



Non-CE2: Modified NSQT coefficient scan for CAVLC

Chih-Wei Hsu, Yu-Wen Huang, Shawmin Lei



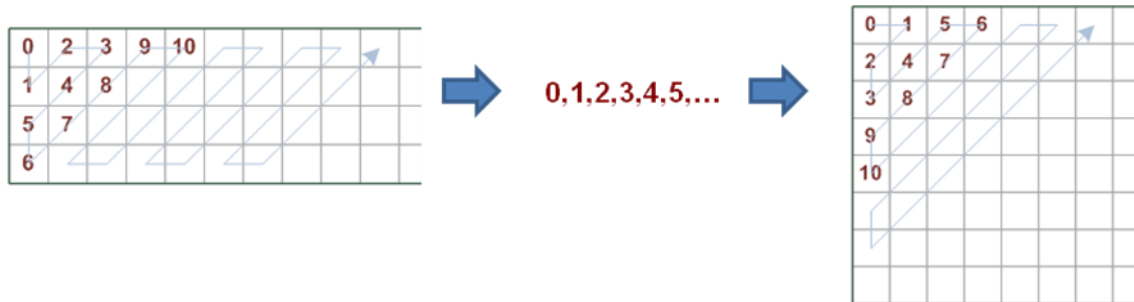
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Overall Summary

- In HM-4.0, NSQT introduced non-square transform blocks
 - Two kinds of TU sizes: 16x4/4x16 and 32x8/8x32
 - For coefficient coding with CAVLC: non-square zigzag scan pattern was used
- In this contribution, simple vertical/horizontal scanning was proposed to replace the original zigzag scan pattern
 - Much regular and avoid extra storage for the non-square zigzag scan patterns
 - Better fit the distribution of non-square transform coefficients
- The proposed method can also reduce 0-0.1% bit rate for luma and 0.1-0.5% bit rate for chroma
- G269 also proposed similar idea

Introduction

- In HM-4.0, NSQT was adopted and non-square transform blocks were remapped to square blocks before coefficient coding



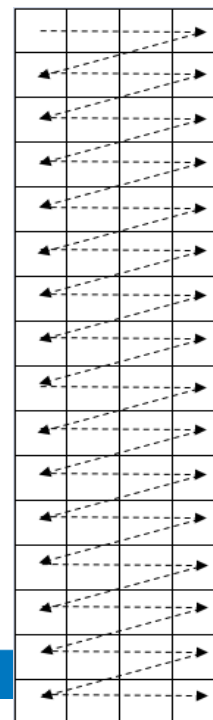
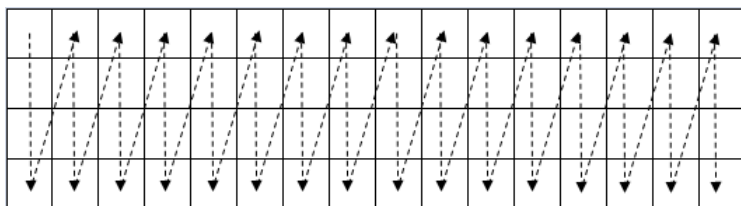
- In CE2.C.1, experiments were carried out to remove the remapping procedure and code coefficients directly
- Zigzag scan patterns for non-square transform blocks were still required in CAVLC

Proposed Method

- Remapping is removed as it was proposed in CE2.C.1
- Vertical/horizontal scan is used to directly code the non-square transform blocks

Horizontal scan pattern for 4x16 block

Vertical scan pattern for 16x4 block



Simulation Results

- Anchor: HM-4.0
- LC-RA, LC-LB, LC-LP were tested
- 0-0.1% bit rate reduction for luma and 0.1-0.5% bit rate reduction for chroma
- Roughly the same encoding and decoding time

	Random Access LC		
	Y	U	V
Class A	0.1%	0.2%	0.2%
Class B	-0.1%	-0.5%	-0.3%
Class C	0.0%	-0.2%	-0.1%
Class D	0.0%	-0.2%	-0.1%
Class E			
Overall	0.0%	-0.2%	-0.1%
	0.0%	-0.2%	-0.1%
Enc Time[%]	101%		
Dec Time[%]	99%		

	Low Delay B LC		
	Y	U	V
Class A			
Class B	-0.1%	-0.7%	-0.5%
Class C	0.0%	-0.3%	-0.5%
Class D	-0.1%	-0.2%	-0.3%
Class E	-0.3%	-0.1%	-0.2%
Overall	-0.1%	-0.4%	-0.4%
	-0.1%	-0.4%	-0.4%
Enc Time[%]	100%		
Dec Time[%]	100%		

	Low Delay P LC		
	Y	U	V
Class A			
Class B	-0.1%	-0.7%	-0.5%
Class C	0.0%	-0.3%	-0.3%
Class D	-0.1%	-0.3%	-0.2%
Class E	-0.2%	-0.6%	-0.5%
Overall	-0.1%	-0.5%	-0.4%
	-0.1%	-0.5%	-0.4%
Enc Time[%]	101%		
Dec Time[%]	100%		

Conclusions

- In this contribution, NSQT blocks are directly coded using simple vertical/horizontal scan for CAVLC
- Extra non-square zigzag scan patterns can be removed
- 0-0.1% bit rate savings for luma and 0.1-0.5% bit rate savings for chroma
- No run time increase is observed