

SONY

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[V-PCC] CE2.18 Report

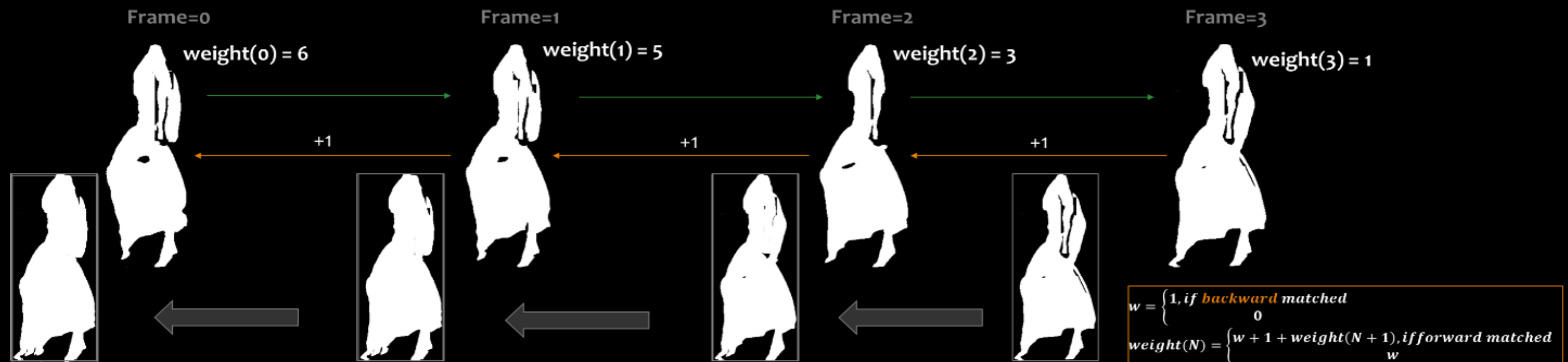
Danillo Graziosi, Alexandre Zaghetto and Ali Tabatabai
US Research Center

March 23, 2019

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CE 2.18 on patch packing

❖ Global Tetris Packing (Sony)

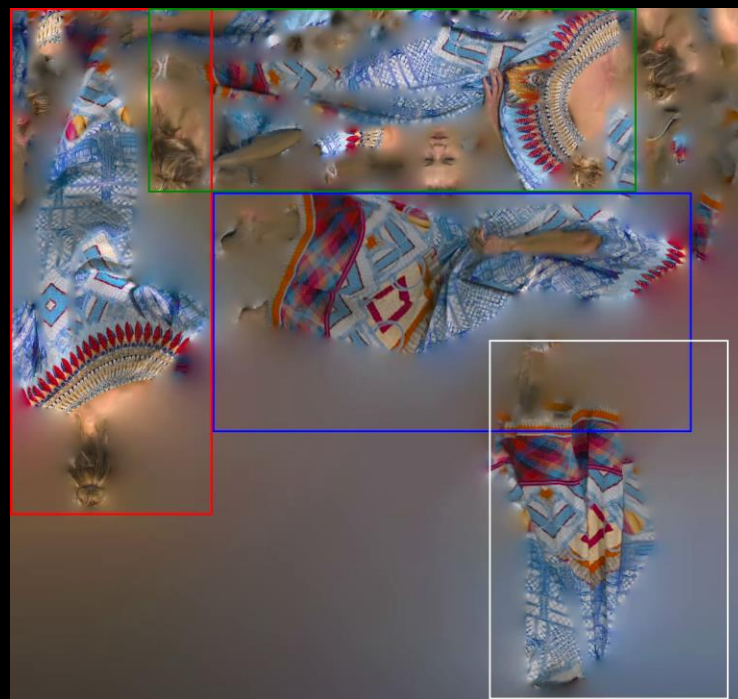


1. To study the coding performance of technique [1] compared to the anchor algorithm (GPA)
2. To study the coding performance of technique [1] using only **8 frames** for analysis
3. To evaluate the **complementary techniques** between [1] and the anchor (GPA)

CE2.18 on Patch Packing

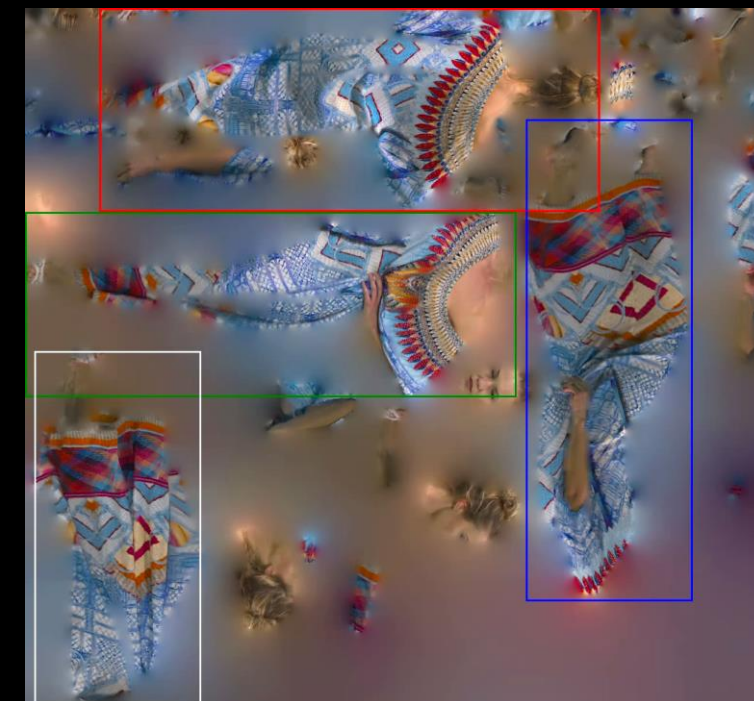
❖ Global Patch Allocation (GPA/anchor)

- Bounding Boxes are aligned (but not the content)
- All patches become intra patches in case the frame size grows too much
- New matches and patch ordering are recalculated



❖ Global Tetris Packing (Sony's proposal)

- Content is aligned (more stable)
- Only changes the position of the patches (all the other information is kept the same)
- Affected by wrong patch generation/matching



[CE2.18] Global Strategy Packing

❖ Results for 32 frames (vox11 sequences have only 10 frames)

- Sequences with bad patch matching are being reset at the anchor with GPA, while we do not change the matching information

C2_ra — lossy geometry, lossy attributes [inter, random access]														
Class	Sequence	No frames	Geom. BD-TotGeomRate [%]		End-to-End BD-AttrRate [%]			Geom. BD-TotalRate [%]		End-to-End BD-TotalRate [%]			Frame Size (REF)	Frame Size (TESTED)
			D1	D2	Luma	Chroma Cb	Chroma Cr	D1	D2	Luma	Chroma Cb	Chroma Cr		
cat2-A	8ivfbv2_loot_vox10	32	1.6%	1.9%	-7.7%	-11.3%	-9.0%	-0.8%	-0.4%	-0.9%	-3.3%	-1.9%	1280x1280	1280x1280
	8ivfbv2_redandblack_vox10	32	3.2%	2.8%	-1.4%	-4.6%	-1.6%	2.3%	1.9%	0.7%	-1.5%	0.6%	1280x1344	1280x2080
	8ivfbv2_soldier_vox10	32	-8.6%	-8.1%	-21.0%	-18.3%	-19.2%	-12.4%	-11.8%	-12.3%	-11.9%	-12.2%	1280x1504	1280x1456
	queen	32	1.0%	1.1%	-2.3%	-3.9%	-4.9%	-1.3%	-1.1%	-0.1%	-1.2%	-1.8%	1280x1408	1280x1408
cat2-B	8ivfbv2_longdress_vox10	32	2.1%	1.8%	-0.8%	-2.5%	-1.4%	1.0%	0.3%	0.3%	-1.0%	-0.2%	1280x1600	1280x2064
cat2-C	basketball_player_vox11	10	-4.9%	-4.7%	-13.4%	-16.0%	-16.0%	-7.1%	-6.7%	-8.0%	-10.2%	-10.0%	2560x3248	2560x1856
	dancer_player_vox11	10	0.8%	0.7%	0.5%	-4.2%	-0.3%	0.8%	0.7%	0.8%	-2.2%	-0.1%	2560x3616	2560x3840
Cat2-A average			-0.7%	-0.6%	-8.1%	-9.5%	-8.7%	-3.1%	-2.9%	-3.2%	-4.5%	-3.8%		
Cat2-B average			2.1%	1.8%	-0.8%	-2.5%	-1.4%	1.0%	0.3%	0.3%	-1.0%	-0.2%		
Cat2-C average			-2.1%	-2.0%	-6.4%	-10.1%	-8.1%	-3.1%	-3.0%	-3.6%	-6.2%	-5.0%		
Overall average			-0.7%	-0.6%	-6.6%	-8.7%	-7.5%	-2.5%	-2.4%	-2.8%	-4.5%	-3.6%		

Frame reset for redandblack → GPA: [0,3),[3,8),[8,10),[10,12),[12,17),[17,22),[22,25),[27,31)
→ GSP: [0, 31)

[CE2.18] Global Strategy Packing

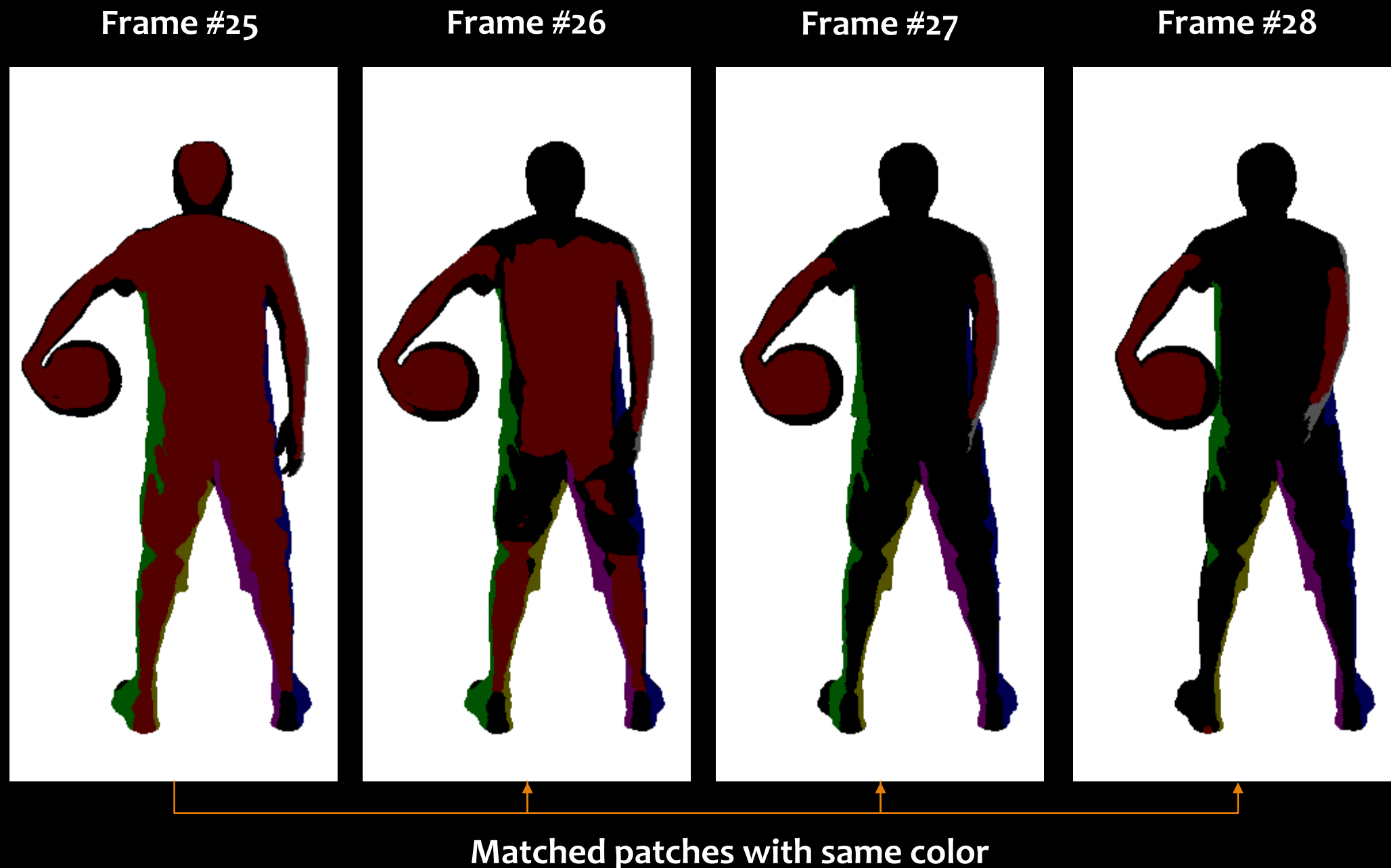
❖ Results for all frames (vox11 sequences have 128 frames)

- Problems with vox11 sequences → notice that the size of the frame increased significantly

C2_ra — lossy geometry, lossy attributes [inter, random access]			Geom. BD-TotGeomRate [%]		End-to-End BD-AttrRate [%]			Geom. BD-TotalRate [%]		End-to-End BD-TotalRate [%]			Frame Size (REF)	Frame Size (TESTED)
Class	Sequence	No frames	D1	D2	Luma	Chroma Cb	Chroma Cr	D1	D2	Luma	Chroma Cb	Chroma Cr		
cat2-A	8ivfbv2_loot_vox10	300	1.1%	1.0%	-4.5%	-10.5%	-10.5%	-0.2%	-0.3%	-0.9%	-4.5%	-4.4%	1280x1488	1280x1824
	8ivfbv2_redandblack_vox10	300	3.3%	2.9%	-0.6%	-5.1%	-0.9%	2.4%	1.8%	1.3%	-1.7%	1.2%	1280x1392	1280x2432
	8ivfbv2_soldier_vox10	300	-5.5%	-5.3%	-14.8%	-17.4%	-16.8%	-8.4%	-8.1%	-8.6%	-11.0%	-10.4%	1280x1776	1280x2304
	queen	250	-1.5%	-1.3%	-4.6%	-9.6%	-8.7%	-3.1%	-2.9%	-2.4%	-5.4%	-5.0%	1280x1408	1280x1552
cat2-B	8ivfbv2_longdress_vox10	300	2.9%	2.6%	-0.3%	-1.3%	-1.1%	1.7%	0.7%	0.9%	0.0%	0.2%	1280x1712	1280x2320
cat2-C	basketball_player_vox11	128	1.3%	1.2%	4.6%	-2.1%	1.5%	3.0%	2.8%	2.3%	-1.9%	0.0%	2560x3264	2560x5616
	dancer_player_vox11	128	3.4%	2.9%	5.1%	-2.0%	0.2%	5.2%	4.5%	3.5%	-1.0%	0.2%	2560x3616	2560x5888
Cat2-A average			-0.7%	-0.7%	-6.1%	-10.7%	-9.2%	-2.3%	-2.4%	-2.7%	-5.6%	-4.6%		
Cat2-B average			2.9%	2.6%	-0.3%	-1.3%	-1.1%	1.7%	0.7%	0.9%	0.0%	0.2%		
Cat2-C average			2.3%	2.1%	4.9%	-2.1%	0.9%	4.1%	3.7%	2.9%	-1.4%	0.1%		
Overall average			0.7%	0.6%	-2.1%	-6.9%	-5.2%	0.1%	-0.2%	-0.6%	-3.6%	-2.6%		

Basketball player issue

- ❖ Vox11 sequences may have matched patches with different sizes across frame



Since the same area is allocated for the matched patches, broken patches might take a lot of area inefficiently. One possible solution would be to break the connection between the patches (see next slide)

[CE2.18] Global Strategy Packing

For temporarily consistent sequences, increasing the GOF size reduces the gain, but for temporarily inconsistent sequences, it reduces the losses and may also reduce frame size

❖ Global Strategy Packing with GOF=8 (32 frames and all frames)

C2_ra — lossy geometry, lossy attributes [inter, random access]													
Class	Sequence	Geom. BD-TotGeomRate [%]		End-to-End BD-AttrRate [%]			Geom. BD-TotalRate [%]		End-to-End BD-TotalRate [%]			Frame Size (REF)	Frame Size (TESTED)
		D1	D2	Luma	Chroma Cb	Chroma Cr	D1	D2	Luma	Chroma Cb	Chroma Cr		
cat2-A	8ivfbv2_loot_vox10	2.0%	2.3%	1.5%	-2.1%	0.6%	1.6%	2.1%	2.0%	0.1%	1.3%	1280x1280	1280x1280
	8ivfbv2_redandblack_vox10	0.6%	0.7%	-3.3%	-4.7%	-3.5%	-1.0%	-1.0%	-1.0%	-1.8%	-1.1%	1280x1344	1280x1360
	8ivfbv2_soldier_vox10	-7.9%	-7.4%	-11.9%	-12.6%	-13.5%	-9.0%	-8.3%	-8.8%	-9.3%	-9.6%	1280x1504	1280x1440
	queen	-0.3%	-0.4%	2.2%	7.3%	5.7%	0.7%	0.5%	1.0%	3.5%	2.9%	1280x1408	1280x1408
cat2-B	8ivfbv2_longdress_vox10	0.6%	0.6%	1.2%	1.0%	1.6%	0.5%	0.3%	1.1%	1.0%	1.4%	1280x1600	1280x1776
cat2-C	basketball_player_vox11	-2.0%	-1.9%	-3.4%	-0.6%	-5.0%	-2.4%	-2.1%	-2.5%	-1.1%	-3.6%	2560x3248	2560x1856
	dancer_player_vox11	-0.6%	-0.5%	-1.7%	-2.5%	-5.2%	-1.1%	-1.0%	-0.9%	-1.4%	-3.2%	2560x3616	2560x3120
Cat2-A average		-1.4%	-1.2%	-2.9%	-3.0%	-2.7%	-1.9%	-1.7%	-1.7%	-1.9%	-1.6%		
Cat2-B average		0.6%	0.6%	1.2%	1.0%	1.6%	0.5%	0.3%	1.1%	1.0%	1.4%		
Cat2-C average		-1.3%	-1.2%	-2.6%	-1.5%	-5.1%	-1.8%	-1.6%	-1.7%	-1.2%	-3.4%		
Overall average		-1.1%	-0.9%	-2.2%	-2.0%	-2.8%	-1.5%	-1.4%	-1.3%	-1.3%	-1.7%		
C2_ra — lossy geometry, lossy attributes [inter, random access]													
Class	Sequence	Geom. BD-TotGeomRate [%]		End-to-End BD-AttrRate [%]			Geom. BD-TotalRate [%]		End-to-End BD-TotalRate [%]			Frame Size (REF)	Frame Size (TESTED)
		D1	D2	Luma	Chroma Cb	Chroma Cr	D1	D2	Luma	Chroma Cb	Chroma Cr		
cat2-A	8ivfbv2_loot_vox10	0.5%	0.5%	0.7%	-0.7%	-0.5%	0.4%	0.4%	0.7%	0.0%	0.0%	1280x1488	1280x1488
	8ivfbv2_redandblack_vox10	1.2%	1.0%	-0.9%	-3.2%	-1.2%	0.5%	0.2%	0.2%	-1.2%	0.1%	1280x1392	1280x2144
	8ivfbv2_soldier_vox10	-5.0%	-4.7%	-8.4%	-10.3%	-10.1%	-5.9%	-5.6%	-6.0%	-7.3%	-7.2%	1280x1776	1280x1952
	queen	-0.7%	-0.7%	1.0%	0.7%	0.6%	-0.2%	-0.1%	0.1%	-0.1%	-0.2%	1280x1408	1280x1408
cat2-B	8ivfbv2_longdress_vox10	1.0%	0.8%	0.7%	0.5%	0.4%	0.7%	0.2%	0.8%	0.6%	0.6%	1280x1712	1280x1984
cat2-C	basketball_player_vox11	-0.2%	-0.2%	0.5%	-3.8%	-1.4%	0.1%	0.1%	0.1%	-2.5%	-1.3%	2560x3264	2560x4384
	dancer_player_vox11	0.6%	0.4%	0.6%	-3.4%	-1.8%	0.9%	0.5%	0.5%	-1.9%	-1.1%	2560x3616	2560x4544
Cat2-A average		-1.0%	-1.0%	-1.9%	-3.4%	-2.8%	-1.3%	-1.3%	-1.2%	-2.1%	-1.8%		
Cat2-B average		1.0%	0.8%	0.7%	0.5%	0.4%	0.7%	0.2%	0.8%	0.6%	0.6%		
Cat2-C average		0.2%	0.1%	0.6%	-3.6%	-1.6%	0.5%	0.3%	0.3%	-2.2%	-1.2%		
Overall average		-0.4%	-0.4%	-0.8%	-2.9%	-2.0%	-0.5%	-0.6%	-0.5%	-1.8%	-1.3%		

Conclusion

- ❖ The proposed method was able to temporarily stabilize the sequences more than the current GPA method. The method may be affected by the inconsistent patch matching/generation, but limiting the GOF size may help. Further improvements could be achieved by improving the patch generation and the patch matching algorithm.
- ❖ We would like for the PCC group to consider the proposed technique for adoption in the test model SW.