

MEDIATEK

JCTVC-U0064

**CE1-related: Palette coding
with inter-prediction**

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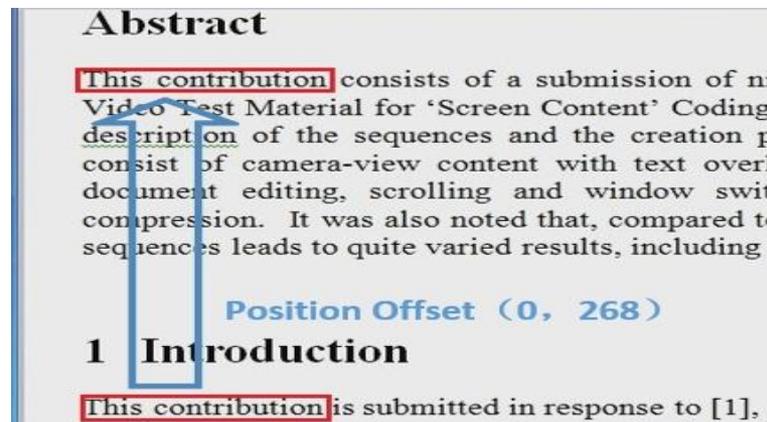
Overall Summary

- Palette coding only consider the redundancy within a block
- Proposed to combine palette coding with the inter mode

Lossy, text & graphics with motion	AI	RA	LB
Proposed Method, RGB	-2.0%	-1.3%	-0.7%
Proposed Method, YUV	-1.8%	-1.2%	-0.6%
CE1 Test A1+ Proposed Method, RGB	-3.1%	-2.0%	-1.5%
CE1 Test A1+ Proposed Method, YUV	-3.6%	-2.0%	-1.5%

Problem Definition

- Two properties in SCC pictures
 - Duplicated patterns → IntraBC coding
 - Concentrated color distribution → Palette coding
- What happens if a block with concentrated color distribution also holds a duplicated pattern?
 - Palette coding cannot explore the redundancy sufficiently

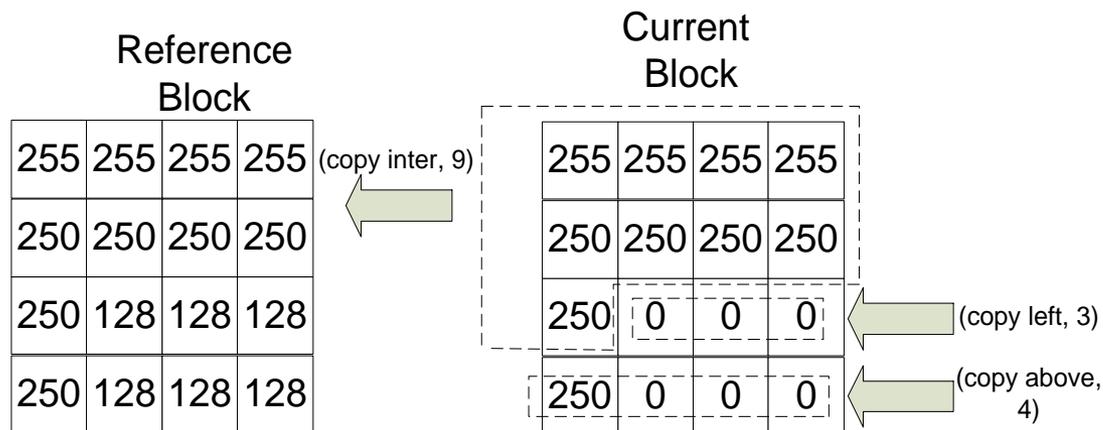


Proposed: Palette Coding with Inter-Prediction

- Inter-palette mode is proposed.
 - A combination of Palette coding and Inter/IntraBC coding
- Inter-palette is a special Palette mode
 - In Palette mode, a flag is signaled to indicate whether Inter-palette mode is used
- If Inter-palette mode is used
 - Motion vectors are signaled as Inter_2Nx2N mode
 - A new copy run mode is added in palette mode

Proposed: Copy-inter

- A new copy run mode, Copy-inter mode, is added
 - Run modes: copy-index, copy-above, and copy-inter
 - The same run coding for all modes
- When Copy-inter is chosen
 - The pixel values are copied from the samples in the reference block



Quick Summary of BD-rate

- Up to 2.0% gains can be provided
- Most of the gains in Inter-Palette mode and CE1 Test A1 and A2 are additive

Lossy, text & graphics with motion	AI	RA	LB
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Proposed Method, YUV	-1.8%	-1.2%	-0.6%
CE1 Test A1+ Proposed Method, RGB	-3.1%	-2.0%	-1.5%
CE1 Test A1+ Proposed Method, YUV	-3.6%	-2.0%	-1.5%
CE1 Test A2+ Proposed Method, RGB	-3.0%	-2.0%	-1.5%
CE1 Test A2+ Proposed Method, YUV	-3.3%	-2.0%	-1.3%

Results – Proposed Method

- Anchor: SCM-4.0, Full-frame IBC
- Test: Proposed Inter-palette mode

	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	-2.0%	-1.9%	-2.0%	-1.3%	-1.2%	-1.3%	-0.7%	-0.6%	-0.6%
RGB, mixed content, 1440p & 1080p	-0.1%	-0.3%	-0.3%	-0.1%	-0.3%	-0.3%	0.2%	-0.1%	0.1%
RGB, Animation, 720p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.1%
RGB, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.1%
YUV, text & graphics with motion, 1080p & 720p	-1.8%	-1.8%	-2.0%	-1.2%	-1.1%	-1.2%	-0.6%	-0.2%	-0.1%
YUV, mixed content, 1440p & 1080p	-0.3%	-0.4%	-0.6%	-0.4%	-0.5%	-0.8%	0.1%	0.4%	0.1%
YUV, Animation, 720p	0.0%	0.1%	0.1%	-0.1%	0.0%	0.2%	0.0%	0.2%	0.1%
YUV, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.1%	-0.1%	0.0%	0.0%
Enc Time[%]	104%			102%			101%		
Dec Time[%]	102%			101%			101%		

- Thank Microsoft for cross-checking

Results – CE1 Test-A1 + Proposed Method

- Anchor: SCM-4.0, Full-frame IBC
- Test: CE1 Test-A1 + Proposed Inter-palette mode

	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	-3.1%	-3.2%	-3.2%	-2.0%	-2.0%	-2.1%	-1.5%	-1.3%	-1.3%
RGB, mixed content, 1440p & 1080p	-0.7%	-1.0%	-1.0%	-0.4%	-0.8%	-0.7%	0.0%	-0.4%	-0.3%
RGB, Animation, 720p	0.0%	0.0%	0.0%	-0.1%	-0.1%	0.0%	-0.1%	0.0%	0.1%
RGB, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	-0.1%	-0.1%	-0.1%
YUV, text & graphics with motion, 1080p & 720p	-3.6%	-3.6%	-3.8%	-2.0%	-2.1%	-2.4%	-1.5%	-1.1%	-1.1%
YUV, mixed content, 1440p & 1080p	-0.9%	-1.5%	-1.7%	-0.7%	-1.2%	-1.6%	-0.2%	-0.7%	-0.9%
YUV, Animation, 720p	0.0%	-0.1%	-0.1%	-0.1%	-0.4%	0.0%	0.0%	0.1%	0.1%
YUV, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.3%
Enc Time[%]	107%			102%			101%		
Dec Time[%]	102%			99%			102%		

Results – CE1 Test-A2 + Proposed Method

- Anchor: SCM-4.0, Full-frame IBC
- Test: CE1 Test-A2 + Proposed Inter-palette mode

	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	-3.0%	-3.0%	-3.1%	-2.0%	-2.0%	-2.1%	-1.5%	-1.4%	-1.3%
RGB, mixed content, 1440p & 1080p	-0.7%	-1.0%	-1.1%	-0.4%	-0.7%	-0.8%	-0.1%	-0.6%	-0.6%
RGB, Animation, 720p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.1%
RGB, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	-0.1%	-0.1%
YUV, text & graphics with motion, 1080p & 720p	-3.3%	-3.3%	-3.6%	-2.0%	-2.0%	-2.4%	-1.3%	-1.0%	-0.8%
YUV, mixed content, 1440p & 1080p	-1.0%	-1.6%	-1.8%	-0.7%	-1.1%	-1.6%	-0.2%	-0.5%	-0.9%
YUV, Animation, 720p	0.0%	-0.1%	-0.1%	-0.1%	-0.3%	-0.1%	0.0%	0.1%	0.2%
YUV, camera captured, 1080p	0.0%	0.0%	0.0%	0.1%	0.0%	-0.2%	-0.1%	0.0%	0.0%
Enc Time[%]	107%			102%			101%		
Dec Time[%]	102%			101%			101%		

Conclusion

- Inter-palette mode is proposed
- Most of the gains in Inter-Palette mode and CE1 Test A1 and A2 are additive

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