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Author Krzysztof Wegner (kwegner@multimedia.edu.pl)
Olgierd Stankiewicz

1 Introduction

This document presents results of Exploration Experiment 1 as defined in [1] for Dog sequence.

2 Quality of estimated depth maps vs reference camera distance

We have checked what is the influence of distance between views used for depth estimation on the quality of the obtained depth map. We have estimated depth maps for 2 views (39, 41) several times. Each time for a given view for which we have been estimated depth map (namely center view) we have used different left and right views. We have choose left and right view in a way so that distance (expressed in view numbers) increase twice each time (Fig 1). Exact view numbers used for depth estimation for view 39 and for view 41 are provided in table 1.

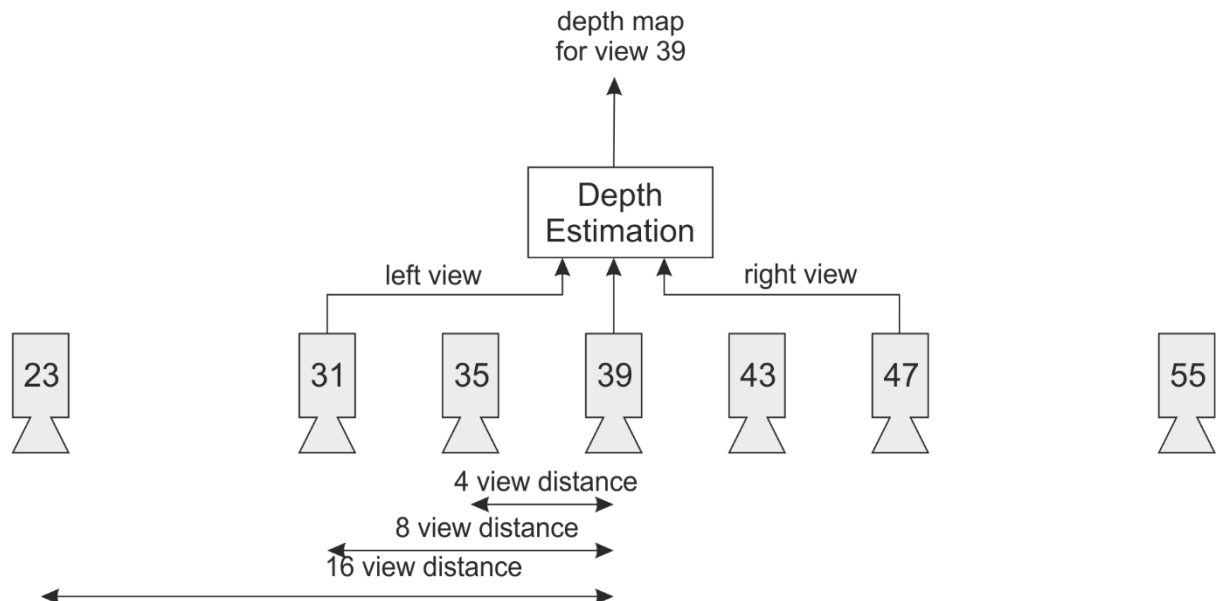


Figure 1. Depth maps estimation for a view 39 with different view distance.

Distance between center view and left/right views during depth estimation was subject to change. We have increased distance from 4 views to 32 views away.

Table 1. View numbers used as left, center and right view for depth estimation.

Case view distance	View 39			View 41		
	Left view number	Center view number	Right view number	Left view number	Center view number	Right view number
4 views	33	39	43	35	41	45
6 views	31	39	45	33	41	47
8 views	29	39	47	31	41	49
16 views	23	39	55	25	41	57
32 views	7	39	71	9	41	73

In each case depth maps for 100 frames has been estimated with quarter-pel precision.

3 Quality evaluation

We have assessed quality of the evaluated depth maps indirectly through view synthesis quality. Obtained depth maps were used for synthesizing virtual view in between views under experiment. So, based on depth maps for view 39 and view 41, a view in position 40 was synthesized and compared via luminance PSNR with original view 40 recorded by the camera (fig 2).

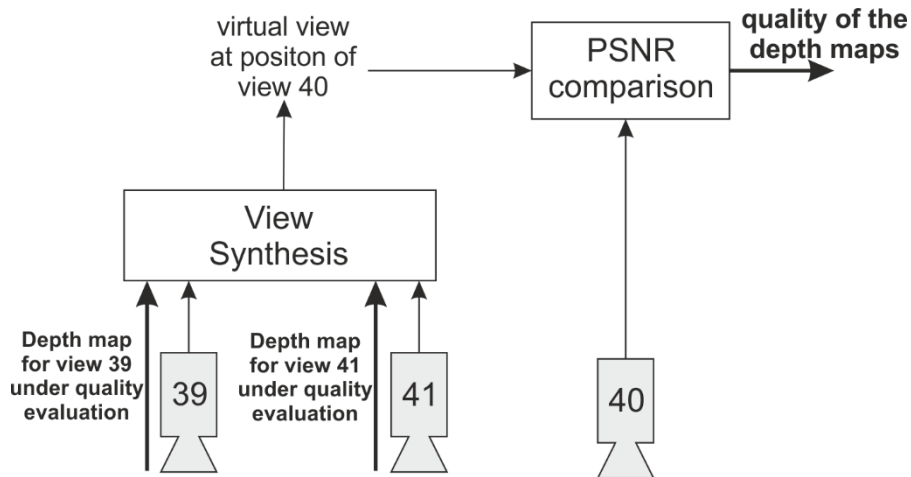


Figure 2. Depth maps quality evaluation methodology used.

4 Results

The attained results have been gathered in Table 2 and Figure 3. Table 2 presents all results (all used smoothing coefficients vs all used view distances).

In figure 3, only the best performing Smoothing Coefficient values have been visualized.

Table 2. Quality of estimated depth maps for different view distance

Smoothing coefficient	View distance				
	4 views	6 views	8 views	16 views	32 views
1.0	28.825	28,865	28.846	28.754	27.099
2.0	28.798	28,827	28.820	28.575	26.551
3.0	28.784	28,812	28.786	27.786	26.537
4.0	28.764	28,752	28.719	26.958	26.538

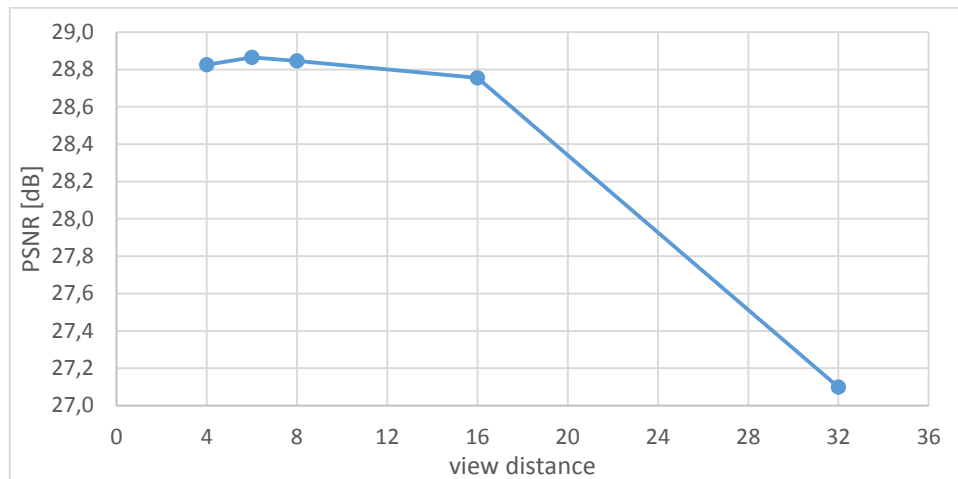


Figure 3. Quality of the estimated depth maps versus view distance between center and left/right view used for depth estimation. The curve has been calculated for the following view distances: 4,6,8,16,32.

5 Conclusion

Quality of the depth maps depends on distance between center and left/right view used for depth estimation. The curve is not trivial – as the view distance gets higher, firstly the quality increases, and then, at about view distance 8, starts to decrease.

Basing one the performed limited experiments, for Dog sequence, distance of 6 views yields best depth maps.

Further study on relationship between view distance and depth quality is needed in order find, more accurate location of the optimum view distance for Dog sequence and others.

6 References

- [1] K. Wegner, M. P. Tehrani, G. Lafruit, „Description of Exploration Experiments on Free-viewpoint Television (FTV)” ISO/IEC JTC1/SC29/WG11 MPEG2013/N14105 October 2013, Geneva, Switzerland
- [2] K. Wegner, O. Stankiewicz, M. Tanimoto, M. Domanski, „Enhanced Depth Estimation Reference Software (DERS) for Free-viewpoint Television” ISO/IEC JTC1/SC29/WG11 MPEG2013/M31518, October 2013, Geneva, Switzerland