

JCTVC-J0141: AhG6

SAO Offset Bypass Coding

Woo-Shik Kim, Madhukar Budagavi, Vivienne Sze

Texas Instruments Inc., USA

- Offset range
 - $[0, 7]$ for 8 bit video, $[0, 15]$ for 9 bit video
 - $[0, 31]$ for bit-depth larger than 9
- Truncated unary binarization
 - 7 bins context coded for 8-bit video, 15 bins context coded for 9-bit video
 - 31 bins context coded for bit-depth larger than 9



TEXAS
INSTRUMENTS

- Truncated unary binarization as in HM-7.0
- Only first two bins are context coded
- The other bins are bypass coded
- Four offsets are coded together so that context coded bins for all four offsets are coded first, followed by coding of bypass coded bins



TEXAS
INSTRUMENTS

Proposed Method – Second Approach

- Truncated unary + fixed length binarization with cMax = 2
- Only first two bins are context coded
- The other bins are bypass coded
- Four offsets are coded together so that context coded bins for all four offsets are coded first, followed by coding of bypass coded bins

→ Max 7 bins coded, Max 2 bins context coded

offset value: binarized bins

0: **0**

1: **10**

2: **11**000

3: **11**001

...

6: **11**110

7: **11**111

< 8 bit video >

offset value: binarized bins

0: **0**

1: **10**

2: **11**00000

3: **11**00001

...

30: **11**11110

31: **11**11111

< 10 bit video >

Experimental Results

- First approach
 - HM-7.0 binarization when only the first bin is context coded
 - 0.0/0.2/0.3 % (Y/Cb/Cr) is resulted on average

	Main			HE10		
AI	0.0%	0.1%	0.2%	0.0%	0.1%	0.1%
RA	0.0%	0.2%	0.2%	0.0%	0.1%	0.1%
LDB	0.0%	0.4%	0.4%	0.1%	0.2%	0.4%
LDP	0.1%	0.6%	0.7%	0.1%	0.2%	0.2%
Ave	0.0%	0.3%	0.3%	0.0%	0.2%	0.2%

Experimental Results

- First approach
 - HM-7.0 binarization when only first two bins are context coded
 - 0.0/0.0/0.0 % (Y/Cb/Cr) is resulted on average

	Main			HE10		
AI	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
RA	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
LDB	0.0%	0.1%	0.1%	0.0%	0.1%	-0.1%
LDP	0.0%	-0.1%	0.1%	0.1%	0.0%	-0.2%
Ave	0.0%	0.0%	0.1%	0.0%	0.1%	-0.1%

Experimental Results

- Second approach
 - TU+FL binarization with cMax=2, when only first two bins are context coded
 - 0.0/0.3/0.3 % (Y/Cb/Cr) loss is resulted on average

	Main			HE10		
AI	0.0%	0.2%	0.3%	0.0%	0.2%	0.2%
RA	0.0%	0.2%	0.2%	0.0%	0.3%	0.3%
LDB	0.0%	0.3%	0.3%	0.1%	0.5%	0.6%
LDP	0.1%	0.4%	0.4%	0.2%	0.8%	0.5%
Ave	0.0%	0.3%	0.3%	0.1%	0.4%	0.4%

Conclusions

- Proposed SAO offset bypass coding
- In the first approach, only the first two bins are context coded and the others are bypass coded
- In the second approach, number of total bins are reduced by using TU+FL binarization with $cMax=2$
- No coding loss is resulted on average in the first approach
- 0.0/0.3/0.3 loss is resulted on average in the second approach