

Unification of transformed coefficient counter

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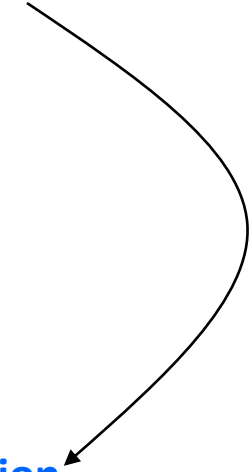
Panasonic Corporation

Panasonic ideas for life

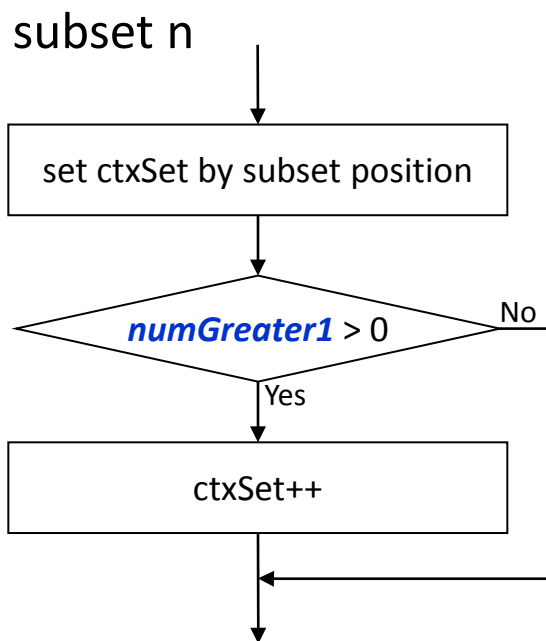
Motivation

- ✓ **Unification of transformed coefficient counters for simplification**
 - **Draft7 : There are two counters to count the number of large level coefficients**
 - **Counter1 : cParam**
 - For level_remaining binarization
 - Count up condition : $\text{coeff level} > 3 * (1 \ll \text{cParam})$
 - **Counter2 : numGreater1**
 - For selection of ctxSet for level_greater1/2_flag context derivation
 - Count up condition : $\text{coeff level} \geq 2$

Approach

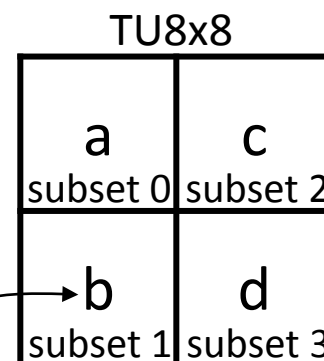
- ✓ **Removal of numGreater1**
 - **Counter1 : cParam**
 - For level_remaining binarization
 - For selection of ctxSet for level_greater1/2_flag context derivation
 - Count up condition : $\text{coeff level} > 3 * (1 \ll \text{cParam})$
- 

- Selection of ctxSet in Draft7



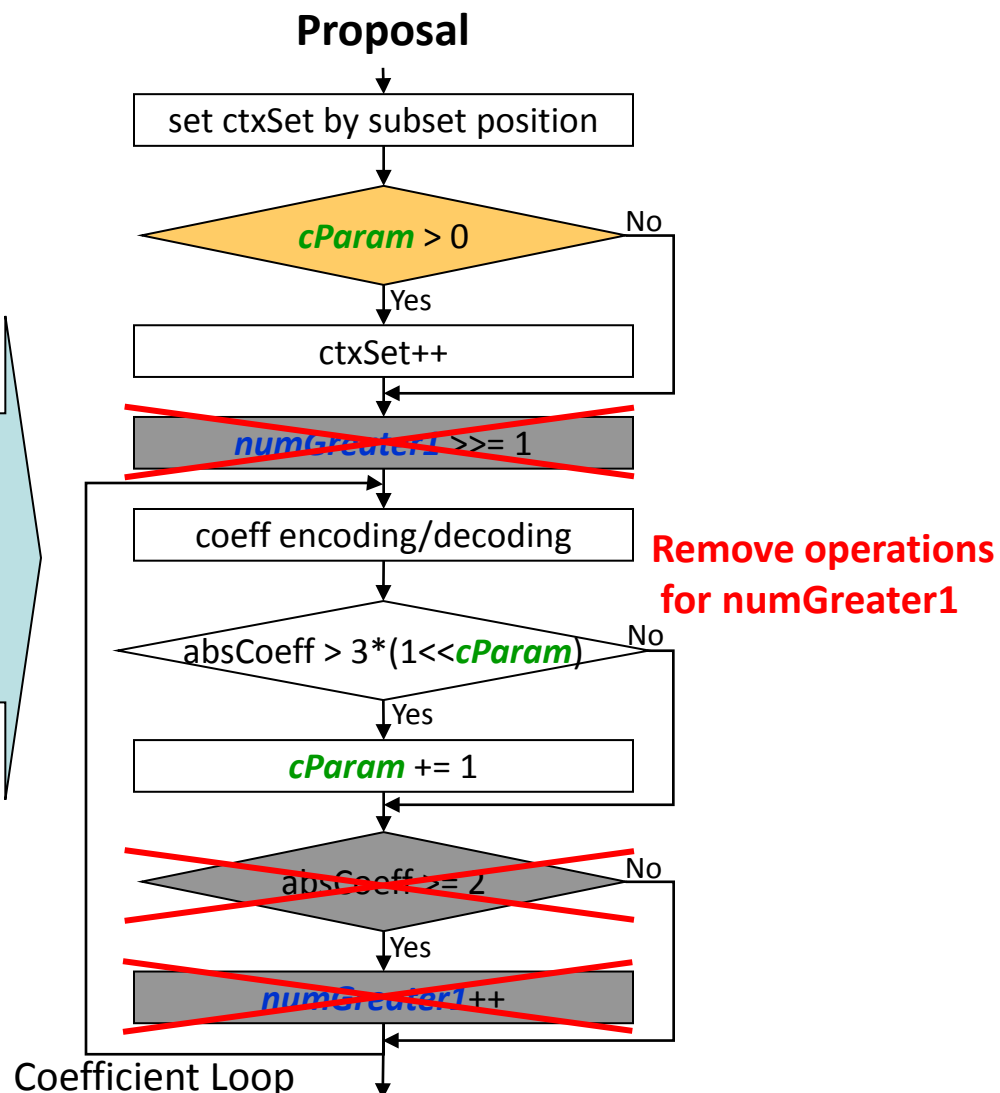
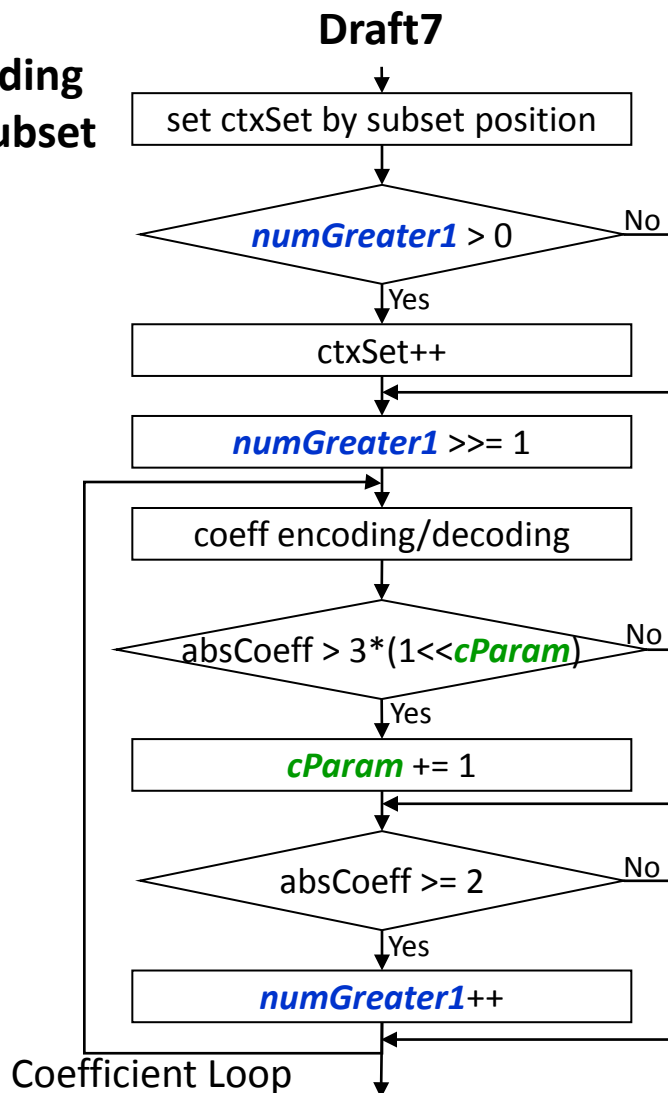
Condition of "ctxSet++"	
subset 3	-
subset 2	$d > 0$
subset 1	$c + (d >> 1) > 0$
subset 0	$b + (c + (d >> 1) >> 1) > 0$

number of "level >= 2" coeff
numGreater1



- ✓ **Removal of numGreater1**
- Use cParam instead of numGreater1

Coefficient coding
in 16 coeff subset



Results

BD BR luminance

	Main			HE10		
	AI	RA	LB	AI	RA	LB
Common Conditions	0.03	0.02	-0.01	0.03	0.03	-0.01
Low QP (12, 17, 22, 27)	0.01	0.00	0.00	0.01	0.01	0.01
Low QP (1, 5, 9, 13)	0.02	-0.03	0.01	-0.01	-0.03	0.02

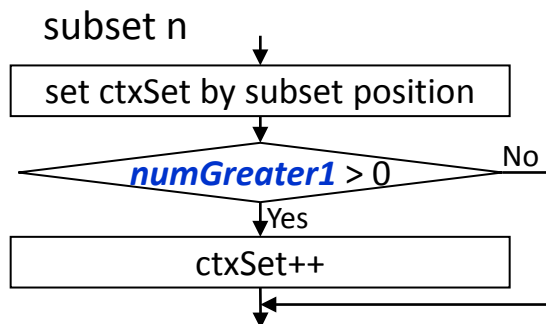
Conclusion

It was confirmed that proposed modification can remove a counter without major impact on coding efficiency.

Recommendation

It is suggested to consider the inclusion of this proposal in the DIS of HEVC.

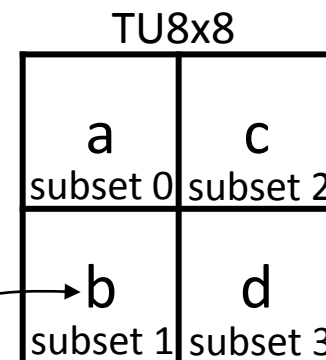
Draft7



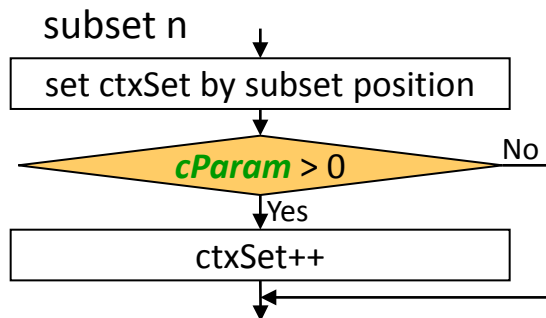
Condition of "ctxSet++"

subset 3	-
subset 2	$d > 0$
subset 1	$c + (d \gg 1) > 0$
subset 0	$b + (c + (d \gg 1) \gg 1) > 0$

number of "level ≥ 2 " coeff



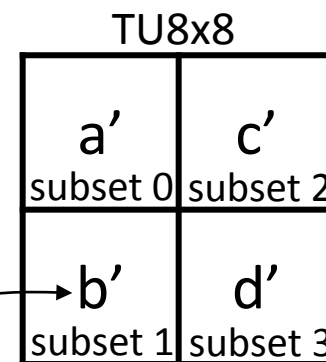
Proposal



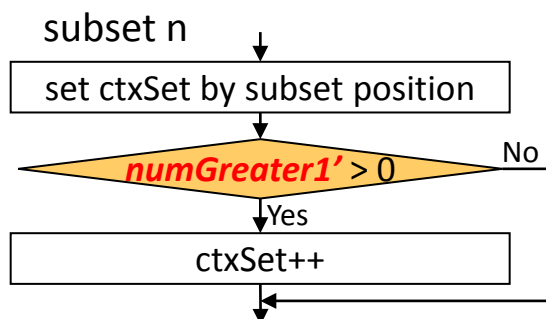
Condition of "ctxSet++"

subset 3	-
subset 2	$d' > 0$
subset 1	$c' > 0$
subset 0	$b' > 0$

number of "level > 3 " coeff



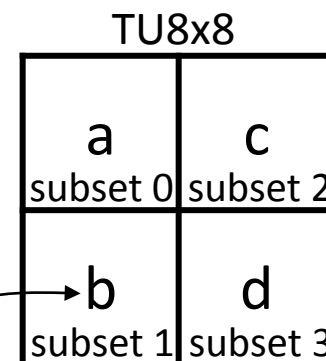
Partial modification



Condition of "ctxSet++"

subset 3	-
subset 2	$d > 0$
subset 1	$c + (d \gg 1) > 0$
subset 0	$b + (c + (d \gg 1) \gg 1) > 0$

number of "level ≥ 2 " coeff



BD BR luminance

	Proposal						Partial modification					
	Main			HE10			Main			HE10		
	AI	RA	LB	AI	RA	LB	AI	RA	LB	AI	RA	LB
Common Conditions	0.03	0.02	-0.01	0.03	0.03	-0.01						
Low QP (12, 17, 22, 27)	0.01	0.00	0.00	0.01	0.01	0.01						
Low QP (1, 5, 9, 13)	0.02	-0.03	0.01	-0.01	-0.03	0.02						