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CE6-related: Context modelling for signalling MTS index

Olena Chubach, Man-Shu Chiang, Ching-Yeh Chen,
Tzu-Der Chuang, Chih-Wei Hsu, Yu-Wen Huang, Shaw-Min Lei

The bottom of the slide features a solid orange background with a dense, white line-art pattern of various objects including a pot, a bowl of food, a laptop, a desk lamp, a lightbulb, a pencil, a ruler, a coffee cup, a pizza, a bottle, a whisk, a puzzle piece, a book, a camera, a key, a fork, a knife, a spoon, a glass, a plate, a bowl, a cup, a can, a box, a bag, a hat, a shoe, a car, a plane, a train, a boat, a house, a tree, a flower, a leaf, a heart, a star, a circle, a square, a triangle, a diamond, a pentagon, a hexagon, a heptagon, an octagon, a nonagon, a decagon, a circle, a square, a triangle, a diamond, a pentagon, a hexagon, a heptagon, an octagon, a nonagon, a decagon.

Presented by Olena Chubach
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Overall Summary

- Redefining ctxIdx for the first bin of tu_mts_index
 - using 6 contexts
 - using 4 contexts
 - using 1 context
- Changing to transform_not_skip_flag in the VVC draft specification

		Y	U	V
Proposed Method	AI	0.00%	0.00%	0.00%
	RA	0.00%	0.00%	0.00%
	LB	0.00%	0.00%	0.00%

Redefining ctxIdx for the first bin of tu_mts_index

Table 1: ctxIdx defined based on the QTDepth of the CB

QTDepth	0	1	2	3	4	≥ 5
ctxIdx	0	1	2	3	4	5

- QTDepth is computed relative to luma CTB size, while MTS is enabled based on the CB size
- VVC allows not only quaternary tree (QT) splits of the CBs, but also BT and TT splits, so when either BT or TT split is applied, the value of QTDepth is fixed and not updated for all further splits.
- Since MTS may be applied to luma CBs of size smaller than or equal to 32x32, the current ctxIdx design starting from zero QTDepth value is ambiguous

Redefining ctxIdx for the first bin of tu_mts_index

Method 1: ctxIdx defined considering luma CB area, using six context variables

luma CB area	1024	512	256	128	64	≤ 32
ctxIdx	0	1	2	3	4	5

Method 2: ctxIdx defined considering luma CB area, using four context variables

luma CB area	1024	512	256	128	64	≤ 32
ctxIdx	0	1	1	2	2	3

Method 3: further reduce the number of context variables to one.

- Changing context modelling of the first bin in tu_mts_idx from QTDepth to luma CB area, helps to solve the ambiguity in the ctxIdx definition
- Also, the fact that MTS is applied to luma CBs of size smaller than or equal to 32x32 is considered.

Changing to transform_not_skip_flag in the VVC draft specification

Proposed (transform_not_skip_flag, tu_mts_idx)	Current (transform_skip_flag, tu_mts_idx)	transform type		binarization		
		horizontal	vertical	MTS & TS enabled	MTS enabled	TS enabled
(0, -)	(1, -)	SKIP		0	-	0
(1, 0)	(0, 0)	DCT-II	DCT-II	10	0	1
(1, 1)	(0, 1)	DST-VII	DST-VII	110	10	-
(1, 2)	(0, 2)	DCT-VIII	DST-VII	1110	110	-
(1, 3)	(0, 3)	DST-VII	DCT-VIII	11110	1110	-
(1, 4)	(0, 4)	DCT-VIII	DCT-VIII	11111	1111	-

Using “transform_not_skip_flag” instead of “transform_skip_flag” to indicate whether to use TS (as in adopted JVET-M0464):

- transform_not_skip_flag equal to 0 means no transform is applied and
- transform_not_skip_flag equal to 1 means DCT-II or MTS can be applied.

Truncated unary binarization is obtained for (transform_not_skip_flag, tu_mts_idx)

Results

		Y	U	V
Proposed Method1	AI	0.00%	-0.02%	-0.01
	RA	0.01%	-0.05%	-0.01%
	LB	0.03%	-0.15%	0.01%
Proposed Method2	AI	-0.01%	-0.05%	0.01%
	RA	0.00%	-0.05%	-0.04%
	LB	0.04%	0.11%	0.10%
Proposed Method3	AI	0.00%	-0.04%	0.01
	RA	-0.02%	-0.06%	-0.07%
	LB	0.03%	0.25%	0.22%

MediaTek would like to thank Qualcomm for the crosscheck



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