



JCTVC-T0120 PALETTE CODING MODE FOR NON-444 SCREEN CONTENT VIDEO

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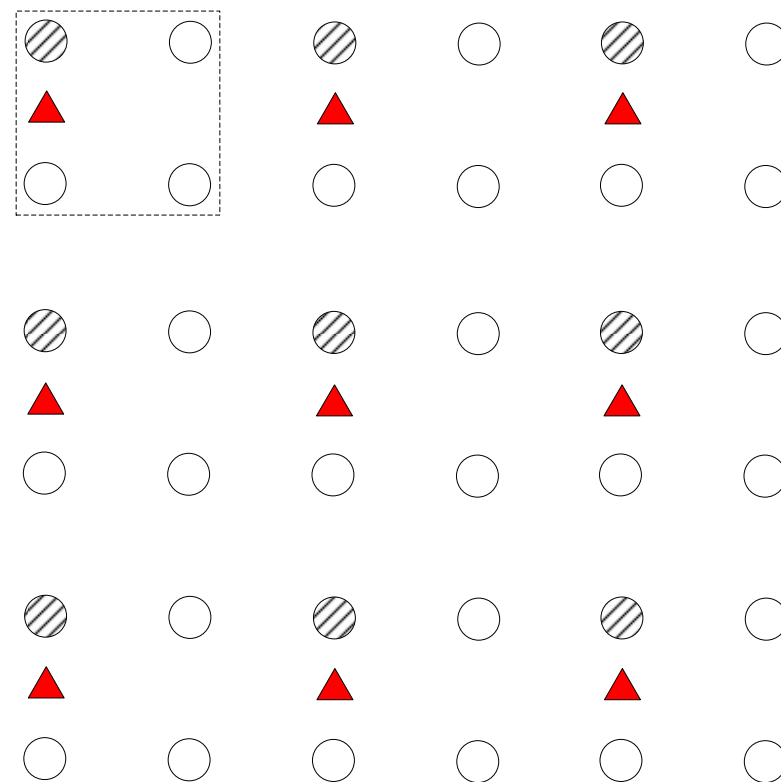
Creating the Living Network

Introduction

- The palette coding mode **only supports 4:4:4 chroma format** in the HEVC SCC working draft 2.
- Video applications with non-4:4:4 input may benefit from the palette coding tool developed in HEVC SCC.
- The non-4:4:4 palette coding method in the AhG software during period of HEVC range extension
 - Requires **one separate implementation of palette coding mode** for non-4:4:4 video.
 - Maintains **two separate palette tables** and **two separate palette predictors** at the decoder.
- This contribution proposes to extend the current 4:4:4 palette for non-4:4:4 video.

The Proposed Solution

- Reuse the existing encoding/decoding logics of 4:4:4 palette
- Output luma and chroma components depending on sample positions
- Minimal change to the existing palette syntax: one condition on escape color signaling for chroma components
- Similar idea was proposed in JCTVC-T0072 and JCTVC-T0109



Proposed text change: syntax table

palette_coding(x0, y0, nCbS) {	Descriptor
.....	
for(cIdx = 0; cIdx < 3; cIdx++) {	
if((cIdx == 0) (ChromaArrayType == 1 && (xR&1 == 0) && (yR&1 == 0))	
(ChromaArrayType == 2 && (xR&1 == 0)) ChromaArrayType == 3) {	
palette_escape_val	ae(v)
PaletteEscapeVal[cIdx][xR][yR] = palette_escape_val	
}	
}	
.....	
}	

Proposed text change: decoding process

8.4.1 General decoding process for coding units coded in intra prediction mode

Depending on the value of the color component $cIdx$, the variable $nSubWidth$ and $nSubHeight$ are derived as follows:

- If $cIdx$ is equal to 0, $nSubWidth$ is set to 1 and $nSubHeight$ is set to 1.
- Otherwise, $nSubWidth$ is set to $SubWidthC$ and $nSubHeight$ is set to $SubHeightC$.

Output of this process is an array $recSamples[x][y]$, with $x = 0..nCbs/nSubWidth - 1$, $y = 0..nCbs/nSubHeight - 1$, specifying reconstructed sample values for the block.

The $(nCbs/nSubWidth \times nCbs/nSubHeight)$ block of the reconstructed sample array $recSamples$ at location $(xCb/nSubWidth, yCb/nSubHeight)$ is derived as follows:

For $x = 0..nCbs/nSubWidth - 1$, $y = 0..nCbs/nSubHeight - 1$, $recSample[cIdx][yCb/nSubHeight + y][xCb/nSubWidth + x]$ is set as follows:

- If $paletteSampleMode[xCb + x * nSubWidth][yCb + y * nSubHeight]$ is not equal to $ESCAPE_MODE$, the following applies:

$recSample[cIdx][xCb/nSubWidth + x][yCb/nSubHeight + y] =$
 $currentPaletteEntries[cIdx][paletteIndexMap[xCb + x * nSubWidth][yCb + y * nSubHeight]]$,

.....

- Otherwise, if $cu_transquant_bypass_flag$ is true, the following applies:

$recSample[cIdx][xCb/nSubWidth + x][yCb/nSubHeight + y] =$
 $paletteEscapeVal[cIdx][xCb + x * nSubWidth][yCb + y * nSubHeight]$,

- Otherwise ($paletteSampleMode[xCb + x * nSubWidth][yCb + y * nSubHeight]$ is equal to $ESCAPE_MODE$ and $cu_transquant_bypass_flag$ is false), the following ordered steps apply:

Lossy Coding Performance

- AI: {3.2%, 6.3%, 5.5%}
- RA: {2.3%, 6.3%, 5.2%}
- LB: {1.5%, 5.1%, 4.1%}

	All Intra			Random Access			Low delay B		
	G/Y	B/U	R/V	G/Y	B/U	R/V	G/Y	B/U	R/V
Text & graphics with motion, 720p	-3.5%	-3.7%	-4.3%	-3.1%	-3.6%	-4.7%	-2.2%	-3.7%	-4.9%
Mixed content, 480p	-0.5%	-2.7%	-2.8%	-0.2%	-1.3%	-1.5%	0.1%	-0.1%	-0.6%
Animation, 768p	-5.3%	-15.1%	-10.6%	-2.9%	-16.7%	-10.0%	-1.6%	-12.7%	-6.0%
Average of all sequences	-3.2%	-6.3%	-5.5%	-2.3%	-6.3%	-5.2%	-1.5%	-5.1%	-4.1%
Enc Time[%]	125%			110%			106%		
Dec Time[%]	92%			92%			90%		

Lossless Coding Performance

- 0.2%, 0.1% and 0% for AI, RA and LB, respectively

	All Intra				Random Access				Low Delay B			
	Bit-rate change (Total)	Bit-rate change (Average)	Bit-rate change (Min)	Bit-rate change (Max)	Bit-rate change (Total)	Bit-rate change (Average)	Bit-rate change (Min)	Bit-rate change (Max)	Bit-rate change (Total)	Bit-rate change (Average)	Bit-rate change (Min)	Bit-rate change (Max)
Text & graphics with motion, 720p	-0.1%	-0.1%	-0.3%	0.0%	-0.1%	-0.2%	-0.3%	-0.1%	-0.1%	0.0%	-0.1%	0.0%
Mixed content, 480p	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Animation, 768p	-0.5%	-0.5%	-0.5%	-0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Average of all sequences	-0.2%	-0.2%	-0.5%	0.0%	0.0%	-0.1%	-0.3%	0.0%	0.0%	0.0%	-0.1%	0.0%
Enc Time[%]	143%				117%				111%			
Dec Time[%]	107%				105%				98%			

Thanks to ITRI for the cross-check!

Closing Remarks

- This contribution proposed non-4:4:4 palette mode
 - Reuse the existing encoding/decoding logics of 4:4:4 palette design
 - Minimal syntax table change on escape color signaling
- Coding performance
 - Lossy coding: average BD-rate savings of 3.2%, 2.3% and 1.5% for AI, RA and LB
 - Lossless coding: average bit-rate savings of 0.2%, 0.1% and 0% for AI, RA and LB
- Suggest to adopt the proposed method to enable palette coding mode for non-4:4:4 video