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ISO/IEC JTC 1/SC 29/WG 04 MPEG VIDEO CODING

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Title   **[MIV] Patch geometry offset modification**
Source   **PUT, ETRI**
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Abstract

The document presents a proposal of patch geometry offset modification. The idea is similar to changing the values of color components of the patch to move the average value to the neutral color. The recommendation is to adopt the proposed syntax and include the proposed modification in TMIV16.

1   Proposal

The idea of patch geometry offset modification is similar to changing the values of color components of the patch to move the average value to the neutral color. Here, we propose to perform similar process also for geometry of patches.
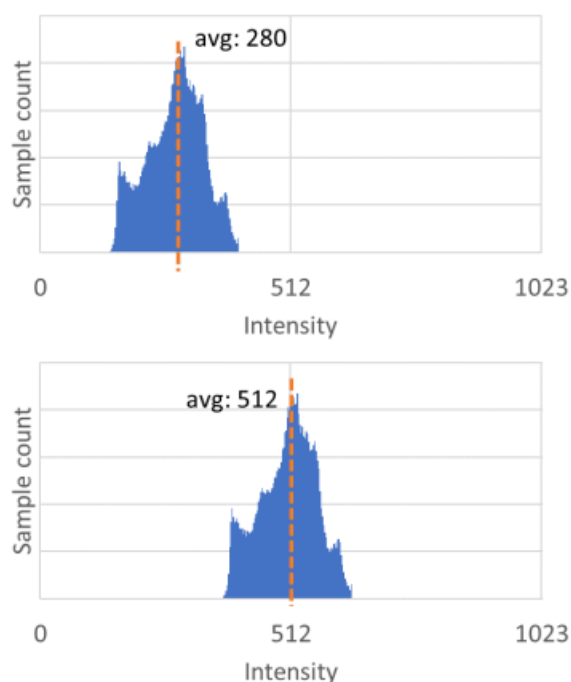

Fig. 1. Idea of proposed patch average geometry modification. From top: original histogram of geometry component of a patch, and histogram of the patch after modification of the patch average geometry.

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Anchor

Proposal

2   Results

A65

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

Sequence		BD-rate Y-PSNR	BD-rate IV-PSNR	BD-PSNR Y-PSNR	BD-PSNR IV-PSNR
Chess	B02	-8.0%	-1.2%	0.2%	0.0%
Guitarist	B03	-19.4%	-2.7%	0.1%	0.0%
Cadillac	J02	-0.4%	-0.3%	0.0%	0.0%
Fan	J04	-0.3%	0.1%	0.0%	-0.0%
Group	W01	-23.9%	-10.5%	1.3%	0.7%
Painter	D01	1.5%	0.1%	-0.1%	-0.0%
Frog	E01	-2.8%	-1.2%	0.2%	0.1%
CBABasketball	L02	15.9%	5.0%	-0.4%	-0.2%
Average		**-4.7%**	**-1.3%**	**0.2%**	**0.1%**

Max delta Y-PSNR [dB]

MIV Main	mXXXXX	Difference [%]
17.50	16.44	-6.1%
24.97	25.16	0.8%
6.73	6.75	0.4%
5.37	5.45	1.5%
13.69	14.62	6.8%
6.56	6.45	-1.8%
9.72	9.66	-0.6%
16.52	16.17	-2.1%
12.63	**12.59**	**-0.1%**

Max delta IV-PSNR [dB]

MIV Main	mXXXXX	Difference [%]
22.18	21.62	-2.5%
23.50	23.58	0.3%
6.50	6.51	0.2%
4.98	4.98	0.1%
14.46	14.36	-0.7%
5.01	5.05	0.8%
6.15	6.04	-1.7%
14.00	13.55	-3.2%
12.10	**11.96**	**-0.8%**

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Anchor · Proposal

W01, QP2
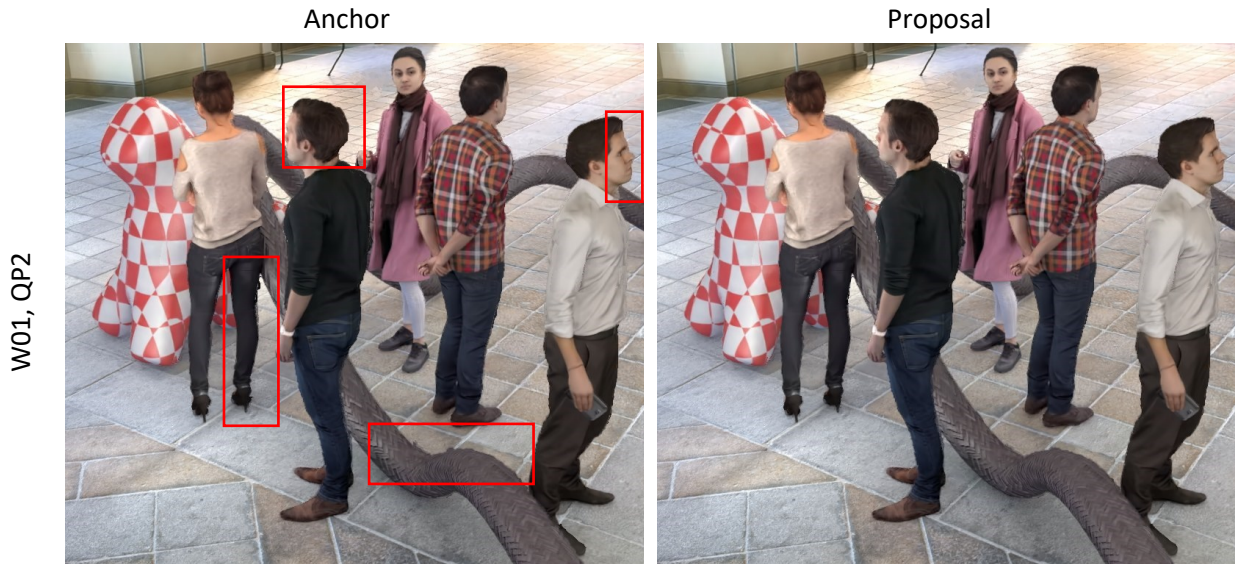
3   Syntax & semantics

Syntax and semantics are analogous to the attribute/texture offset already adopted to MIV.

8.3.2.3. Atlas sequence parameter set MIV extension syntax

asps_miv_extension( ) {	Descriptor
asme_ancillary_atlas_flag	u(1)
asme_embedded_occupancy_enabled_flag	u(1)
if(asme_embedded_occupancy_enabled_flag)	
asme_depth_occ_threshold_flag	u(1)
asme_geometry_scale_enabled_flag	u(1)
if(asme_geometry_scale_enabled_flag) {	
asme_geometry_scale_factor_x_minus1	ue(v)
asme_geometry_scale_factor_y_minus1	ue(v)
}	
if(!asme_embedded_occupancy_enabled_flag)	
asme_occupancy_scale_enabled_flag	u(1)
if(!asme_embedded_occupancy_enabled_flag && asme_occupancy_scale_enabled_flag) {	
asme_occupancy_scale_factor_x_minus1	ue(v)
asme_occupancy_scale_factor_y_minus1	ue(v)
}	
asme_patch_constant_depth_flag	u(1)
asme_patch_attribute_offset_enabled_flag	u(1)
if(asme_patch_attribute_offset_enabled_flag)	
asme_patch_attribute_offset_bit_depth_minus1	ue(v)
asme_patch_geometry_offset_enabled_flag	u(1)
if(asme_patch_geometry_offset_enabled_flag)	
asme_patch_geometry_offset_bit_depth_minus1	ue(v)
asme_max_entity_id	ue(v)
asme_inpaint_enabled_flag	u(1)
}	

8.3.2.7. Patch data unit MIV extension syntax

pdu_miv_extension(tileID, p) {	Descriptor
if(asme_max_entity_id > 0)	
pdu_entity_id[tileID][p]	u(v)
if(asme_depth_occ_threshold_flag)	
pdu_depth_occ_threshold[tileID][p]	u(v)
if(asme_patch_attribute_offset_enabled_flag)	
for(c = 0; c < 3; c++) {	
pdu_attribute_offset[tileID][p][c]	u(v)
if(asme_patch_geometry_offset_enabled_flag)	
pdu_geometry_offset[tileID][p]	u(v)
if(asme_inpaint_enabled_flag)	
pdu_inpaint_flag[tileID][p]	u(1)
}	

asme_patch_geometry_offset_enabled_flag equal to 1 indicates that the asme_patch_geometry_offset_bit_depth_minus1 syntax element is present in the syntax structure. asme_patch_geometry_offset_enabled_flag equal to 0 indicates that the asme_patch_geometry_offset_bit_depth_minus1 syntax element is not present in the syntax structure.

asme_patch_geometry_offset_bit_depth_minus1 plus 1 specifies the number of bits used to represent the pdu_geometry_offset[tileID][p] syntax element. asme_patch_geometry_offset_bit_depth_minus1 shall be in the range of 0 to ai_geometry_2d_bit_depth_minus1, inclusive.

pdu_geometry_offset[tileID][p] specifies an offset applied to the geometry value of the patch with index equal to p, in the tile with ID equal to tileID. The number of bits used to represent pdu_geometrye_offset[tileID][p] is equal to asme_patch_geometry_offset_bit_depth_minus1 + 1. When not present, the value of pdu_geometry_offset[tileID][p] is inferred to be equal to 0.

4 Recommendation

We recommend adopting the proposed syntax and including the proposed modification in TMIV16.

5 Acknowledgement