INTERNATIONAL ORGANISATION FOR STANDARDISATION
ORGANISATION INTERNATIONALE DE NORMALISATION
ISO/IEC JTC 1/SC 29/WG04
MPEG VIDEO CODING

ISO/IEC JTC 1/SC 29/WG 04 m58047
October 2021, Online

Title: Partial geometry assistance information
Source: PUT: Błażej Szydełko, Adrian Dziembowski, Dawid Mieloch, Marek Domański
ETRI: Gwangsoon Lee, Jun Young Jeong

Abstract

This document presents a description of the experiment on sending the geometry assistance SEI for a subset of views only. In such a case, more detailed features may be sent within the 1Mbps constraint. The results show, that the proposed approach performs better than the G17 anchor in terms of quality and depth estimation time.

The recommendation is to open an EE, to test whether the proposed solution outperforms the approach with sending geometry assistance SEI for all the views.

1 Proposed approach

In the proposal, the geometry assistance SEI is sent only for views packed into the first of four texture atlases.

In order to provide good quality depth information for the large part of the scene, the basic views are reshuffled (when compared to the G17 anchor), and the first atlas contains the most distant views (chosen by the TMIV view selector/labeler launched for the 2nd time, only for basic views).

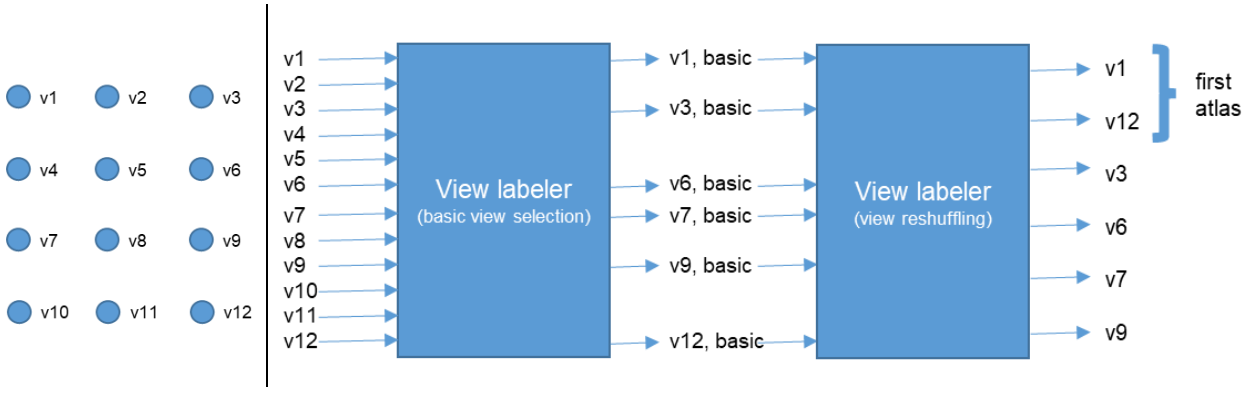

Fig. Basic view reshuffling in case, where an atlas contains 2 views. Left: camera arrangement, right: view selection process (basic views are additionally processed to find most distant ones).

For basic views from the 2nd, 3rd, and 4th atlas, the geometry assistance SEI is not being sent at all. For these views, features are estimated at the decoder side, based on textures (as in G17 anchor).

Skipping of sending features for some views allows sending more detailed features for the remaining ones. Therefore, we have proposed to change the initial size of the block for feature estimation from 128x128 to 32x32.

2 Results

The proposal was tested on all perspective content (mandatory + optional) and compared to the G17 anchor.

Mandatory content - Proposal vs. Low/High-bitrate Anchors

Sequence		High-BR BD rate Y-PSNR	Low-BR BD rate Y-PSNR	Max delta Y-PSNR	High-BR BD rate IV-PSNR	Low-BR BD rate IV-PSNR
Fan	O	2.4%	2.8%	10.62	-5.3%	-0.4%
Kitchen	J	-16.8%	-7.0%	11.62	-7.5%	-0.1%
Painter	D	-5.2%	2.7%	6.24	-10.0%	-1.8%
Frog	E	42.1%	27.0%	8.48	44.7%	28.1%
Carpark	P	-8.2%	-0.6%	10.04	-33.1%	-21.1%
Group	R	---	---	16.14	---	---
MIV		---	---	**10.52**	---	---

Runtime ratio (%)

Atlas encoding	Video encoding	Decoding & Rendering
105.0%	97.4%	54.9%
102.8%	107.6%	80.5%
99.7%	101.6%	75.8%
105.4%	97.4%	50.8%
99.6%	113.9%	79.2%
95.5%	107.3%	87.6%
101.4%	104.2%	71.5%

Optional content - Proposal vs. Low/High-bitrate Anchors

Fencing	L	-58.1%	-31.4%	13.10	-26.2%	-19.1%
Hall	T	---	---	15.61	---	---
Street	U	11.1%	4.6%	7.20	-1.5%	-0.2%
Mirror	I	-0.1%	3.1%	12.75	-2.4%	-1.1%
Cadillac	G	76.6%	50.4%	14.89	59.5%	44.2%
MIV		---	---	**12.71**	---	---

105.9%	94.4%	61.1%
94.9%	94.8%	79.2%
105.3%	82.7%	60.0%
103.7%	120.3%	87.4%
84.0%	116.9%	80.3%
98.8%	101.8%	73.6%

The objective results show that the proposal provides a reduction of depth estimation and rendering runtime by 30% and simultaneously gives the increase of the quality of rendered views for most of perspective content.

3 Recommendation

We recommend opening an EE, to test whether the proposed solution outperforms the approach with sending geometry assistance SEI for all the views.

4 Acknowledgement

This work was supported by Institute of Information & Communications Technology Planning & Evaluation (IITP) grant funded by the Korea government (MSIT) (No. 2018-0-00207, Immersive Media Research Laboratory).