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| *Title:* | **Improvement of CAVLC table adaptation for coefficient coding** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Proposal | | |
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# Abstract

In this contribution, a scheme is proposed to to switch VLC tables including last level of run-coding. Simulation shows that the scheme has -0.2%/-0.1%/-0.1% coding performance improvements with intra, low delay and random access low complexity configuration respectively. Moreover, no additional complexity is observed for all tests.

# Introduction

In HM3.0 CAVLC coding, coefficients are coded followed by run-coding, where VLC tables are switched according to absolute value of coefficient and pre-defined threshold (*atable[5] ={4,6,14,28, 0xffffff}*). In this scheme, the last level of run-coding does not participate in adaptation of VLC tables. We propose last level of run coding participated in adaptation of VLC tables.

# Proposal

The flowchart of coefficients coding in both HM3.0 and proposed one are depicted in Figure 1. The table switching (adaptation) is only occurred in the middle of coefficient coding after run-coding. However, last level of run-coding could be treated as one of successive coefficient. Therefore, VLC table switching can be applied for both the last level of run-coding and coefficients coding. Moreover the threshold table is modified from *atable[5] ={4,6,14,28, 0xffffff}* to *{3,7,15,31,0xffffff}*.



Figure **1 Comparisons of HM3.0 and Propose method**

# Test Condition

First we tested under the common test condition for two cases. One is to apply threshold change only, the other is to combine threshold changing and last level of run –coding participated in VLC table switching.

# Experimental Results

   

**Table 1 Results on threshold table changing**

   

**Table 2 Results on both table changing and last level of run-coding participated in VLC switching**

# Conclusion

This proposal is the improvement of CAVLC coefficient coding. It is evaluated by simulation results that there is coding gain -0.2%/-0.1%/-0.1% with intra, low delay and random access low complexity configuration respectively. No additional complexity is observed at both encoder and decoder.

# Specification

JCTVC-E603\_d8 Section 9.2.4.4

Table 9‑13 – Derivation of levelThreshold from vlcIdx

|  |  |
| --- | --- |
| **vlcIdx** | **levelThreshold** |
| 0 | ~~4~~3 |
| 1 | ~~6~~7 |
| 2 | ~~14~~15 |
| 3 | ~~28~~31 |

After Section 9.2.4.3 :: Missing level\_minus2\_and\_sign for run\_level and insert below

#### Parsing process for level\_minus2\_and\_sign for run\_level

* Same parsing process of subclause 9.2.4.2.
* If level\_minus2 +2 is greater than levelThreshold[vlcIdx==0],

vlcNumLevel =1

Otherwise

vlcNumLevel =0

|  |
| --- |
| residual\_coding\_cavlc( x0, y0, log2TrafoSize, trafoDepth, cIdx ) { |
| n = ( 1 << ( log2TrafoSize << 1 ) ) >> ( cIdx > 0  ?  2  :  0 ) |
| **last\_pos\_level\_one** |
| lastPos **=** last\_pos\_level\_one % n |
| levelGreaterThanOneFlag = ( last\_pos\_level\_one > n ) |
| level\_and\_sign( levelGreaterThanOneFlag, transCoeffLevel, x0, y0, trafoDepth,  cIdx, lastPos) |
| runModeFlag = TRUE |
| n = lastPos – 1 |
| sumBigCoeff = 0 |
| switchThres = ( PredMode == MODE\_INTRA && cIdx == 0)? 0 : 49 |
| while (runModeFlag && n >= 0) { |
| **run\_level\_one** |
| runOfZeros = run\_level\_one % n |
| levelGreaterThanOneFlag = (run\_level\_one > n) |
| trOne = (trOne = = 0 | | levelGreaterThanOneFlag) ? 0 : Max(4, trOne + 1) |
| n = n – runOfZeros |
| if( n >= 0 ) { |
| level\_and\_sign( levelGreaterThanOneFlag, transCoeffLevel, x0, y0,  trafoDepth, cIdx,  n) |
| if ( levelGreaterThanOneFlag ) { |
| sumBigCoeff = sumBigCoeff + level |
| if ( log2TrafoSize==2 | | n > switchThres | | sumBigCoeff > 2 ) |
| { |
| vlcNumLevel = (level > levelThreshold[0]) ? 1 : 0 |
| runModeFlag = FALSE |
| } |
| } |
| } |
| n-- |
| } |

# Patent rights declaration(s)

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