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1. Introduction

This document reports experimental results of depth coding on 'Pantomime' sequence in response to EE4 of 3D video coding [1]. The purpose of these experiments is to determine appropriate combinations of QPs for the test material in 2-view and 3-view configurations based on total target bit rates. Therefore, we first generated the depth video with the best performance in terms of PSNR of synthesized views by DERS 5.0. Then, we carried out the coding experiments with various QPs using JMVC 6.0. Using the decoded depth video, we synthesized the intermediate views and we compared compressed sequences to uncompressed ones in terms of PSNR and subjective quality.

2. Results of Depth Video Coding

We performed the coding experiments following the description of EE in the document N10720 [1]. In order to determine appropriate range of rate points, we checked the performance of color and depth sequences with various QPs in both 2-view and 3-view configurations. Table 1 represents coding conditions.

Table 1. Coding conditions

Reference software		JMVC 6.0
Coding structure		Hierarchical B
GOP size		15
Number of frames		200
Search range		96
View number	2-view	39, 41
	3-view	37, 39, 41

2.1. 2-view Configuration

We selected the best combinations of QPs for color and depth sequences based on the target bit rates; 1, 2, 4, 8 Mbps for 'Pantomime'. In the case of 2-view configuration, the total bit rate is calculated by

$$\text{Total bit rate} = \text{Rate}(L\_color) + \text{Rate}(R\_color) + \text{Rate}(L\_depth) + \text{Rate}(R\_depth)$$

Table 2 shows the total bit rates and PSNR of synthesized images for 2-view configuration. The synthesis results for view 40 are obtained by the decoded pairs of sequences. Figure 1 shows the synthesis results for the best combinations of QPs.

Table 2. Total bit rates and PSNR of synthesized images for 2-view configuration

Color			Depth			Total bit rate (kbps)	PSNR of syn. (view 40) (dB)
QP	Bit rate (kbps)		QP	Bit rate (kbps)			
	View 39	View 41		View 39	View 41		
22	3272.14	2977.64	25	1005.27	690.89	7945.93	36.2676
27	1874.71	1508.13	33	340.36	285.68	4008.89	35.8590
33	1053.08	735.44	41	121.84	104.70	2015.07	34.8293
41	535.90	303.98	44	85.83	72.30	998.02	31.6824

(a) color QP 22, depth QP 25

(b) color QP 27, depth QP 33

(c) color QP 33, depth QP 41 (d) color QP 41, depth QP 44

Fig. 1. Synthesis results in the 50th frame at view_40 (2-view)

2.2. 3-view Configuration

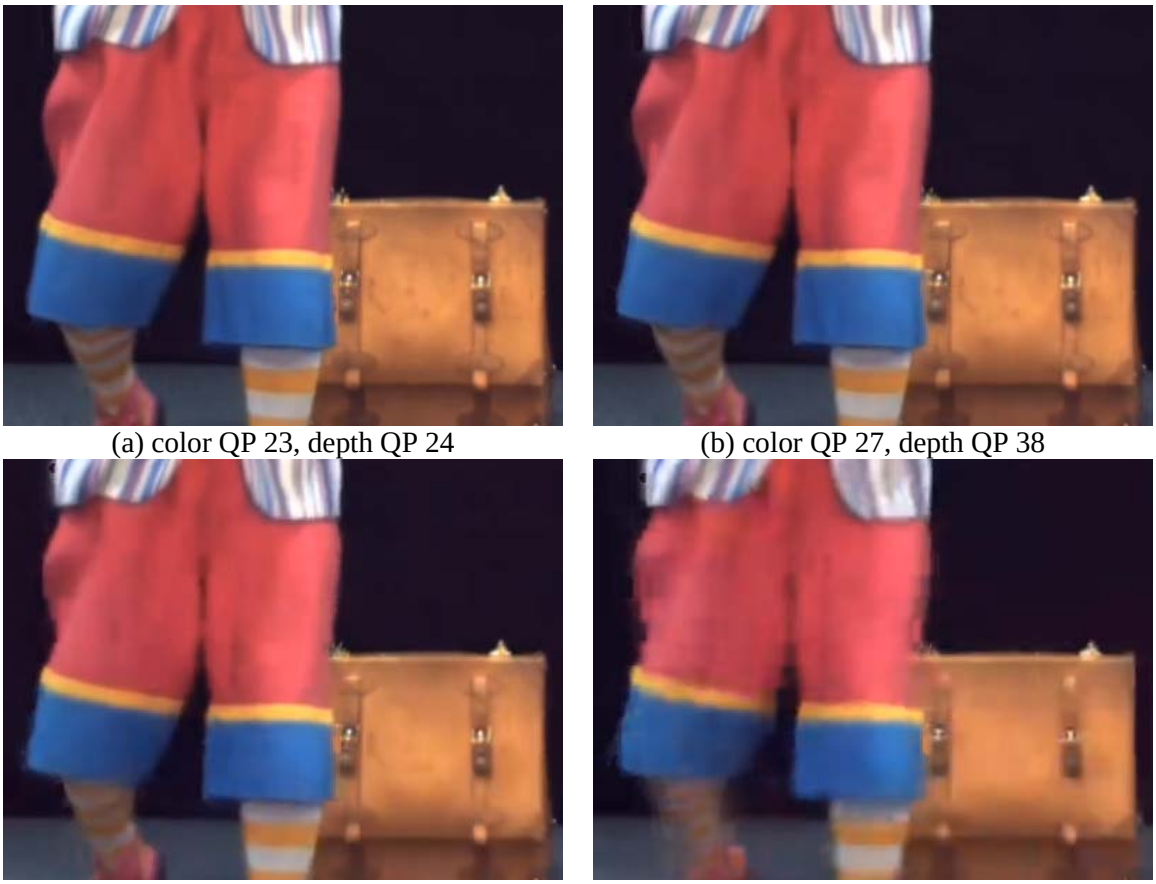
In the case of 3-view configuration, coding experiments are performed based on the target bit rates; 1.3, 2.6, 5.2, 10.4 Mbps for 'Pantomime'. The total bit rate is calculated by

$$\text{Total bit rate} = \text{Rate}(L\_color) + \text{Rate}(C\_color) + \text{Rate}(R\_color) + \text{Rate}(L\_depth) + \text{Rate}(C\_depth) + \text{Rate}(R\_depth)$$

Table 3 shows the total bit rates and PSNR of synthesized images for 3-view configuration. The synthesis results for view 38 and view 40 are also obtained by the decoded pairs of sequences. Figure 2 shows the synthesis results for the best combinations of QPs.

Table 3. Total bit rates and PSNR of synthesized images

Color				Depth				Total bit rate (kbps)	PSNR of syn. (dB)	
QP	Bit rate (kbps)			QP	Bit rate (kbps)					
	View 37	View 39	View 41		View 37	View 39	View 41		View 38	View 40
23	2965.57	2021.11	2617.76	24	1072.13	686.93	935.08	10298.58	34.6437	36.2426
27	1920.98	1197.04	1580.00	38	170.06	164.26	166.98	5199.34	34.3835	35.7614
34	978.84	563.93	718.18	41	118.34	119.37	114.20	2612.86	33.5536	34.5258
43	463.40	272.64	282.04	43	94.66	96.07	87.72	1296.52	30.5730	30.7787



(a) color QP 23, depth QP 24 (b) color QP 27, depth QP 38

(c) color QP 34, depth QP 41 (d) color QP 43, depth QP 43

Fig. 2. Synthesis results in the 50th frame at view_40 (3-view)

3. Conclusion

We have reported the experimental results on 3D video coding. The best combinations of QPs were determined based on the assigned target bit rates. We also reported the synthesis results for the best combinations of QPs. We are ready to demonstrate the synthesized video for each target bit rates in this meeting.

4. Acknowledgements

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5. References

[1] ISO/IEC JTC1/SC29/WG11 “Description of Exploration Experiments in 3D Video Coding,” N10720, July 2009.

[2] ISO/IEC JTC1/SC29/WG11 “Depth Estimation Reference Software (DERS) 4.0,” m16605, July 2009.