

Chroma DC offset for intra coding

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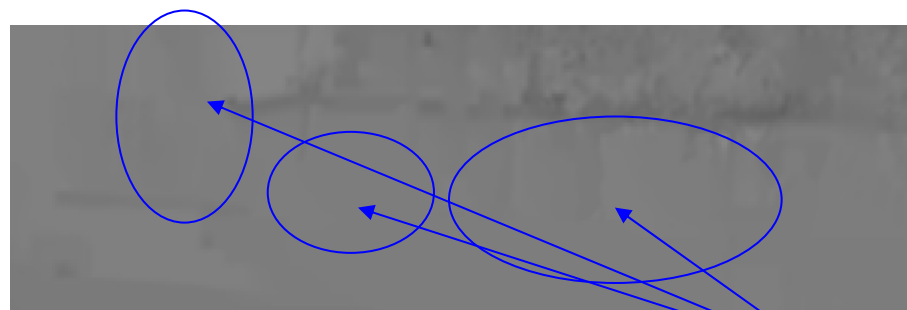
Panasonic ideas for life

Motivation

- ✓ Color bleeding artifacts are observed with some test sequences coded by HM3.0.



Decoded Image of HM3.0



U component of Decoded Image of HM3.0

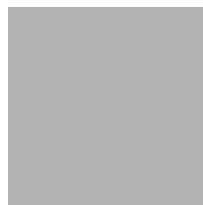
flat

Investigation

- ✓ Color bleeding artifacts are much visible at flat region
- ✓ Color looks different if U and V have ± 2 level differences.



(Y, U, V) = (128, 126, 126)



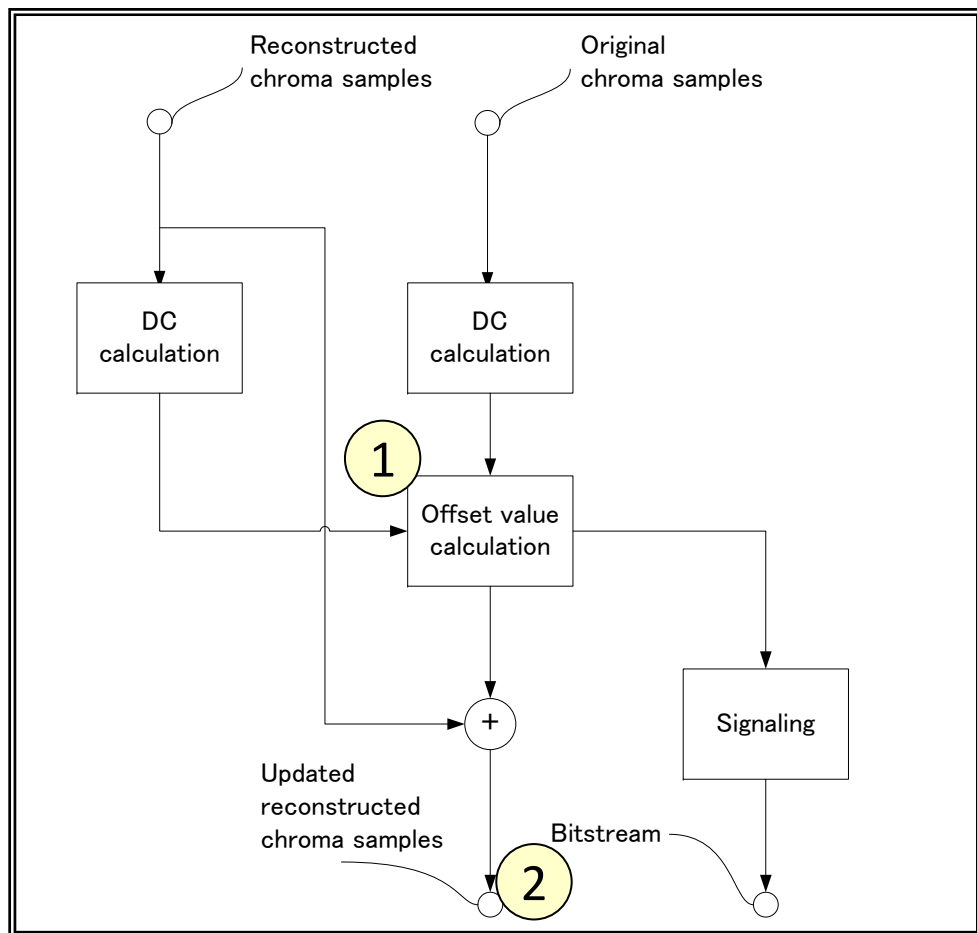
(128, 128, 128)



(128, 130, 130)

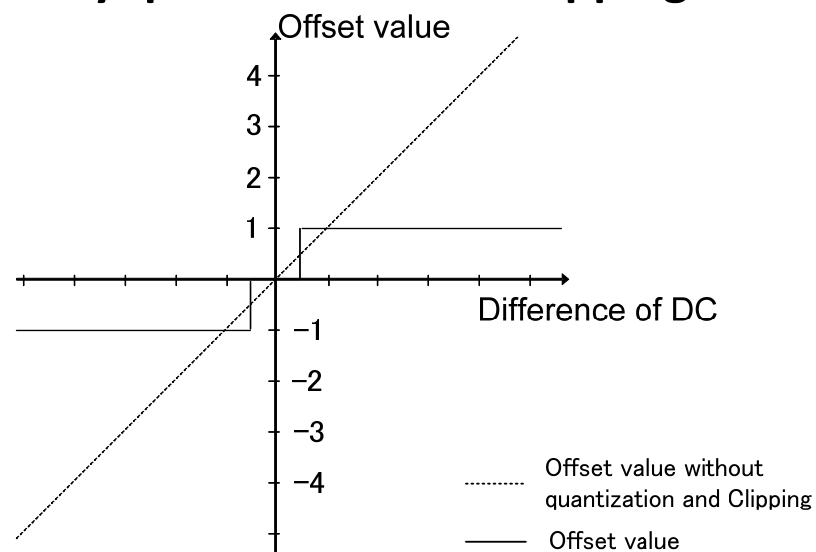
→ Those artifacts can be reduced by adding offset for Chroma

Chroma DC offset can be operated on CU or LCU level.



1

Offset value is calculated by quantization and clipping.



2

The reconstructed samples are used for next intra prediction.

Complexity of Chroma DC calculation

[Encoder] Calculations of mean for original chroma and **decided** reconstructed chroma

[Encoder / Decoder] Addition of offset value to reconstructed chroma samples

Advantage of proposed solution

- ✓ Chroma quality improvement is achieved with Limited complexity cost
 - No additional RD calculation for encoder
 - Only one add operation is added on each pixels (worst case)

Simulation Results

→ cross checked by NEC (JCTVC-F686)

LCU level coding

	All Intra			Random Access			Low delay B		
	Y	U	V	Y	U	V	Y	U	V
Overall	0.1	-1.8	-2.2	0.2	-2.0	-2.6	0.2	-1.3	-1.9
Enc Time[%]	101%			100%			100%		
Dec Time[%]	101%			105%			106%		

CU level coding

	All Intra			Random Access			Low delay B		
	Y	U	V	Y	U	V	Y	U	V
Overall	4.0	-10.5	-11.7	1.7	-9.7	-12.2	0.8	-4.3	-4.7
Enc Time[%]	101%			100%			100%		
Dec Time[%]	100%			102%			102%		

Anchor: HM3.0

Test condition described in JCTVC-E700

Subjective quality

Original image



HM3.0



CU level signaling



Parkscene: 1st-frame, RA-HE QP=37

Subjective quality

Original image



HM3.0



CU level signaling



Parkscene: 1st-frame, RA-HE QP=37

**By our proposal, DC Chroma Offset
less color bleeding artifact than HM3.0 on subjective
quality could be achieved
with limited additional complexity.**

Recommendation

**To be considered chroma subjective quality with
this proposal in CE/AHG.**

Subjective quality

LCU level signaling



CU level signaling



Parkscene: 1stI-frame, RA-HE QP=37

Subjective quality

Original image



HM3.0



CU level signaling



Parkscene: 1st-frame, RA-HE QP=37

JCTVC-F479

Subjective quality

Original image



HM3.0



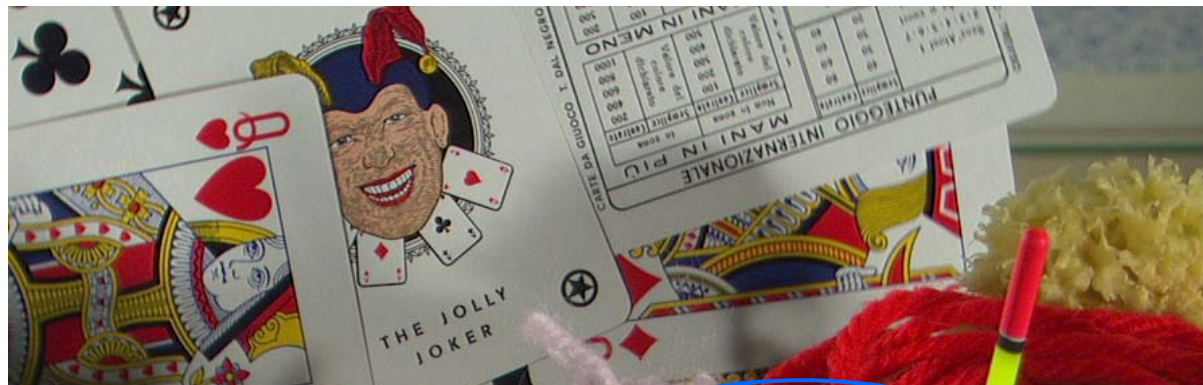
CU level signaling



BQTerrace: 1st I-frame, RA-HE QP=37

Subjective quality

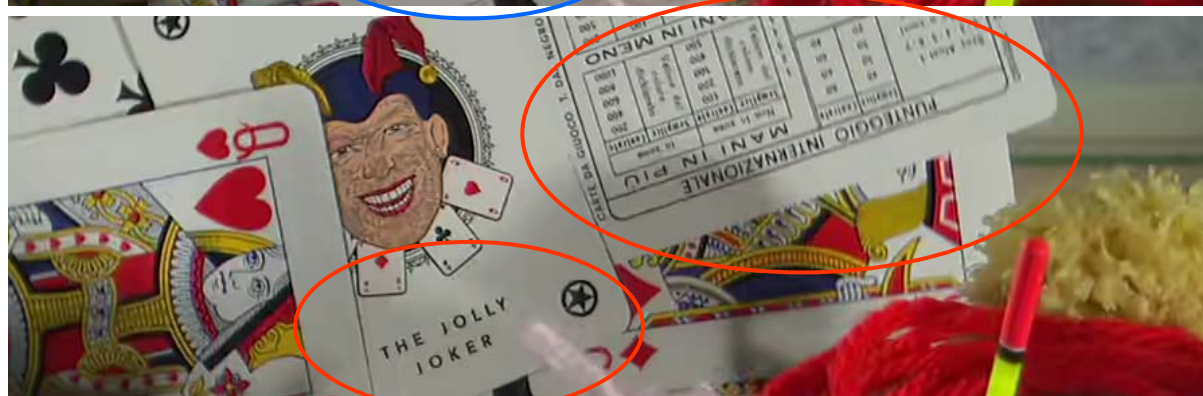
Original image



HM3.0



CU level signaling



Cactus: 1st-frame, RA-HE QP=37

Subjective quality



Original image



HM3.0



CU level signaling

PeopleOnStreet : 1st-frame, RA-HE QP=37

Subjective quality

Original image



HM3.0



CU level signaling



Parkscene: 1st-frame, RA-LC QP=37

Subjective quality

Original image



HM3.0



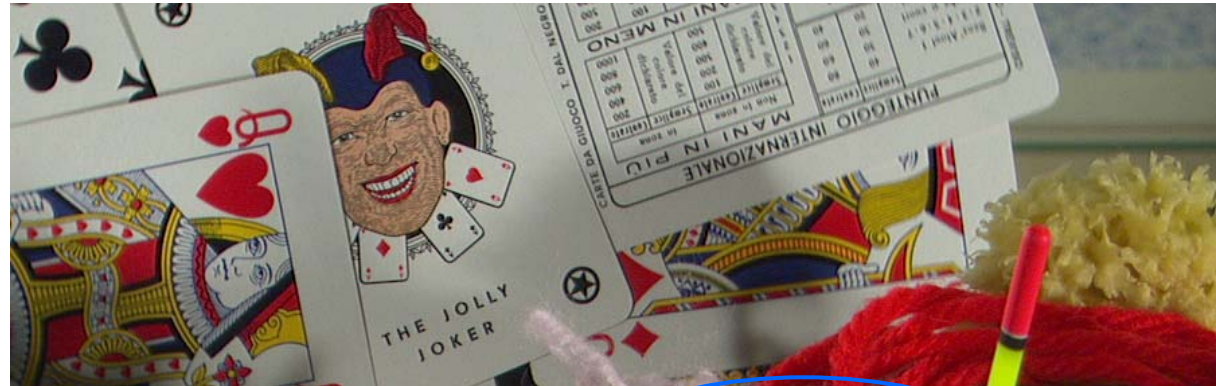
CU level signaling



BQTerrace: 1st I-frame, RA-LC QP=37

Subjective quality

Original image



HM3.0



CU level signaling



Cactus: 1st-frame, RA-HE QP=37

Subjective quality



Original image



HM3.0



CU level signaling

PeopleOnStreet: 1st-frame, RA-HE QP=37