

JCTVC-G443

Improved directional intra prediction smoothing

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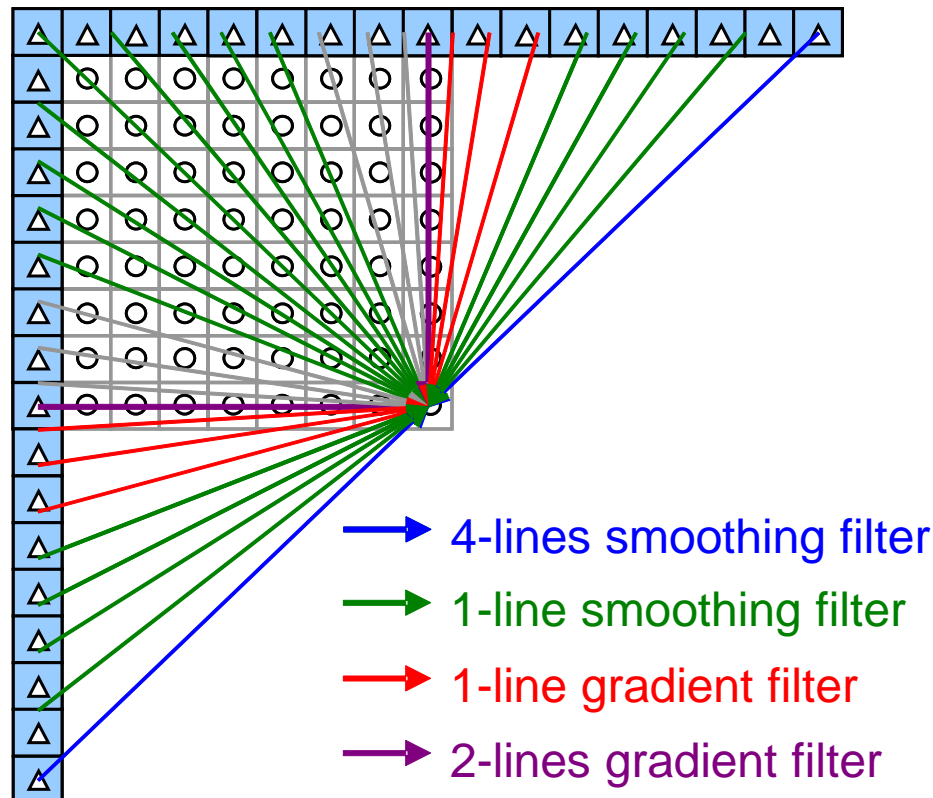
Mitsubishi Electric Corporation

Overall Summary

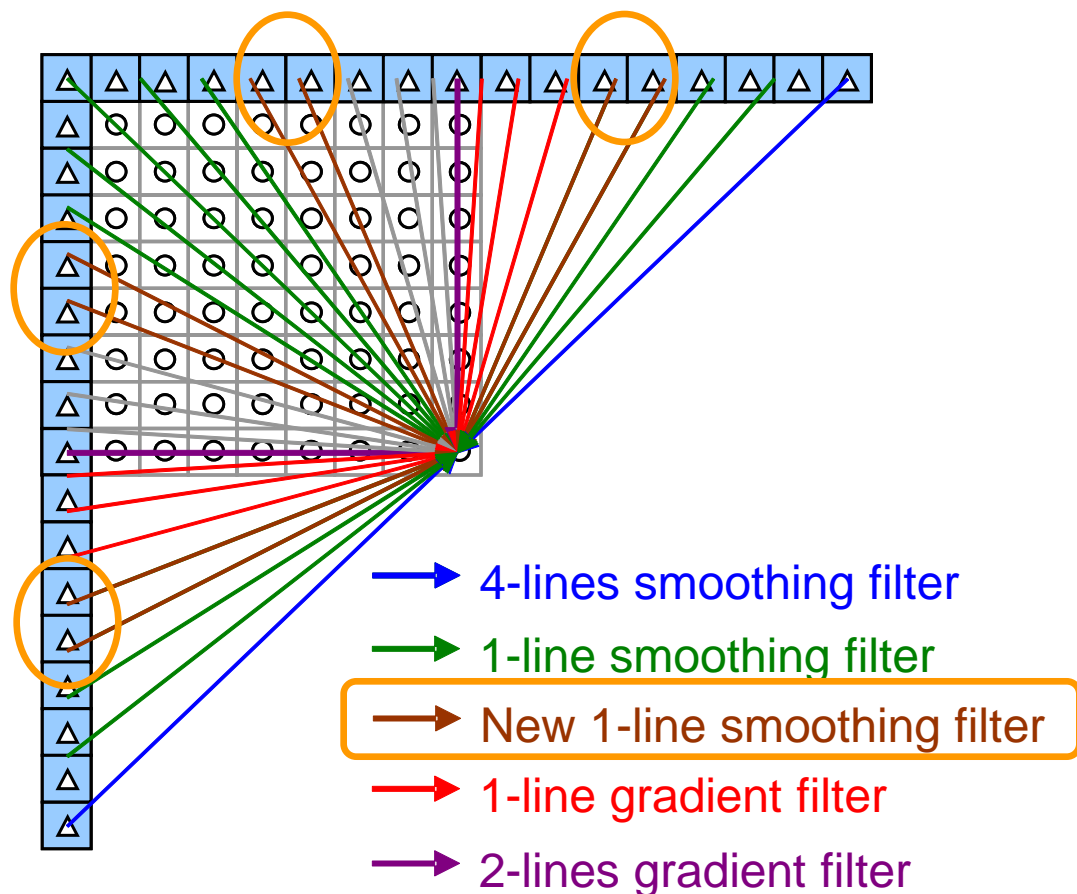
- Propose a technique improving intra angular prediction filtering discussed in CE6.d
 - Base: harmonized scheme proposed by JCTVC-G280
 - Proposal: Shift the position of the reference samples for filtering along the prediction direction
 - 0.01-0.02% luma BD-rate gains for AI/HE and AI/LC
- The simplified scheme is proposed
 - Reduce the number of intra prediction modes to be filtered
 - Almost the same coding efficiency compared to the harmonized scheme in CE6.d
- Crosscheck
 - JCTVC-G896 (Nokia)
- Propose the scheme to be adopted to HM-5

Harmonization scheme in CE6.d

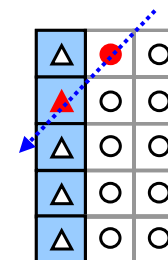
- Proposed by MediaTek, Nokia, ETRI and Mitsubishi (JCTVC-G280)



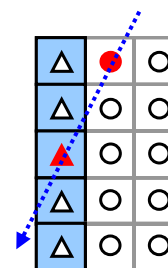
Proposed scheme



1-line smoothing filter



New 1-line smoothing filter



- △ Coded samples
- Prediction samples
- A sample to be filtered
- ▲ A reference sample
-→ Prediction direction

Simulation Results (1)

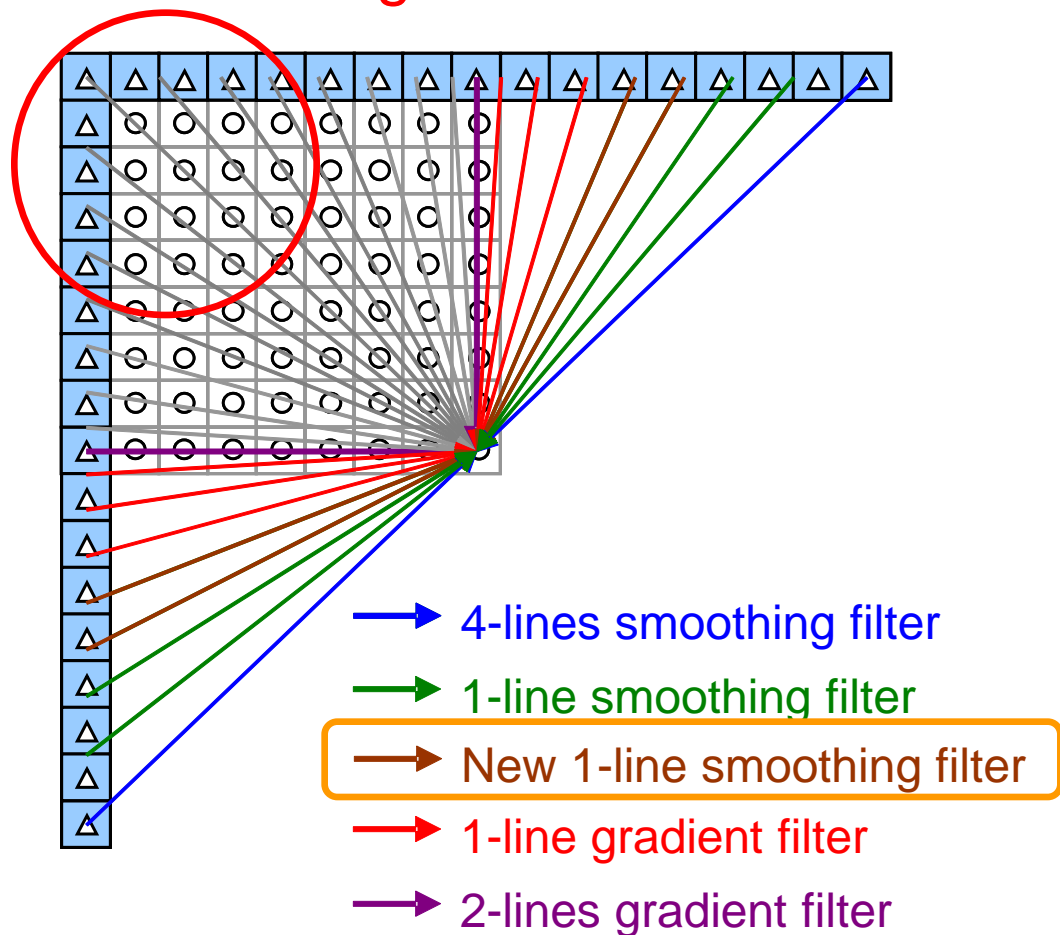
- Anchor: Harmonized scheme in CE6.d implemented on HM4.0
- Tested: Proposed scheme implemented on HM4.0

	All Intra HE			All Intra LC		
	Y	U	V	Y	U	V
Class A	0.02%	0.02%	0.00%	0.02%	0.05%	0.04%
Class B	-0.02%	-0.12%	0.04%	-0.02%	0.00%	0.00%
Class C	-0.03%	-0.01%	0.00%	-0.03%	-0.02%	0.01%
Class D	-0.02%	0.01%	0.02%	-0.01%	0.05%	0.01%
Class E	-0.05%	-0.01%	0.07%	-0.01%	0.06%	0.00%
Overall	-0.02%	-0.03%	0.02%	-0.01%	0.02%	0.01%
	-0.02%	-0.01%	0.02%	-0.01%	0.02%	0.01%
Enc Time[%]	100%			100%		
Dec Time[%]	99%			100%		

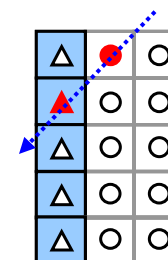
0.01-0.02% BD-rate gains without additional operation

Simplification of the proposed scheme

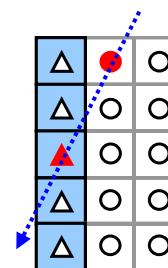
Disable filtering



1-line smoothing filter



New 1-line smoothing filter



- △ Coded samples
- Prediction samples
- A sample to be filtered
- ▲ A reference sample
- Prediction direction

Simulation Results (2)

- Anchor: Harmonized scheme in CE6.d implemented on HM4.0
- Tested: Simplified proposed scheme implemented on HM4.0

	All Intra HE			All Intra LC		
	Y	U	V	Y	U	V
Class A	0.00%	0.06%	0.10%	-0.01%	0.03%	0.03%
Class B	-0.02%	0.00%	0.01%	-0.06%	0.03%	-0.05%
Class C	0.00%	0.02%	0.00%	0.03%	0.00%	0.03%
Class D	0.01%	0.03%	0.01%	0.03%	0.00%	0.03%
Class E	-0.04%	0.03%	0.02%	-0.03%	0.02%	0.03%
Overall	-0.01%	0.03%	0.03%	-0.01%	0.02%	0.01%
	-0.01%	0.04%	0.02%	-0.01%	0.01%	0.01%
Enc Time[%]	100%			100%		
Dec Time[%]	99%			101%		

Almost the same coding performance with reduction of the number of intra prediction modes to be filtered

Conclusions

- The proposed scheme
 - 0.01-0.02% BD-rate gains compared to the harmonized scheme in CE6
 - No additional operation
- The simplified proposed scheme
 - Reduce the number of intra prediction modes to be filtering
 - Almost the same coding performance compared to the harmonized scheme in CE6
- Propose the scheme to be adopted to HM-5