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Title	**Results of 3DV/FTV Exploration Experiment 1 (EE1) for Poznan sequences**
Sub group	**Video**
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1   Introduction

This document presents results of Exploration Experiment 1 (EE1) performed on "Poznan" sequences [2] and is in response to W11095 "Description of Exploration Experiments in 3D Video Coding" [1]

2   Experiments conditions

Experiments were performed basing on W10925 and W11095 [1] guidelines:

EE1:
- Select stereo pair from data set, i.e. an original left view OL and an original right view OR
- Estimate depth corresponding to neighboring original views OL (left) and OR (right), from neighboring cameras with use of semi-automatic mode
- Synthesize views (synthesized left SL and synthesized right SR) at positions from OL+D and OR+D
- Compare OL-OR with SL-SR subjectively

The test were performed on 'Poznan' [1] sequences with following views selected as OL-OR and NL-NR.

Table 1. The specification of views for EE experiment.

Data set	Original Pair OL-OR	Synthesized Pair SL-OR (OL-SR)	Frame Range for EE1	Frame Range for EE4
Poznan_Hall1	2-1	2-1.5	0~199	N/A
Poznan_Hall2	7-6	7-6.5	0~199	N/A
Poznan_Street	4-3	4-3.5	150~349	150~349
Poznan_CarPark	4-3	4-3.5	200~399	N/A

Table 1: Input and output views for MVD representation format in 2-view configuration

Data set	Original Pair OL-OR	Synthesized Pair SL-OR (OL-SR)	Frame Range for EE1	Frame Range for EE4
Poznan_Hall1	2-1	2-1.5	0~199	N/A
Poznan_Hall2	7-6	7-6.5	0~199	N/A
Poznan_Street	4-3	4-3.5	150~349	150~349
Poznan_CarPark	4-3	4-3.5	200~399	N/A

Table 2: Input and output views for MVD representation format in 3-view configuration

Data set	Original Views OL-OC-OR	Views to Synthesize for stereo viewing[1]	Views to Synthesize for 9-view display[2]
Poznan_Hall1	3-2-1	2.125, 1.875	2.5, 2.375, 2.25, 2.125, 1.875, 1.75, 1.625, 1.5
Poznan_Hall2	7-6-5	6.125, 5.875	6.5, 6.375, 6.25, 6.125, 5.875, 5.75, 5.625, 5.5
Poznan_Street	5-4-3	4.125, 3.875	4.5, 4.375, 4.25, 4.125, 3.875, 3.75, 3.625, 3.5
Poznan_CarPark	5-4-3	4.125, 3.875	4.5, 4.375, 4.25, 4.125, 3.875, 3.75, 3.625, 3.5

[1] The selected baseline distances correspond to emulation of a 22-view display on a stereo display.
[2] The views to synthesize for a multiview display are subject to change according to specific display requirements that would be available at a given meeting.
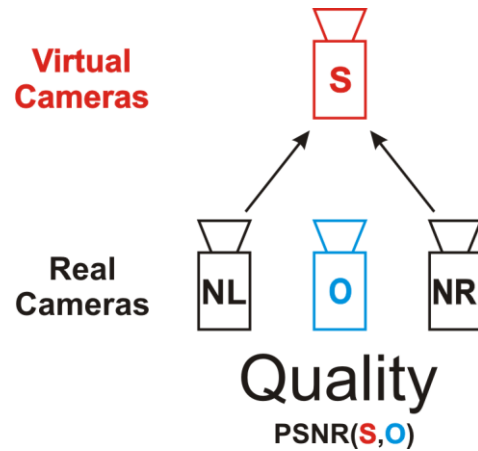
Figure 1. Two cameras case – test setup.

3   Depth estimation

In order to estimate the final depth maps, many auxiliary depth maps (over 15) have been generated. Various dedicated tools and wide range of parameters was used. Basing on these auxiliary depth maps, view have been synthesized and subjectively assessed. Each region of sequence, an analysis have been performed in order to select the best performing depth map. Finally, selected depth maps have been manually merged into one final depth map by copy&paste method.

The used auxiliary depth maps include:

1. Generated by DERS automatic mode.
2. Generated by DERS in semi-automatic mode with manual dat.
3. Generated by PUTv1.
4. Generated by PUTv3, improved with MLH.
5. (1)-(4) with additional use of temporal denoising tool.
6. Background depth map, generated with DERS from background images (inpainted)
7. Background depth maps, generated by selective median from (5).
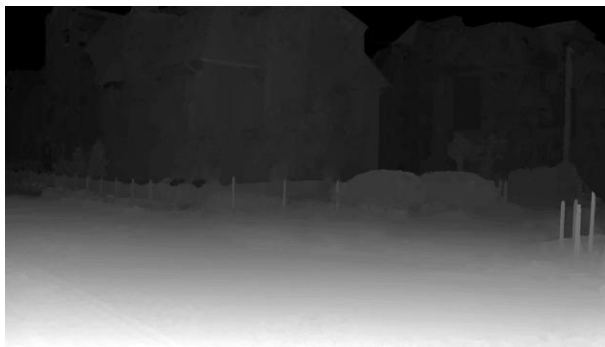
4   Results

Figures 1 and 2 show exemplary frames of "Poznan_Street" and "Poznan_CarPark" sequences.
As can be notices, quality of depth maps vary across different regions of the scenes. The final depth
map have been composed from the best performing (in synthesis) fragments of other depth maps.

a)   image

b)   final depth map

c)   background depth map

d)   DERS in semi-automatic mode

Figure 1. Various depth maps for "Poznan_Street" sequence.

a) image

b) final depth map

c) background depth map

d) DERS in semi-automatic mode

Figure 2. Various depth maps for "Poznan_CarPark" sequence.

5   Conclusions

- A new set of depth maps for "Poznan_Street", "Poznan_CarPark" and "Poznan_Hall" sequences have been created.
- New revision of depth maps for "Poznan_Street" sequence is acceptable.
- Quality of depth maps for "Poznan_CarPark" sequence is vastly improved, but still there are some artifacts.
- "Poznan_Hall 1&2" sequences are still a challenge. Despite several approaches, the quality of resultant depth maps is only slightly improved.

6   References

[1] "Description of Exploration Experiments in 3D Video Coding" ISO/IEC MPEG 2009/W11095. Kyoto. Japan. January 2010.
[2] M. Domański, T. Grajek, K. Klimaszewski, M. Kurc, O. Stankiewicz, J. Stankowski, K. Wegner, "Poznań Multiview Video Test Sequences and Camera Parameters", ISO/IEC JTC1/SC29/WG11 MPEG 2009/M17050, Xian, China, October 2009.