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[JCTVC-F358]

Mode Dependent Filtering for Intra Predicted Samples

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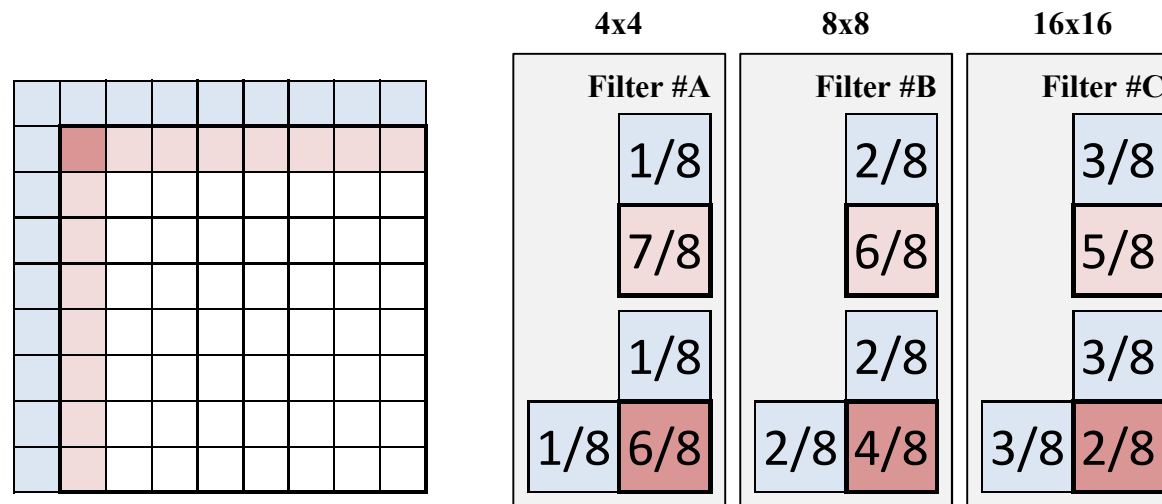
Contents

- ☐ Introduction
- ☐ Proposal 1. Single filter for DC predicted samples
- ☐ Proposal 2. Filtering for planar predicted samples
- ☐ Proposal 3. Filtering for angular prediction samples
- ☐ Proposal 4. Mode-dependent filtering for intra predicted samples
- ☐ Conclusions

Introduction

❑ Filtering process of DC predicted samples in HM3.0

❖ Three types of filter according to block size

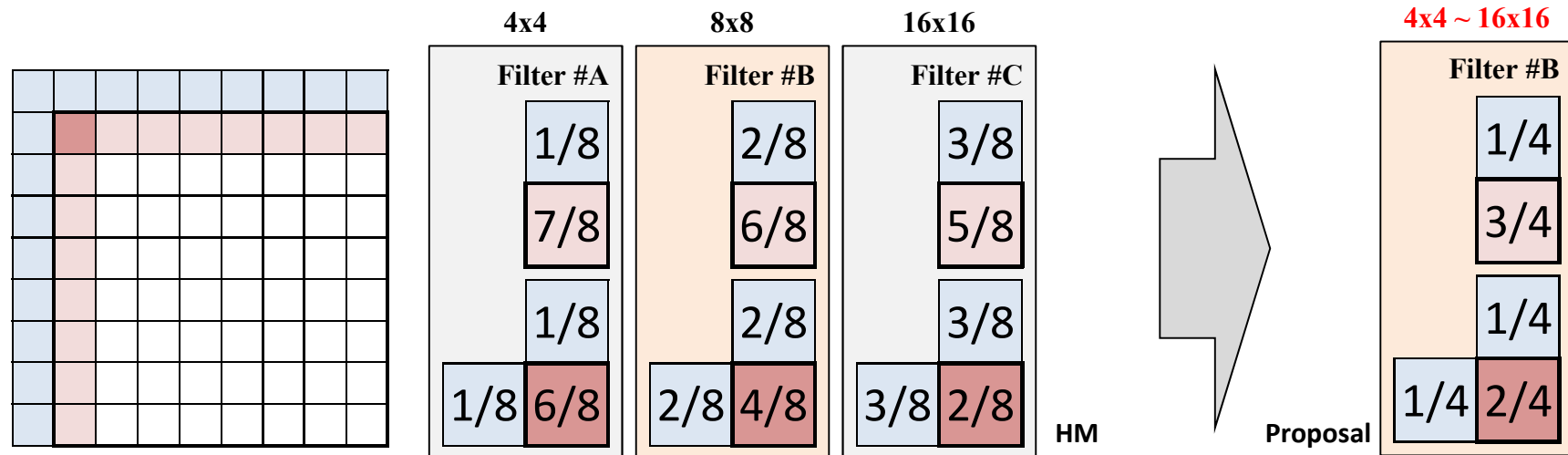


Three types of filter for DC predicted samples

Proposal 1

❑ Single filter for DC predicted samples

❖ Use filter #B for 4x4 ~ 16x16 block sizes



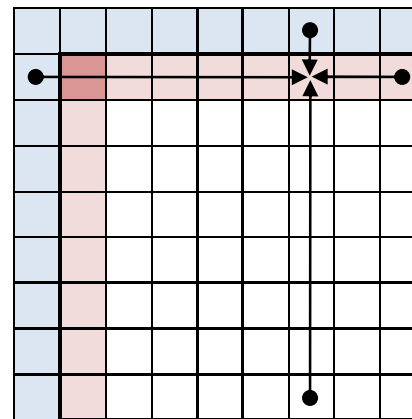
Anchor:
HM3.2rc1

	All Intra HE (BD-rate)			All Intra LC (BD-rate)		
	Y	U	V	Y	U	V
Class A	0.0	-0.1	-0.1	0.0	-0.1	-0.1
Class B	0.0	0.0	0.0	0.0	0.0	-0.1
Class C	0.0	0.0	0.0	0.0	0.0	0.0
Class D	0.0	0.0	0.0	0.0	0.0	0.0
Class E	0.0	0.0	0.0	0.0	0.0	0.0
Overall	0.0	0.0	0.0	0.0	0.0	0.0
Enc Time[%]	100%			99%		
Dec Time[%]	100%			100%		

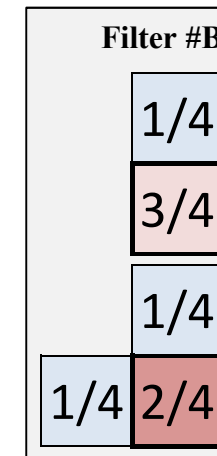
Proposal 2

❑ Filtering for planar predicted samples

- ❖ To improve the prediction continuity in the boundary region
- ❖ Use filter #B of DC prediction
- ❖ Apply to 4x4~16x16



4x4 ~ 16x16



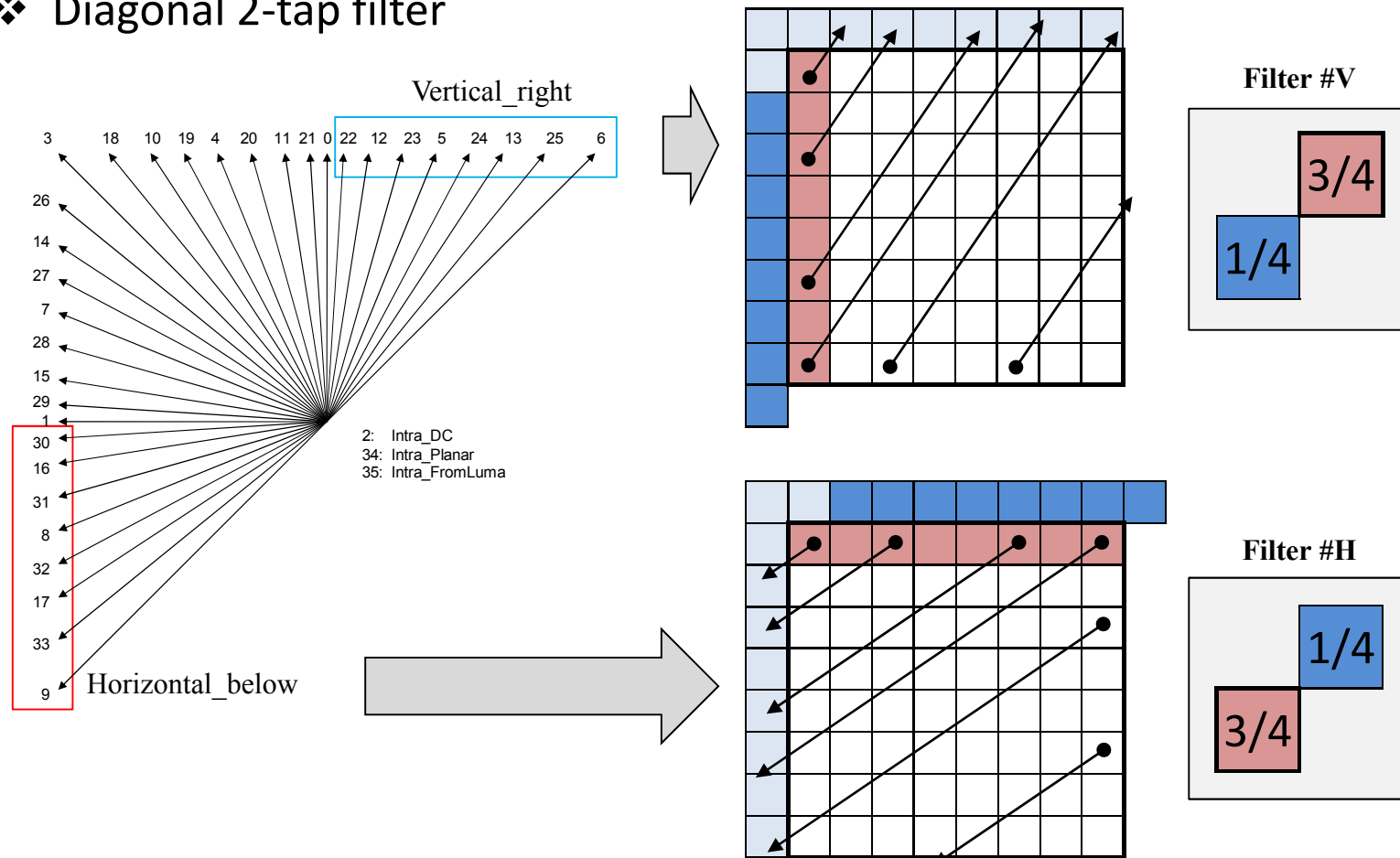
Anchor:
HM3.2rc1

	All Intra HE (BD-rate)			All Intra LC (BD-rate)		
	Y	U	V	Y	U	V
Class A	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Class B	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Class C	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Class D	0.0	-0.1	-0.1	-0.1	-0.1	-0.1
Class E	-0.1	0.0	-0.1	-0.1	-0.1	-0.1
Overall	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Enc Time[%]	100%			100%		
Dec Time[%]	100%			100%		

Proposal 3 (1/2)

❑ Filtering for angular predicted samples

- ❖ To improve the prediction continuity in the boundary region
- ❖ Diagonal 2-tap filter



Proposal 3 (2/2)

❑ Filtering for angular predicted samples

❖ Experimental results

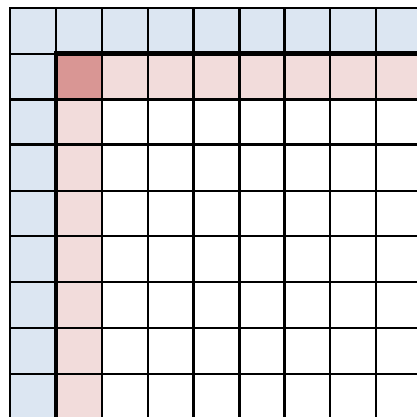
- Anchor: HM3.2rc1
- Apply to 4x4~16x16

	All Intra HE (BD-rate)			All Intra LC (BD-rate)		
	Y	U	V	Y	U	V
Class A	-0.4	-0.4	-0.4	-0.4	-0.6	-0.6
Class B	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3
Class C	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Class D	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Class E	-0.4	-0.2	-0.4	-0.3	-0.4	-0.4
Overall	-0.3	-0.2	-0.3	-0.3	-0.3	-0.4
Enc Time[%]	100%			100%		
Dec Time[%]	100%			101%		

Proposal 4 (1/2)

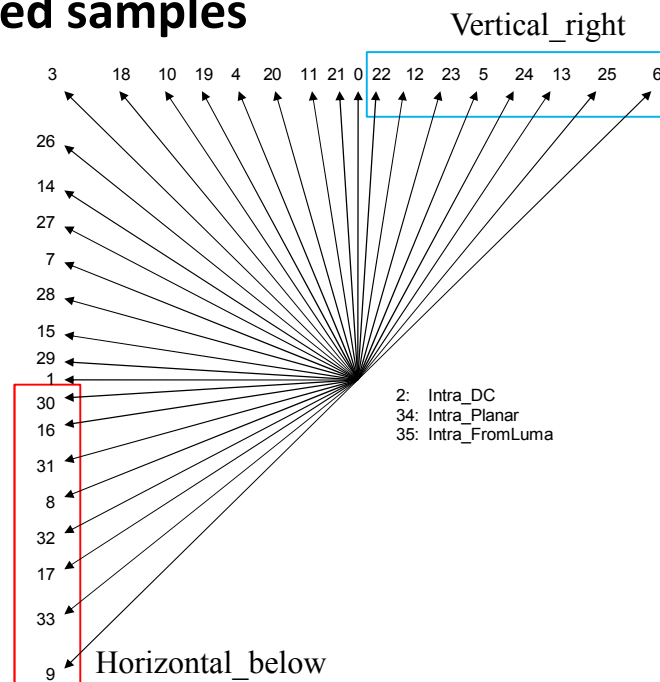
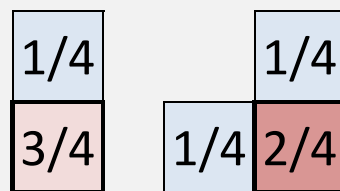
❑ Mode-dependent filtering for intra predicted samples

- ❖ Filter #1: DC, Planar prediction modes
- ❖ Filter #2: 'Vertical_right' prediction modes
- ❖ Filter #3: 'Horizontal_below' prediction modes



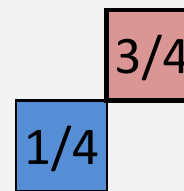
DC, Planar

Filter #1



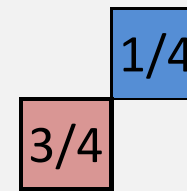
Vertical_right

Filter #2



Horizontal_below

Filter #3



Proposal 4 (2/2)

❑ Mode-dependent filtering for intra predicted samples

❖ Apply to 4x4~16x16

Mode	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Filter type	0	0	1	0	0	2	2	0	3	3	0	0	2	2	0	0	3	3	0	0	0	0	2	2	2	2	0	0	0	0	3	3	3	3	1

HE	Sequence	BD-rate Y	BD-rate U	BD-rate V
class A	S01 Traffic	-0.9	-0.8	-0.6
	S02 PeopleOnStreet	-1.0	-1.0	-0.9
	S03 Nebuta	-0.2	-0.1	-0.2
	S04 SteamLocomotive	-0.2	-0.1	-0.1
class B	S05 Kimono	-0.3	-0.2	-0.2
	S06 ParkScene	-0.5	-0.3	-0.2
	S07 Cactus	-0.6	-0.4	-0.4
	S08 BasketballDrive	-0.2	-0.3	-0.3
	S09 BQTerrace	-0.1	-0.1	0.0
class C	S10 BasketballDrill	-0.2	-0.3	-0.2
	S11 BQMall	-0.4	-0.4	-0.4
	S12 PartyScene	-0.2	-0.2	-0.2
	S13 RaceHorses	-0.2	-0.2	-0.2
class D	S14 BasketballPass	-0.4	-0.4	-0.4
	S15 BQSquare	-0.1	0.0	0.1
	S16 BlowingBubbles	-0.3	-0.2	-0.2
	S17 RaceHorses	-0.4	-0.6	-0.5
class E	S18 Vidyo1	-0.4	-0.5	-0.5
	S19 Vidyo3	-0.4	-0.2	-0.4
	S20 Vidyo4	-0.5	-0.3	-0.5

	All Intra HE (BD-rate)		
	Y	U	V
Class A	-0.6	-0.5	-0.5
Class B	-0.3	-0.3	-0.2
Class C	-0.2	-0.3	-0.3
Class D	-0.3	-0.3	-0.3
Class E	-0.4	-0.3	-0.4
Overall	-0.4	-0.3	-0.3
Enc Time[%]	100%		
Dec Time[%]	101%		

	All Intra LC (BD-rate)		
	Y	U	V
Class A	-0.5	-0.7	-0.7
Class B	-0.3	-0.4	-0.4
Class C	-0.2	-0.3	-0.3
Class D	-0.3	-0.3	-0.3
Class E	-0.4	-0.5	-0.5
Overall	-0.3	-0.4	-0.5
Enc Time[%]	100%		
Dec Time[%]	101%		

Conclusions

❑ Experimental results

Proposal	Y/U/V (BD-rate)		Enc/Dec Time (%)	
	HE	LC	HE	LC
1 (DC-single filter)	0.0/0.0/0.0	0.0/0.0/0.0	100/100	99/100
2 (Planar)	-0.1/-0.1/-0.1	-0.1/-0.1/-0.1	100/100	100/100
3 (Angular)	-0.3/-0.2/-0.3	-0.3/-0.3/-0.4	100/100	100/101
4 (Combination)	-0.4/-0.3/-0.3	-0.3/-0.4/-0.5	100/101	100/101

❑ Consistent luma and chroma gain for all sequences.

❑ Cross-checked by Mitsubishi (JCTVC-F649).

❑ Suggest the proposals to be adopted into the HM.

Thank You Very Much !

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