

MEDIATEK

JCTVC-U0063: CE1-related: Colour-plane-based Escape Pixel Coding

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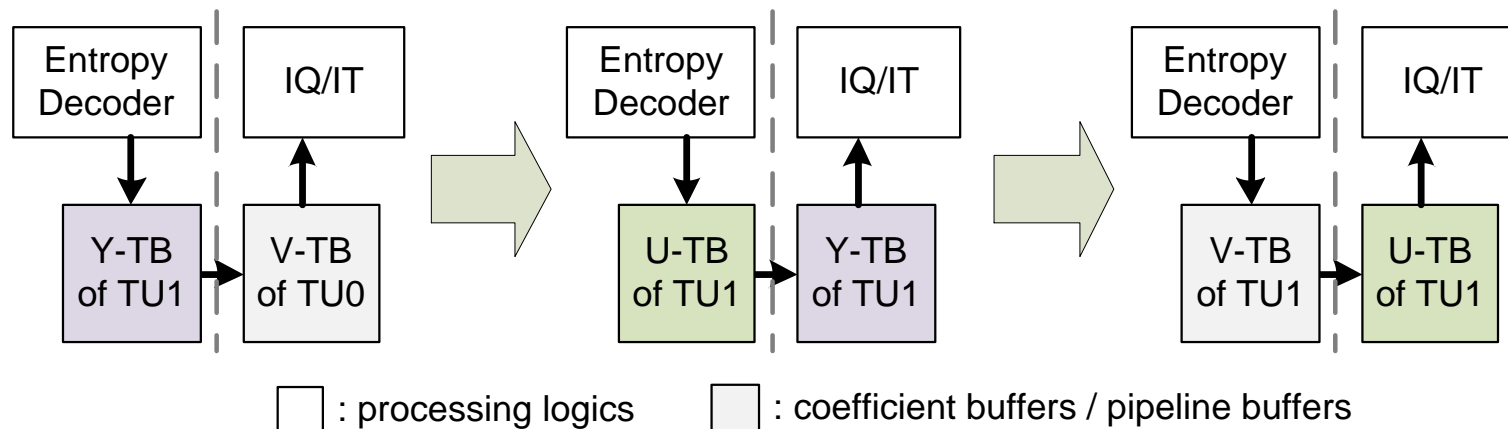
Presented by Tzu-Der (Peter) Chuang
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Overview Summary

- Proposed to group the escape values of the same colour component together to reduce the buffer requirement of escape pixels coding
 - The coefficient buffer can be reused to store the palette indices and escape values
 - In parsing stage, it usually only has one coefficient buffer
 - In SCM-4.0, the color interleaved escape value coding requires three coefficient buffers
- No BD-rate change

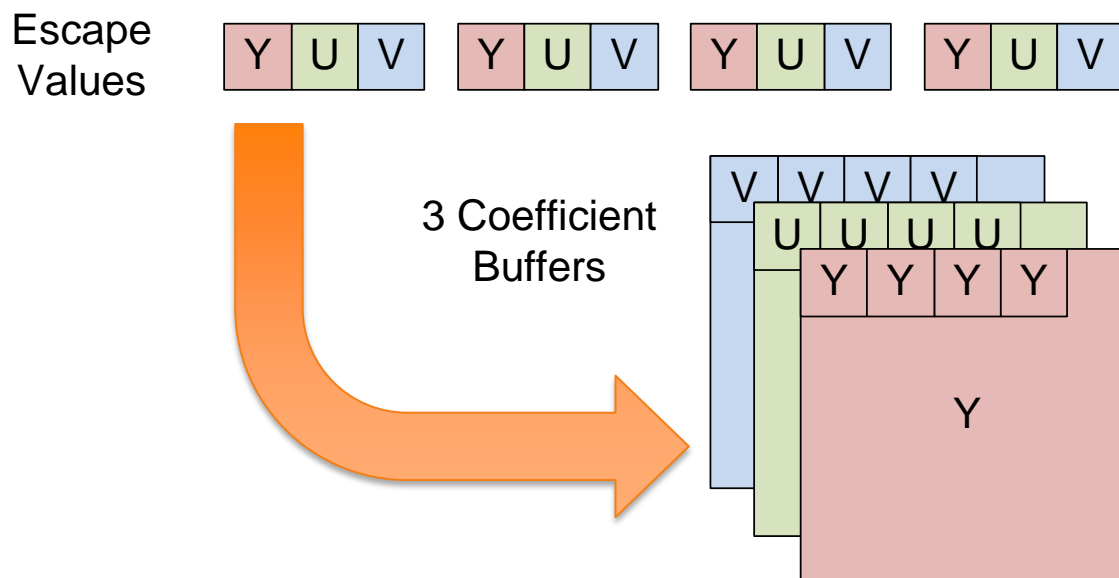
Problem Definition

- In HEVC residual decoding, the coefficients of different colour components are decoded separately
- The decoder only needs to decode the TB of one colour component at a time
- In a HEVC decoder architecture, only one coefficient buffer of one colour component is required in CABAC parser



Problem Definition

- The residual coefficient buffer can be reused to store the palette indices and escape values
- In SCM-4.0 escape pixel coding, the escape values of three colour components of one sample are coded together
- Three coefficient buffers are required in entropy decoder in the worst case
- The implementation cost and complexity are increased



Proposed Colour-plane-based Escape Pixel Coding

- Proposed to group the escape values of the same colour component together
 - The entropy decoder only needs to decode the escape values of one colour component at a time
 - Only one coefficient buffer of one colour component is required in CABAC parser

```

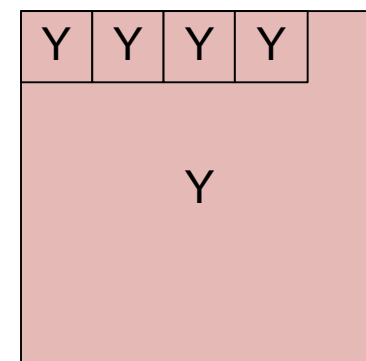
for( cIdx = 0; cIdx < numComps; cIdx++ ){
  while( sPos < nCbS * nCbS ) {
    ...
    if( PaletteIndexMap[ xC ][ yC ] == MaxPaletteIndex ) {
      for( cIdx = 0; cIdx < numComps; cIdx++ )
        ...
        palette_escape_val
        ...
      }
      sPos++
    }
  }
}

```

Escape
Values



1 Coefficient
Buffers



Lossy Coding Result

- Anchor: SCM-4.0, Full-frame IBC
- Test: Proposed colour-plane-based escape pixel coding
- No BD-rate change

	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
RGB, text & graphics with motion, 1080p & 720p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
RGB, mixed content, 1440p & 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
RGB, Animation, 720p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
RGB, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
YUV, text & graphics with motion, 1080p & 720p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
YUV, mixed content, 1440p & 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
YUV, Animation, 720p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
YUV, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Thanks Qualcomm for cross-checking

Lossless Coding Result

- Anchor: SCM-4.0, Full-frame IBC
- Test: Proposed colour-plane-based escape pixel coding
- No BD-rate change

	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)
RGB, text & graphics with motion, 1080p & 720p	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
RGB, mixed content, 1440p & 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
RGB, Animation, 720p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
RGB, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
YUV, text & graphics with motion, 1080p & 720p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
YUV, mixed content, 1440p & 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
YUV, Animation, 720p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
YUV, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Conclusion

- Proposed to group the escape values of the same colour component together
 - Only one coefficient buffer of one colour component is required in CABAC parser
 - **The implementation cost and complexity of palette decoding/reconstruction module are reduced**
- No BD-rate change