

**INTERNATIONAL ORGANISATION FOR STANDARDISATION
ORGANISATION INTERNATIONALE DE NORMALISATION
ISO/IEC JTC1/SC29/WG11
CODING OF MOVING PICTURES AND AUDIO**

**ISO/IEC JTC1/SC29/WG11
MPEG2011/M20004
March 2011, Geneva, CH**

**Source: GIST (Gwangju Institute of Science and Technology)
Status: Report
Title: 3DV EE5 Results on Newspaper Sequence
Author: Cheon Lee and Yo-Sung Ho**

1. Introduction

This document describes the process of additional two depth data of the ‘Newspaper’ sequence for EE4. The current depth data of the ‘Newspaper’ sequence is acceptable for both 2-view and 3-view cases, while the 4-view case needs further improvement due to slight artifacts [1]. Therefore, we generated two additional depth data including manual modification. As a result, the synthesized images have better subjective quality than those presented in the previous MPEG meeting.

2. Procedure of Depth Generation

The depth data generated by Samsung in the last meeting showed some visual artifacts: flickering and doubling. In this contribution, we performed depth estimation process with DERS 5.1 using semi-automatic method and manual modification process sequentially, as shown in Fig. 1.

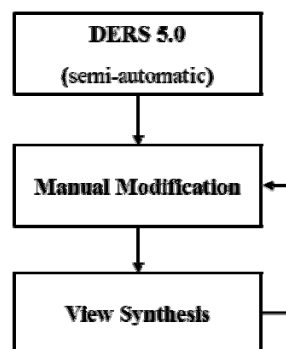


Fig. 1. Depth maps of 143rd frame

First, we obtained the depth data using DERS 5.1 which is the latest version on the SVN server. We used the semi-automatic method proposed by Nagoya University with manually generated additional data, i.e., static map, initial disparity, and edge map. All settings of DERS are described in Table 1.

Table 1. The parameters used in DERS 5.1

Parameter Name	Value
Depth Type	0
MinimumValueOfDisparitySearchRange	15
MaximumValueOfDisparitySearchRange	50
MinimumValueOfDisparityRange	15
MaximumValueOfDisparityRange	50
SmoothingCoefficient	1.0
BaselineBasis	1
Precision	2
SearchLevel	2
Filter	1
MatchingMethod	1
TemporalEnhancement	1
Threshold	1.5
MatchingBlock	3

The synthesized image using the resultant depth data of DERS have visual artifacts due to false depth values. In order to remove artifacts from the synthesized image, we modify the depth values using the table-based depth modification method as depicted in Fig. 2, which is the same method that we modified the depth data for 2-view and 3-view configurations [2]. Selecting reference frames, we make a table mapping the color and depth values, and then we modified the depth value of the target frames referring to the table. Indicating the target area of frame, we can specify the ROI (region-of-interest) area.

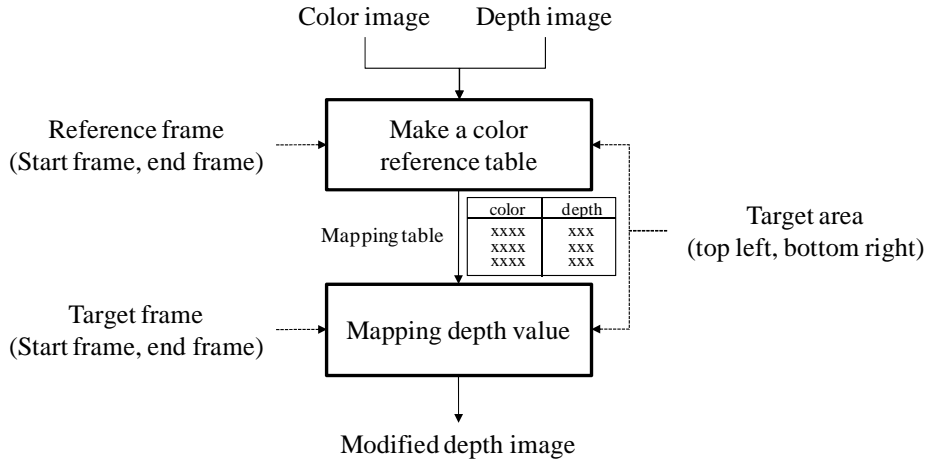
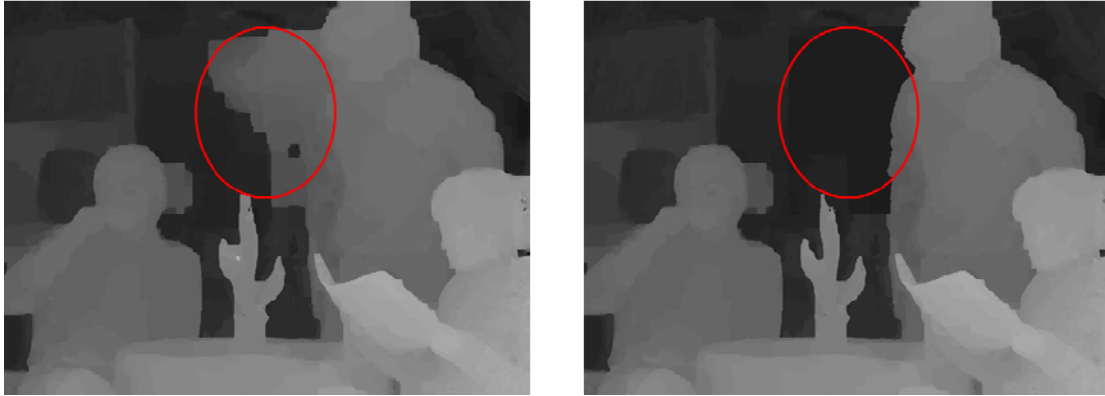


Fig. 2. Procedure of depth modification method

3. Experimental Results

We generated two additional depth data for view 5 and view 7 of ‘Newspaper’ sequence. As shown in Fig. 3, the resultant output depth generates visual artifacts on background area, and these are removed by the modified depth data. In addition, we

enhanced the temporal consistency by modifying the depth value around the pod. To evaluate the objective quality of the final depth data, we synthesized a video for view 6. The average PSNR value for 300 frames between the original video and the synthesized video is 34.94 dB.



(a) Generated depth image for view5: DERS5.1 (left), and modified depth (right)



(b) Synthesized image for view5: DERS5.1 (left), and modified depth (right)

Fig. 3. Comparison of depth images and synthesized images

4. Conclusion

We have modified the depth data of ‘Newspaper’ sequence to remove visual artifacts from the background region. Those data shows better rendering quality. We have prepared all test materials for 3D viewing during the 96th Geneva meeting.

5. Acknowledgements

This research was supported by the MKE(The Ministry of Knowledge Economy), Korea, under the ITRC(Information Technology Research Center) support program supervised by the NIPA(National IT Industry Promotion Agency) (NIPA-2011-(C1090-1111-0003))

6. References

- [1] ISO/IEC JTC1/SC29/WG11 “Description of Exploration Experiments in 3D Video Coding,” N11831, January 2011.
- [2] ISO/IEC JTC1/SC29/WG11 “Modified Depth Data of Newspaper Sequence,” M17490, April 2010.

Appendix 1. DERS 5.1 configuration file

INPUT PARAMETERS	
DepthType	0
SourceWidth	1024
SourceHeight	768
StartFrame	0
TotalNumberOfFrames	300
LeftCameraName	param_news04/06
CenterCameraName	param_news05/07
RightCameraName	param_news06/08
MinimumValueOfDisparitySearchRange	15
MaximumValueOfDisparitySearchRange	50
MinimumValueOfDisparityRange	15
MaximumValueOfDisparityRange	50
SmoothingCoefficient	1.0
FileLeftViewImage	Newspaper_R_4/6.yuv
FileCenterViewImage	Newspaper_R_5/7.yuv
FileRightViewImage	Newspaper_R_6/8.yuv
FileOutputDepthMapImage	news_d5/7.yuv
FileCameraParameter	cam_param_news.txt
BaselineBasis	1
Precision	2
SearchLevel	2
Filter	1
MatchingMethod	1
Temporal Enhancement	
TemporalEnhancement	1
Threshold	1.50
Size of Matching Block	
MatchingBlock	3
Softsegmentation (for MatchingMethod = 3 only)	
SoftDistanceCoeff	10.0
SoftColorCoeff	20.0
SoftBlockWidth	11
SoftBlockHeight	11
Segmentation	

ImageSegmentation	0
SmoothingCoefficient2	1.00
SegmentationMethod	1
MaxCluster	64
Semi-automatic Depth Estimation	
DepthEstimationMode	0

Appendix 2. VSRS 3.5 configuration file

INPUT PARAMETERS	
DepthType	1
SourceWidth	1024
SourceHeight	768
StartFrameNum	0
TotalNumberOfFrames	300
LeftNearestDepthValue	-2715.181648
LeftFarthestDepthValue	-9050.605493
RightNearestDepthValue	-2715.181648
RightFarthestDepthValue	-9050.605493
CameraParameterFile	cam_param_news.txt
LeftCameraName	param_news05
VirtualCameraName	param_news07
RightCameraName	param_news06
LeftViewImageName	Newspaper_R_5.yuv
RightViewImageName	Newspaper_R_7.yuv
LeftDepthMapName	depth_news_5.yuv
RightDepthMapName	depth_news_7.yuv
OutputVirtualViewImageName	news_virtual_6.yuv
ColorSpace	0
Precision	2
Filter	0
BoundaryNoiseRemoval	0
SynthesisMode	0
General mode	
ViewBlending	0
1D mode	
SplattingOption	2
BoundaryGrowth	40

MergingOption	2
DepthThreshold	75
HoleCountThreshold	30