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Title Results of Exploration Experiments on Omnidirectional 6-DoF/3-DoF+ rendering
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1. Introduction

Omnidirectional video formats natively provide capability of changing direction of viewing but not the position of viewing. Such capability, of changing also the position of viewing, is key for the prospective Omnidirectional 6DoF/3DoF+ video technology. On previous meeting 119th MPEG meeting a set of exploration experiments has been established [1]. This document reports results obtained according to the EE description.

2. EE1: Omnidirectional depth estimation

As it has been shown in [2], rendering of additional views for the scene through depth image base rendering (DIBR) can be done with the use of depth maps. Previously it has been demonstrated [3] that it is possible to estimate depth maps by stereomatching depth estimation from uncalibrated stereoscopic 360 video. Here we use such an approach to perform experiments on a biggest set of test sequences.

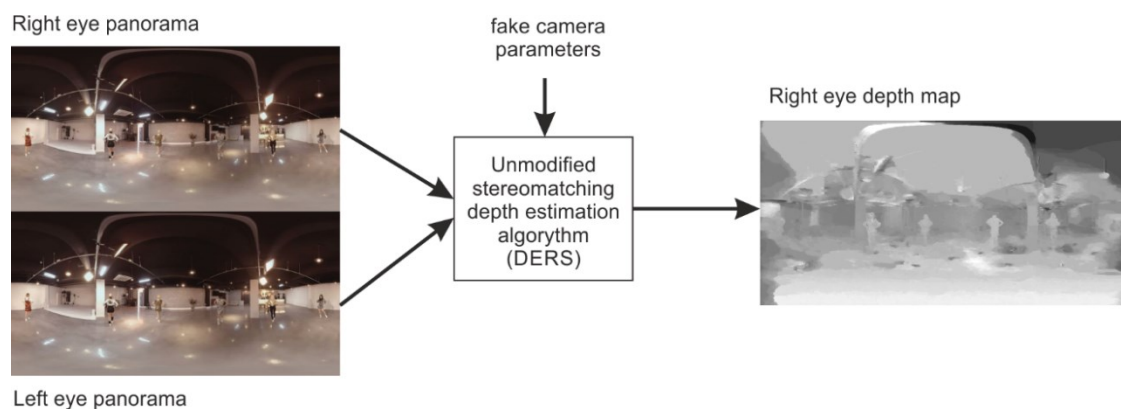


Figure f1. Depth estimation procedure for stereoscopic 360 video

According to the description [1] we have estimated depth maps for the following sequences:

- ETRI dancing,
- ETRI driving,
- JamSession,
- SkateBoardTrick,
- Train.

For the depth estimation we have used our in-house stereomatching depth estimation algorithm [4].

3. EE2: Omnidirectional viewpoint rendering

Based on the depth maps estimated under EE1, we have rendered virtual views as it would be seen from viewpoint displacement from center position by some amount. In the experiments we have to move no more than two steps each side.

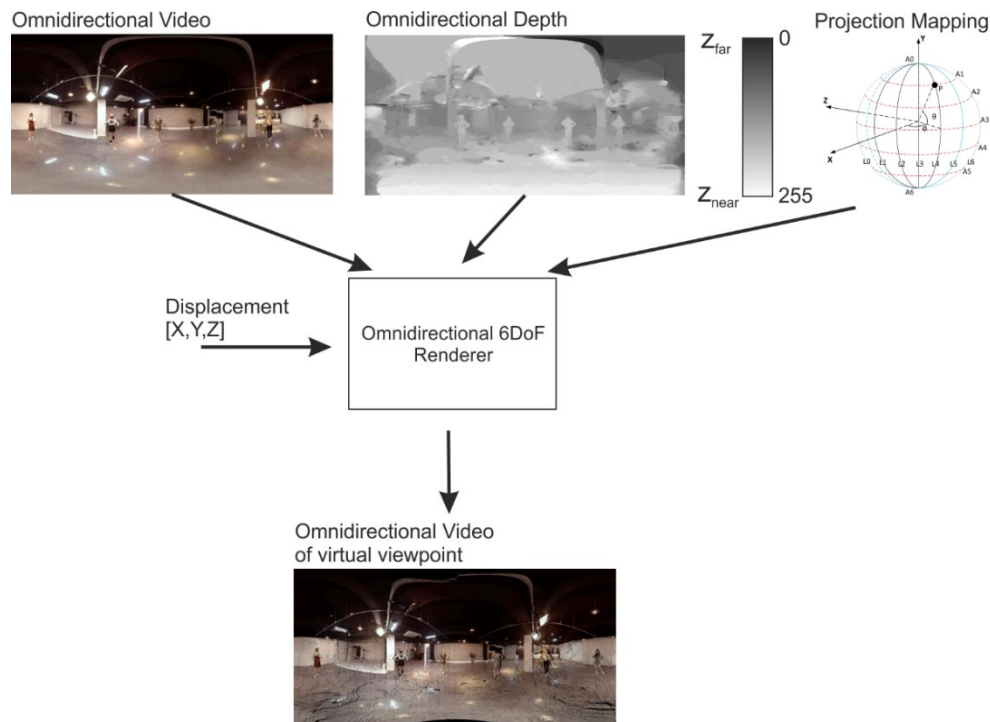


Figure 2. Overview of the omnidirectional rendering of virtual viewpoint based on omnidirectional video plus omnidirectional depth (OVD)

Rendering of a omnidirectional virtual viewpoint is equivalent to virtual translation of entire acquisition system taking omnidirectional images by certain amount.

4. Conclusions

The results will be made available during the meeting for the viewing.

5. References

- [1] Gun Bang, Krzysztof Wegner, "Exploration Experiments for MPEG-I: Omnidirectional-6DoF", ISO/IEC JTC1/SC29/WG11 MPEG2017/N17071, July 2017, Torino, Italy.
- [2] Krzysztof Wegner, Olgierd Stankiewicz, Adrian Dziembowski, Dawid Mieloch, Marek Domański, "Omnidirectional 6-DoF/3-DoF+ rendering", ISO/IEC JTC1/SC29/WG11 MPEG2017/M40806 July 2017, Torino, Italy.
- [3] Krzysztof Wegner, Olgierd Stankiewicz, Tomasz Grajek, Marek Domański, "Depth estimation from circular projection of 360 degree 3D video", ISO/IEC JTC1/SC29/WG11, MPEG2017/m40596, April 2017, Hobart, Australia.
- [4] Dawid Mieloch, Adrian Dziembowski, Adam Grzelka, Olgierd Stankiewicz, Marek Domański, "Temporal Enhancement of Graph-Based Depth Estimation Method", IEEE International Conference on Systems, Signals and Image Processing IWSSIP 2017, Poznań, Poland, 22-24 May 2017.