

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).

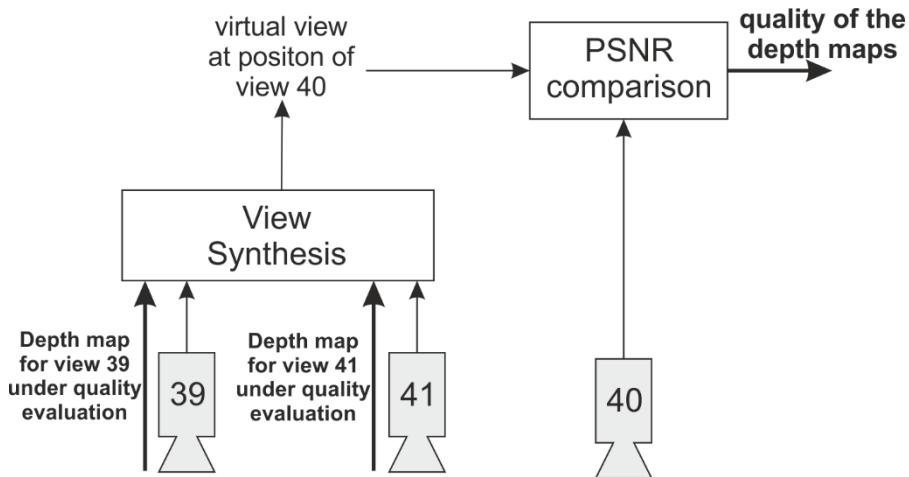


Figure 2. Depth maps quality evaluation methodology used.

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 |

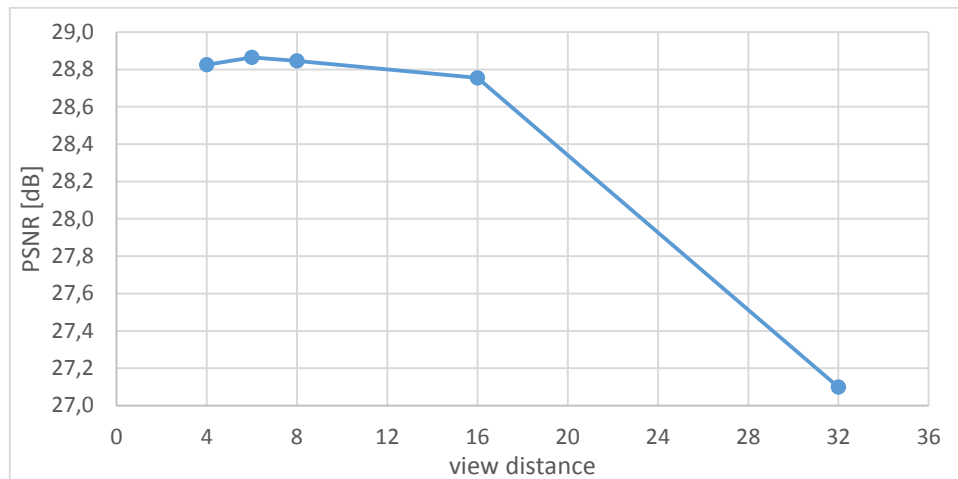


Figure 3. Quality of the estimated depth maps versus view distance between center and left/right view used for depth estimation. The curve has been calculated for the following view distances: 4,6,8,16,32.

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