

JVET-M0275
Non-CE6 : On transform skip conditions

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Proposed method

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 - To allow transform skip based on the number of pixels (instead of width and height of a block)
 - Encourage elongated blocks to be coded with transform-skipped.
 - If the transform skip size is extended up to 8x8, then
 - Additionally includes 1:4 / 4:1 ratio of block (e.g. 4x16, 16x4)

Test result

■ Test result under CTC

		Over VTM-3.0				
		Y	U	V	EncT	DecT
AI	Class A1	0.00%	0.03%	0.00%	101%	100%
	Class A2	0.01%	0.00%	0.02%	101%	100%
	Class B	0.00%	0.02%	0.05%	102%	100%
	Class C	0.00%	-0.06%	-0.03%	101%	97%
	Class E	0.00%	0.01%	0.03%	102%	101%
	Overall	0.00%	0.00%	0.01%	101%	100%
	Class D	0.00%	-0.04%	0.04%	103%	100%
	Class F	0.00%	0.00%	-0.01%	102%	101%
RA	TGM	0.00%	0.02%	0.01%	101%	101%
	Class A1	0.01%	-0.13%	0.06%	100%	100%
	Class A2	0.01%	0.13%	0.16%	100%	101%
	Class B	-0.01%	0.12%	-0.13%	100%	101%
	Class C	0.00%	0.05%	0.03%	101%	101%
	Overall	0.00%	0.05%	0.01%	100%	101%
	Class D	-0.01%	-0.19%	0.11%	101%	101%
	Class F	-0.01%	-0.04%	0.01%	100%	100%
LB	TGM	-0.04%	-0.02%	-0.05%	101%	100%
	Class B	0.01%	-0.05%	0.13%	100%	100%
	Class C	0.01%	0.30%	0.43%	101%	100%
	Class E	0.05%	0.22%	-0.18%	100%	101%
	Overall	0.02%	0.14%	0.15%	100%	100%
	Class D	0.03%	-0.01%	0.32%	101%	102%
	Class F	0.03%	0.04%	0.11%	100%	101%
	TGM	0.13%	0.02%	0.12%	100%	100%

Test result

- Test results of transform skip up to 64 pixels, under CTC

		Over VTM-3.0				
		Y	U	V	EncT	DecT
AI	Class A1	-0.03%	0.01%	0.15%	109%	99%
	Class A2	0.02%	0.02%	-0.04%	111%	100%
	Class B	-0.02%	-0.04%	-0.03%	112%	97%
	Class C	-0.16%	-0.16%	-0.13%	114%	93%
	Class E	0.01%	-0.04%	0.03%	112%	94%
	Overall	-0.04%	-0.05%	-0.01%	112%	96%
	Class D	-0.16%	-0.12%	-0.07%	117%	88%
	Class F	-2.01%	-1.67%	-1.68%	119%	94%
TGM	-7.62%	-6.02%	-6.23%	132%	91%	
RA	Class A1	0.01%	0.09%	0.19%	103%	100%
	Class A2	0.03%	0.03%	0.10%	104%	100%
	Class B	-0.06%	0.00%	-0.10%	104%	100%
	Class C	-0.20%	-0.12%	0.11%	106%	100%
	Overall	-0.07%	-0.01%	0.05%	104%	100%
	Class D	-0.34%	-0.27%	-0.28%	107%	100%
	Class F	-1.99%	-1.37%	-1.58%	107%	99%
TGM	-7.62%	-6.51%	-6.64%	112%	96%	
LB	Class B	-0.03%	-0.07%	0.06%	104%	100%
	Class C	-0.27%	0.27%	0.21%	107%	99%
	Class E	0.12%	0.51%	-0.49%	101%	100%
	Overall	-0.07%	0.19%	-0.03%	104%	100%
	Class D	-0.50%	-0.34%	0.22%	108%	101%
	Class F	-2.13%	-1.51%	-1.56%	105%	99%
TGM	-7.58%	-6.66%	-6.88%	111%	97%	

Test result

- Test results of transform skip up 64 pixels, transform skip up to 8x8 as an anchor

		Over transform skip extended up to 8x8				
		Y	U	V	EncT	DecT
AI	Class A1	0.00%	0.04%	0.05%	103%	101%
	Class A2	0.00%	-0.01%	-0.04%	104%	101%
	Class B	-0.01%	-0.02%	-0.03%	103%	101%
	Class C	-0.03%	-0.01%	0.13%	103%	101%
	Class E	-0.01%	-0.02%	-0.02%	103%	103%
	Overall	-0.01%	-0.01%	0.02%	103%	101%
	Class D	-0.05%	0.04%	0.11%	103%	103%
	Class F	-0.14%	-0.12%	-0.14%	103%	100%
	TGM	-0.88%	-0.83%	-0.91%	103%	99%
RA	Class A1	-0.03%	-0.14%	-0.03%	102%	100%
	Class A2	0.00%	0.11%	0.13%	102%	100%
	Class B	-0.03%	-0.16%	-0.05%	101%	100%
	Class C	-0.02%	-0.02%	-0.05%	102%	100%
	Overall	-0.02%	-0.07%	-0.01%	102%	100%
	Class D	0.00%	0.17%	-0.18%	102%	100%
	Class F	-0.16%	-0.07%	-0.11%	102%	99%
	TGM	-0.91%	-0.89%	-0.90%	103%	99%
LB	Class B	0.01%	0.22%	0.29%	102%	101%
	Class C	-0.06%	0.16%	-0.12%	102%	100%
	Class E	0.06%	-0.87%	-0.57%	100%	99%
	Overall	0.00%	-0.07%	-0.06%	101%	100%
	Class D	-0.12%	-0.43%	-0.04%	103%	99%
	Class F	-0.45%	-0.43%	0.16%	101%	100%
	TGM	-0.85%	-0.73%	-0.81%	103%	100%

Proposed spec text

- **7.3.4.12 Residual coding syntax**

residual_coding(x0, y0, log2TbWidth, log2TbHeight, cIdx) {	Descriptor
if(transform_skip_enabled_flag && (cIdx != 0 tu_mts_flag[x0][y0] == 0) && (log2TbWidth <= 2) && (log2TbHeight <= 2) (log2TbWidth + log2TbHeight < <u>= 4</u>))	
transform_skip_flag[x0][y0][cIdx]	ae(v)
last_sig_coeff_x_prefix	ae(v)
last_sig_coeff_y_prefix	ae(v)
...	

Conclusion

- Transform skip is allowed by the number of pixels, not each size of width and height
- When the transform skip is extended to larger block size, the coding efficiency is remarkable on the computer-generated materials, with reasonable complexity increment.
- It is recommended to be adopted in the spec and next software.
- Crosschecked by HHI (JVET-Mxxxx)

Thank you