

JCTVC-G445

Removing DC component of ALF filter coefficients

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Summary

- Proposed method
 - DC-offset of ALF is removed.
- Results
 - 0.1% gain in BD-rate, and 1% ~ 4% reduction in encoding time.
- Crosscheck
 - JCTVC-G615 (by Qualcomm)
 - JCTVC-G918 (by Samsung)

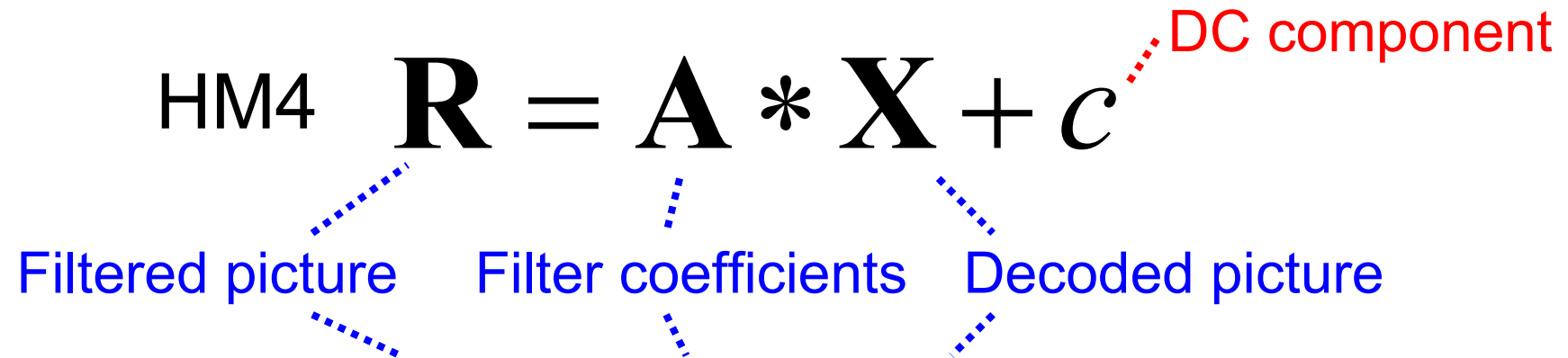
Motivation

- There are two similar functions for compensating the offset of pixel values in HM4.
 - DC component of ALF
 - Sample Adaptive Offset (SAO)
- To reduce the functional redundancy, remove the DC-offset of ALF.

DC Component Removal in ALF

HM4 $\mathbf{R} = \mathbf{A} * \mathbf{X} + c$ DC component

Filtered picture Filter coefficients Decoded picture



Proposed $\mathbf{R} = \mathbf{A}' * \mathbf{X}$

- Solve the least squares problem without a constant term.
- Complexity reduction
 - Reduce the matrix size in solving the LSM problem
 - Remove the constant addition in filtering
- Coding gain
 - Remove the constant coefficient from bitstream

Simulation Results

	All intra			Random access			Low delay		
	Y	U	V	Y	U	V	Y	U	V
Class A	0.0%	-0.2%	-0.3%	-0.1%	-0.4%	-0.5%			
Class B	-0.1%	-0.4%	-0.5%	-0.1%	-0.6%	-0.4%	0.0%	-0.1%	0.5%
Class C	-0.1%	-0.2%	-0.3%	-0.1%	-0.2%	-0.4%	-0.1%	0.2%	0.1%
Class D	-0.1%	-0.2%	-0.3%	-0.2%	-0.5%	-0.6%	-0.1%	-0.1%	-0.5%
Class E	-0.1%	-0.8%	-0.7%				0.1%	-0.3%	2.4%
Overall	-0.1%	-0.3%	-0.4%	-0.1%	-0.4%	-0.5%	0.0%	0.0%	0.5%
Enc Time	96%			99%			99%		
Dec Time	101%			101%			102%		

- BD-rate gain: 0.1%
- Enc time reduction: 1% ~ 4%

Conclusion

- Proposed method
 - In order to reduce the redundancy with SAO, DC component of ALF is removed.
- Results
 - 0.1% BD-rate gain
 - 1% ~ 4% enc time reduction
- Recommendation
 - Adopt the proposed method to HM5 and WD5.