JCTVC-G209

Modified method for coding mvd in the CABAC mode

Shih-Ta Hsiang and Shawmin Lei

Presented by Shih-Ta Hsiang
7th JCT-VC Meeting in Geneva
21-30 November, 2011

Overall Summary

- The method for coding the absolute value of each component of the MVD vector by representing the value by its most significant bit (MSB) index followed by its refinement bits
- Average BD-rate gains 0.1 and 0.3% for Luma and Chroma, respectively, for HE-RA and no gain for HE-LDB, under the common test conditions
- Average BD-rate gains 0.3% and 0.7% for Luma and Chroma, respectively, for HE-RA and 0.1 and 0.0% for Luma and Chroma, respectively, for HE-LDB with QP = 32, 37, 42, and 47.
- Approach also applied to coding the positions of last significant coefficients (G239)

Introduction

- Current method in WD 4 (F455)
  - Binarization in TU + Exp-Golomb (EG1)
  - Two fixed contexts for binIdx0 and binIdx1, shared between x/y components
  - Bypass coding for remaining EG1 bins
  - Group CABAC bits & bypass bits from x/y components
- The proposed method attempts to further improve the efficiency for coding EG1 prefix bins

Proposed Method

- Representation by most significant bit (MSB) index and refinement bits
- Binarization
  - A concatenation of a prefix bin string and a suffix bin string
  - The prefix string represents the MSB index plus one, or **msb_plus_one,** of symbol *x* with

$$\text{msb\_plus\_one} = \text{Floor}(\text{Log2}(x)) + 1, \text{ if } x > 0 \text{, or 0 otherwise.}$$

  - Prefix part representing msb_plus_one in a unary code
  - Suffix part representing refinement bins in a fixed-length binary code
- Entropy Coding
  - The prefix bin string coded by CABAC
  - The refinement bits bypass coded
  - Each prefix bin assigned a single context (9 contexts used)

Compared to WD 4

- The same bin string
- Context modeling for TU bins and EG1 prefix bins
- By-pass the EG1 suffix bins

mvd	msb_plus_one	refinement bins	TU prefix	EG1 prefix	EG suffix
0	0	-	0		
1	10	-	10		
2	110	0	11	0	0
3	110	1	11	0	1
4	1110	00	11	10	00
5	1110	01	11	10	01
6	1110	10	11	10	10
7	1110	11	11	10	11

Experimental Results: Common Test Conditions

- Anchor results by HM-4.0
- Cross verification
  - Thank Qualcomm for cross checking
  - Results confirmed

	Random Access HE		
	Y	U	V
Class A	-0.2%	-0.8%	-0.7%
Class B	-0.1%	-0.2%	-0.1%
Class C	-0.1%	-0.3%	-0.2%
Class D	0.0%	-0.1%	-0.1%
Class E			
Overall	-0.1%	-0.3%	-0.3%
	-0.1%	-0.3%	-0.3%
	Low delay B HE		
	Y	U	V
Class A			
Class B	0.0%	0.0%	0.1%
Class C	0.0%	0.1%	-0.1%
Class D	0.0%	0.0%	-0.2%
Class E	0.0%	0.1%	0.3%
Overall	0.0%	0.0%	0.0%

Experimental Results:
QP values = 32, 37, 42, 47

	Random Access HE		
	Y	U	V
Class A	-0.5%	-1.6%	-1.7%
Class B	-0.3%	-0.4%	-0.4%
Class C	-0.3%	-0.6%	-0.7%
Class D	-0.2%	-0.4%	-0.2%
Class E			
Overall	-0.3%	-0.7%	-0.7%
	-0.3%	-0.7%	-0.7%
	Low delay B HE		
	Y	U	V
Class A			
Class B	-0.1%	0.3%	-0.6%
Class C	-0.1%	0.0%	0.0%
Class D	-0.1%	0.1%	-0.5%
Class E	-0.1%	0.9%	0.2%
Overall	-0.1%	0.3%	-0.3%
	-0.1%	0.3%	-0.3%

Conclusions

- The proposed method equivalent to further utilizing context modeling for coding the EG 1 prefix bins.
- Experimental results show Y BD-rate gains 0.1% and 0.0% for HE-RA and HE-LDB under the common test condition
- Y BD-rate gains 0.3% and 0.1% for HE-RA and HE-LDB over the low bitrate range
- Recommend further study as part of CE on entropy coding