

JVET-P0546

Non-CE4: An applying condition of BDOP

Kyohei Unno, Kei Kawamura, Sei Naito
KDDI Corp. (KDDI Research, Inc.)

■ Problem statement

- Current applying conditions of BDOF don't consider POC distances between a current frame and a L0/L1 reference frame.
- However, BDOF prediction refinement process assumes that a current frame is at center position temporally a L0 ref. frame and L1 ref. frame.

■ Proposal

- An applying condition is changed to allowing only equal POC case.
- That is the same condition as DMVR.
- This solution is identical to JVET-P0415 Test 2 and JVET-P0598 Test B.

■ Experimental results

- Only 0.01% (RA) loss in comparison with VTM-6.0

- The current BDOF applying conditions don't consider POC distances between a current frame and a L0/L1 reference frame.
 - It is only considered whether “Bi-directional prediction” or not.
- However, BDOF refinement process assumes POC distances are equivalent.
 - Predicted sample values from L0 and L1 are used in the calculation without any weighting coefficients reflecting POC distances.

$$\text{diff}[x][y] = (\text{predSamplesL0}[hx][vy] \gg \text{shift2}) - (\text{predSamplesL1}[hx][vy] \gg \text{shift2}) \quad (8-807)$$

$$\text{tempH}[x][y] = (\text{gradientHL0}[x][y] + \text{gradientHL1}[x][y]) \gg \text{shift3} \quad (8-808)$$

$$\text{tempV}[x][y] = (\text{gradientVL0}[x][y] + \text{gradientVL1}[x][y]) \gg \text{shift3} \quad (8-809)$$

$$\begin{aligned} \text{bdofOffset} = & (v_x * (\text{gradientHL0}[x+1][y+1] - \text{gradientHL1}[x+1][y+1])) \gg 1 \quad (8-819) \\ & + (v_y * (\text{gradientVL0}[x+1][y+1] - \text{gradientVL1}[x+1][y+1])) \gg 1 \end{aligned}$$

- There is an inconsistency between the applying conditions and the refinement process.
- DMVR refinement process has the same assumption, and the DMVR applying conditions consider POC distances.

■ An applying condition is changed to allowing only when POC distances for L0 and L1 are equivalent.

- If all of the following conditions are true, bdofFlag is set equal to TRUE.
 - sps_bdof_enabled_flag is equal to 1 and slice_disable_bdof_dmvr_flag is equal to 0.
 - predFlagL0[xSbIdx][ySbIdx] and predFlagL1[xSbIdx][ySbIdx] are both equal to 1.
 - ~~– DiffPicOrderCnt(currPic, RefPicList[0][refIdxL0]) * DiffPicOrderCnt(currPic, RefPicList[1][refIdxL1]) is less than 0.~~
 - DiffPicOrderCnt(currPic, RefPicList[0][refIdxL0]) is equal to DiffPicOrderCnt(RefPicList[1][refIdxL1], currPic)
 - MotionModelIdc[xCb][yCb] is equal to 0.
 - merge_subblock_flag[xCb][yCb] is equal to 0.
 - ...
 - cIdx is equal to 0.
- Otherwise, bdofFlag is set equal to FALSE.

■ The proposed solution is identical to JVET-P0415 Test 2 and JVET-P0598 Test B.

■ Anchor: VTM-6.0

- Coding loss is negligible.

| | Random access | | | | |
|----------------|---------------|-------|--------|------|------|
| | Over VTM-6.0 | | | EncT | DecT |
| | Y | U | V | | |
| Class A1 | 0.02% | 0.03% | 0.04% | 100% | 100% |
| Class A2 | 0.02% | 0.00% | 0.01% | 100% | 100% |
| Class B | 0.01% | 0.02% | -0.01% | 100% | 100% |
| Class C | 0.00% | 0.05% | 0.06% | 100% | 100% |
| Class E | | | | | |
| Overall | 0.01% | 0.03% | 0.02% | 100% | 100% |
| Class D | 0.05% | 0.00% | 0.04% | 100% | 100% |
| Class F | 0.00% | 0.01% | 0.01% | 100% | 100% |

■ Proposal

- An BDOF applying condition is changed to allowing only equal POC case.
- That is the same condition as DMVR.
- This solution is identical to JVET-P0415 Test 2 and JVET-P0598 Test B.

■ Experimental results

- Only 0.01% (RA) loss in comparison with VTM-6.0

■ Proposal is recommended to adopt to VVC D7 and VTM-7.

■ Thank Panasonic for cross-checking.