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Title [MPEG-I Visual] Natural outdoor test sequences
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1 Introduction

This document presents a description of PUT test sequences [1] with new depth maps. The proposal is the answer to the discussion on the test material conducted during BoG on future aspects of immersive video [2]. The proposed sequences are natural content and include two sequences of outdoor scenes and one with moving cameras. Sequences are challenging for the depth estimation, as they include areas with reflections, transparency.

2 Used multi-view capturing system

Our multi-view sequences were recorded by a 9-view camera rig (Fig. 1). We used cinematic Canon XH-G1 cameras, synchronized in time with the use of gunlock input, which provides HDTV signal via the SDI interface. The SDI streams are captured by a raid-like PC cluster.



Figure 1. Multiview camera rig.

All cameras are arranged equidistantly along a straight line with parallel optical axes. The inter-axial distance between neighboring cameras is approximately **13.75 cm** and the distance between optical centers of outer cameras is **110.0 cm**.

The specifications of the Canon XH-G1 camera are as follows:

- 3-chip 1/3" CCD sensors,
- progressive scan RGB camera,
- HDTV resolution (1920 × 1088),
- 25 frames / second,
- Frame and shutter synchronization by TTL trigger,
- Parameter control via LANC interface,
- Frame timestamp output,
- SDI signal output,
- Dimensions (W × H × L) 163 × 189 × 350 mm.

3 Proposed test sequences

Three test sequences are proposed:

- PoznanHall (Fig. 2) – Poznan University of Technology Hall
500 frames, indoor, moving camera
- PoznanCarpark (Fig. 3) – Poznan University of Technology Car Park
250 frames, outdoor
- PoznanStreet (Fig. 4) – Polanka Street near Poznan University of Technology building
250 frames, outdoor

Test sequences were calibrated and color-corrected. These sequences have been already used in previous MPEG activities related to 3D-HEVC.

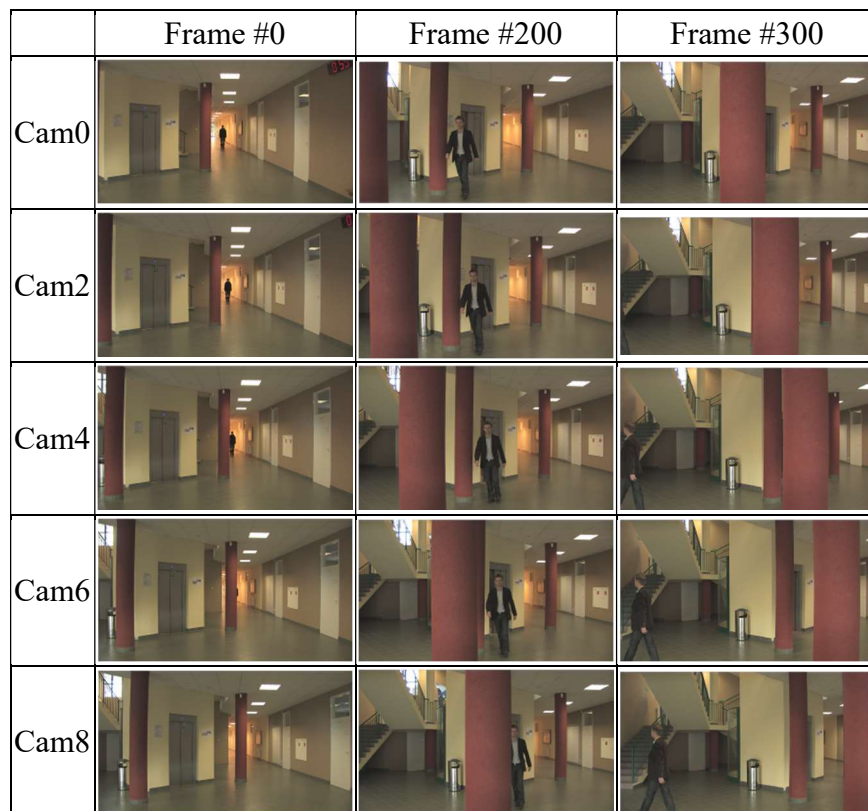


Figure 2. Selected views and frames of PoznanHall sequence.

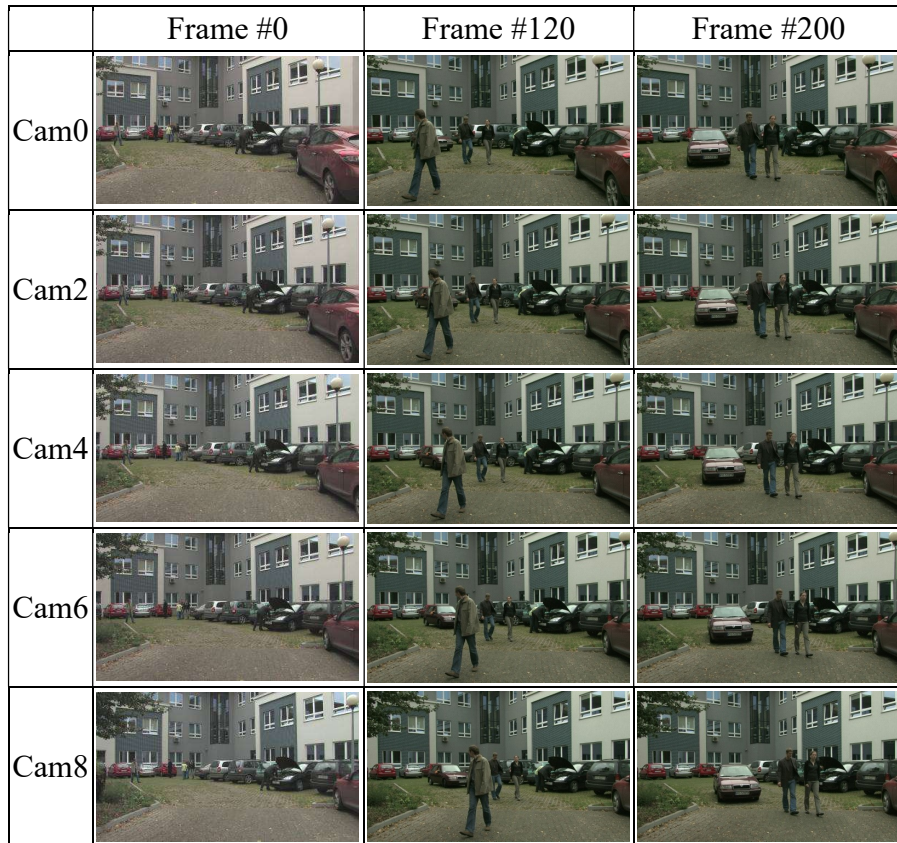


Figure 3. Selected views and frames of PoznanCarpark sequence.

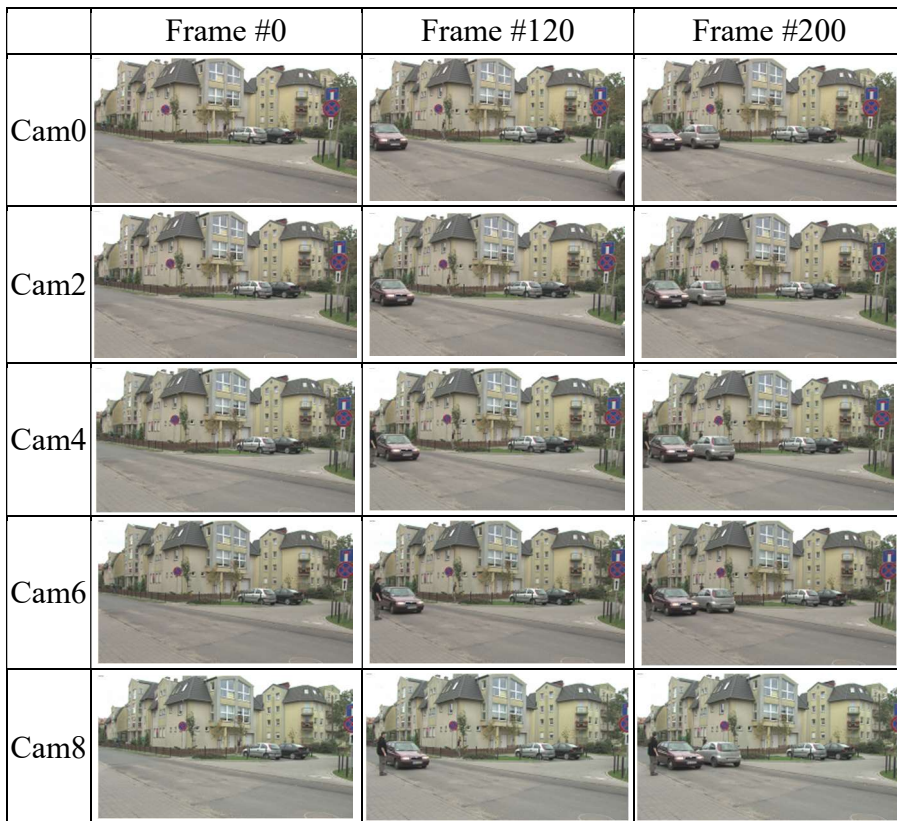


Figure 4. Selected views and frames of PoznanStreet sequence.

The proposed depth maps were calculated using the method based on [3] and [4]. The estimation is performed for segments and thus their size can be used to control a trade-off between the quality of depth maps and the processing time. The method uses also parallelization and temporal consistency enhancement methods that reduce the processing time of depth estimation. In the end, the depth maps were enhanced using the PDR [5]. Selected depth maps of proposed sequences are presented in Fig. 5.

	Input view	Depth map
Poznan Hall		
Poznan Carpark		
Poznan Street		

Figure 5. Selected views and depth maps of proposed sequences.

The proposed sequences, together with camera parameters and depth maps, will be uploaded to the MPEG content server if it will be requested by the group.

4 Acknowledgment

This work was supported by the Ministry of Science and Higher Education.

5 Recommendations

We recommend to use proposed sequences for new Core Experiments and include them in the Common Test Conditions.

6 References

- [1] Marek Domański, Tomasz Grajek, Krzysztof Klimaszewski, Maciej Kurc, Olgierd Stankiewicz, Jakub Stankowski, Krzysztof Wegner, “Poznań Multiview Video Test Sequences and Camera Parameters”, ISO/IEC JTC1/SC29/WG11 MPEG/M17050, October 2009, Xian, China.
- [2] Joel Jung, Vinod Kumar Malamal Vadakital, “BoG report: future aspects on immersive video”, ISO/IEC JTC1/SC29/WG11 MPEG/M51479, October 2019, Geneva, CH.
- [3] Dawid Mieloch, Olgierd Stankiewicz and Marek Domański, “Depth Map Estimation for Free-Viewpoint Television and Virtual Navigation,” IEEE Access, early access.
- [4] Dawid Mieloch, Adrian Dziembowski, Adam Grzelka, Olgierd Stankiewicz, Marek Domański, “Graph-based multiview depth estimation using segmentation”, IEEE International Conference on Multimedia and Expo ICME 2017, Hong Kong, 10-14 July 2017.
- [5] “Manual of depth refinement software PDR”, ISO/IEC JTC1/SC29/WG11 MPEG2019/N18708, Gothenburg, July 2019.