

Title: Effectiveness of recursive splitting in feature extraction for subset of views
Source: PUT: Błażej Szydełko, Adrian Dziembowski, Dawid Mieloch, Marek Domański
 ETRI: Gwangsoon Lee, Jun Young Jeong

Abstract

This document presents the results of an additional experiment on sending the geometry assistance information for a subset of views. In m58047 the features were extracted with the initial block size equal to 32x32; here the initial grid was set to 128x128, but the recursive splitting (up to 4 split levels) was allowed.

The recommendation is to include the approach with recursive splitting into the EE-5.5.

1 Proposed approach

Identical to m58047:

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).

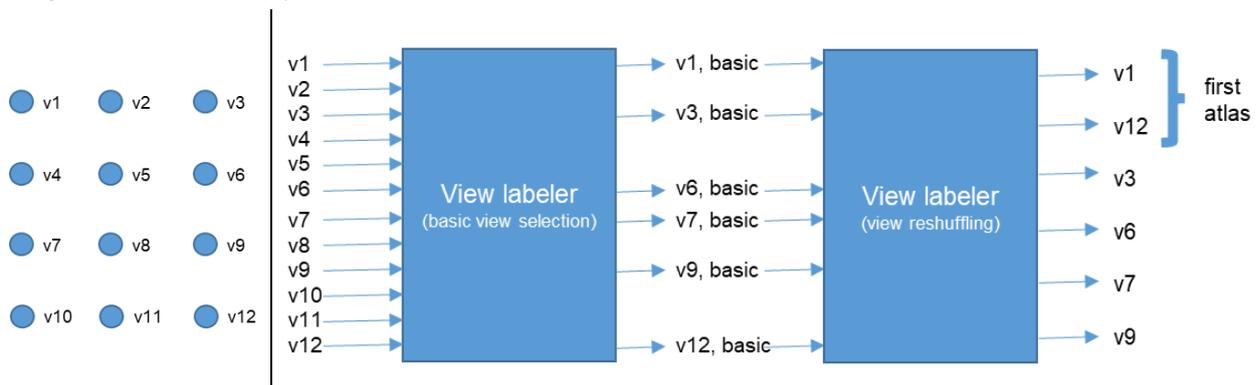


Fig. Basic view reshuffling in case, where an atlas contains 2 views. Left: camera arrangement, right: view selection process (basic views are additionally processed to find most distant ones).

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.

Different than in m58047:

Therefore, we have proposed to test the effectiveness of the recursive splitting, keeping the initial grid set to 128x128 and allowing up to 4 split levels.

At this moment, we did not finish the feature compressor, which fully handles the features extracted recursively. However, we have performed a rough estimation of the bitrate of additional metadata, trying to fit within the 1 Mbps constraint.

We suspect that such a feature compressor will be ready shortly after the meeting and it would be used in the EE.

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							Runtime ratio (%)		
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	Atlas encoding	Video encoding	Decoding & Rendering
Fan	O	1.4%	5.6%	10.64	-1.7%	5.1%	105.0%	97.4%	55.9%
Kitchen	J	-18.6%	-2.5%	11.25	-6.9%	5.8%	102.8%	107.6%	90.3%
Painter	D	-9.2%	-0.3%	6.38	-11.5%	-3.9%	99.7%	101.6%	73.5%
Frog	E	-5.7%	1.4%	7.35	5.4%	8.5%	105.4%	97.4%	51.7%
Carpark	P	-32.2%	-15.4%	9.70	-41.8%	-26.0%	99.6%	113.9%	85.0%
Group	R	---	---	16.32	---	---	95.5%	107.3%	81.8%
MIV		---	---	10.28	---	---	101.4%	104.2%	73.0%

Optional 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	Atlas encoding	Video encoding	Decoding & Rendering
Fencing	L	-68.5%	-31.2%	12.99	-24.7%	-13.7%	105.9%	94.4%	71.0%
Hall	T	---	---	15.17	---	---	94.9%	94.8%	90.9%
Street	U	-4.5%	6.2%	7.00	-0.6%	9.6%	105.3%	82.7%	78.5%
Mirror	I	3.3%	14.9%	12.70	2.7%	11.6%	103.7%	120.3%	82.6%
Cadillac	G	74.4%	58.9%	14.71	58.5%	51.8%	84.0%	116.9%	70.0%
MIV		---	---	15.74	---	---	98.8%	107.9%	81.7%

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 the perspective content.

3 Recommendation

We recommend including this approach into the EE-5.5, as a third test.

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).