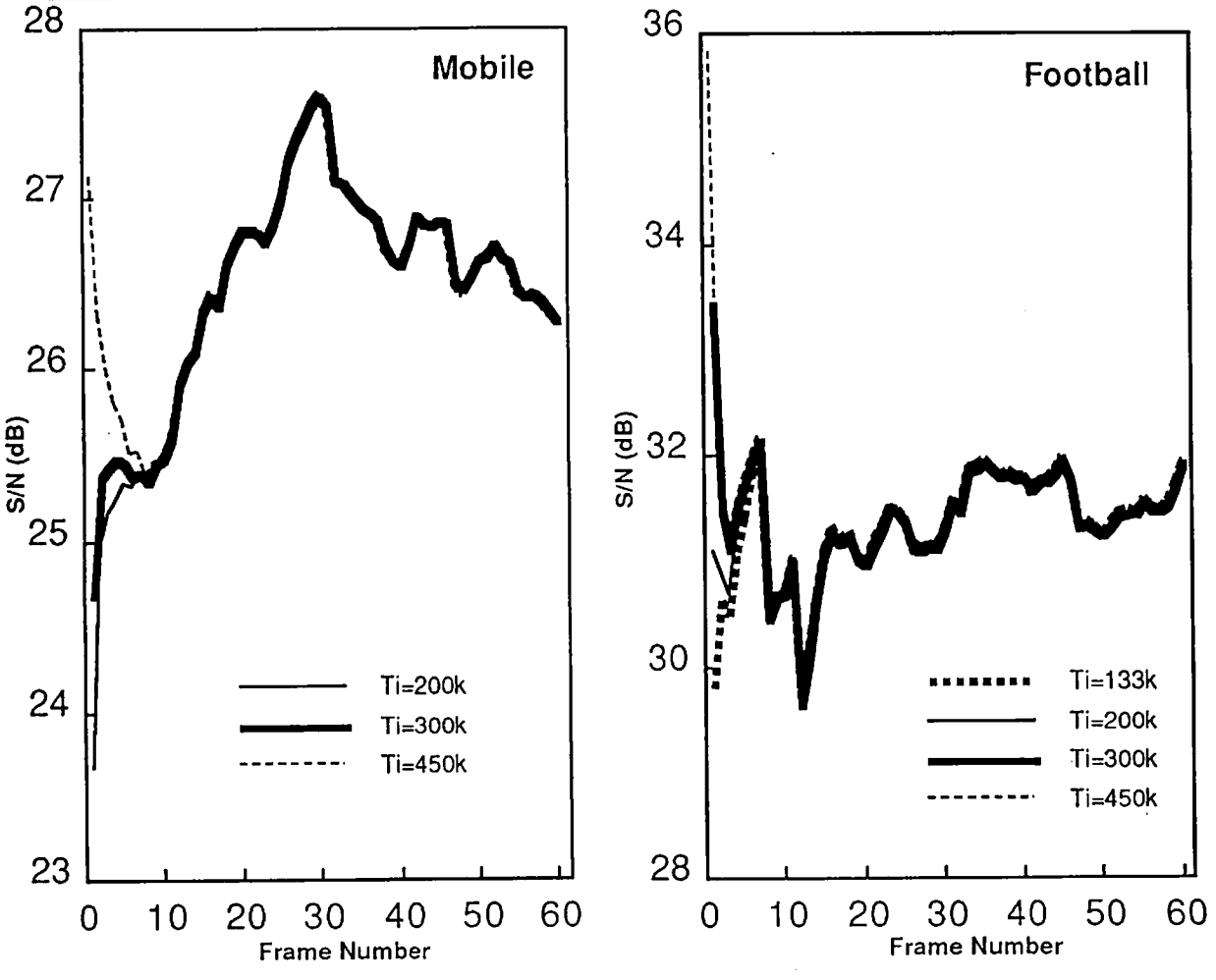

Fig.2 Simulation Results