JCTVC-Q0092

Non-RCE1: Simplification of RCE1 Test2

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Overall Summary

- Propose two modifications on RCE1 Test2 adaptive MV precision
  - A single context adaptive MV precision flag coding is proposed to reduce the line buffer
  - The adaptive MV precision is disabled for merge mode PUs to improve the coding efficiency
- Results (SC YUV 444 sequences)

Lossy coding BD-rate	RA-MT	LB-MT
Method 1 on top of RCE1 Test2	0.2%	0.1%
Method 1+2 on top of RCE1 Test2	-0.2%	-0.6%
Method 1+2 on top of Rext-6.0	-0.9%	-1.3%

RCE1 Test2 Adaptive MV Precision

- A CU-level adaptive MV precision method is proposed and studied in RCE1 Test2 (JCTVC-Q0049)
  - A CU-level flag is signaled to indicate whether all PUs in the CU have integer-precision or quarter-precision MVs
- Problems:
  - A line buffer is required since the context formation of the CU-level flag requires the information of the above CU
  - The adaptive MV precision is found to be less efficient for merge mode

Method-1: Single Context Adaptive MV Precision Flag Coding

- The context formation of the adaptive MV precision flag is similar to split_flag coding:
  - ctxIdx = cu_imv_flag[left_CU] + cu_imv_flag[above_CU]
  - A line buffer is required to store the coded adaptive MV precision flag of the above CU
- Proposed to use only one context for the adaptive MV precision flag
  - No information of neighboring CUs is required to be stored
  - No line buffer is required

Method-2: Disabling Adaptive MV Precision for Merge Mode

- The adaptive MV precision is found to be less efficient for merge mode
- Propose to disable the adaptive MV precision for all merge mode Pus
  - The adaptive MV precision flag is only transmitted when the current CU contains at least one merge mode PU
  - Otherwise, the adaptive MV precision flag is inferred as 0

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Lossy Coding Results of Method-1 on Top of RCE1 Test2

- Anchor: RCE1 Test2
- Only 0.2% / 0.1% BD-rate loss for SC YUV 444 sequences under RA-MT / LB-MT
  - No loss in other mandatory classes
- Thank Qualcomm for cross-verification (JCTVC-Q0173)

BD-rate Y	RA-MT	RA-HT	LB-MT	LB-HT
Class F	0.0%	0.0%	0.0%	0.0%
Class B	0.0%	0.0%	0.0%	0.0%
SC RGB 444	0.0%	0.1%	-0.1%	0.1%
Animation RGB 444	0.0%	0.0%	0.0%	0.0%
SC YUV 444	0.2%	0.2%	0.1%	0.2%
Animation YUV 444	0.0%	0.0%	0.0%	0.0%
RangeExt	0.0%	0.0%	-0.1%	0.0%
SC(444) GBR Optional	0.2%	0.1%	0.9%	-0.3%
SC(444) YUV Optional	-0.3%	-0.3%	0.6%	0.2%

Lossless Coding Results of Method-1 on Top of RCE1 Test2

- Anchor: RCE1 Test2
- 0.1% BD-rate gain for SC YUV 444 sequences under RA-MT / LB-MT

	RA	LB
Class F	0.0%	0.0%
Class B	0.0%	0.0%
RGB 4:4:4 SC	0.0%	0.0%
RGB 4:4:4 Animation	0.0%	0.0%
YCbCr 4:4:4 SC	-0.1%	-0.1%
YCbCr 4:4:4 Animation	0.0%	0.0%
RangeExt	0.0%	0.0%
RGB 4:4:4 SC (Optional)	0.0%	0.2%
YCbCr 4:4:4 SC (Optional)	0.0%	0.0%

Lossy Coding Results of Method-1+2 on Top of RCE1 Test2

- Anchor: RCE1 Test2
- 0.2% / 0.6% BD-rate gain for SC YUV 444 sequences under RA-MT / LB-MT
  - 0.4/ 0.8% BD-rate gain for class F sequences under RA-MT / LB-MT
- The encoding times are reduced by 10%

BD-rate Y	RA-MT	RA-HT	LB-MT	LB-HT
Class F	-0.4%	-0.3%	-0.8%	-0.5%
Class B	-0.2%	-0.1%	-0.4%	-0.2%
SC RGB 444	-0.2%	-0.1%	-0.4%	-0.2%
Animation RGB 444	0.0%	0.1%	0.2%	0.3%
SC YUV 444	-0.2%	-0.2%	-0.6%	-0.4%
Animation YUV 444	-0.3%	-0.2%	-0.5%	-0.2%
RangeExt	-0.2%	-0.1%	-0.4%	-0.1%
SC(444) GBR Optional	-0.1%	-0.2%	-1.2%	-1.9%
SC(444) YUV Optional	-0.2%	-0.4%	-1.8%	-1.7%
Enc Time[%]	91%	90%	90%	89%
Dec Time[%]	99%	99%	99%	98%

Lossless Coding Results of Method-1+2 on Top of RCE1 Test2

- Anchor: RCE1 Test2
- 0.3% / 0.2% BD-rate gain for SC YUV 444 RA-MT / LB-MT
- The encoding times are reduced by 10%

	RA	LB
Class F	0.0%	-0.1%
Class B	0.0%	0.0%
RGB 4:4:4 SC	-0.3%	-0.1%
RGB 4:4:4 Animation	0.0%	0.0%
YCbCr 4:4:4 SC	-0.3%	-0.2%
YCbCr 4:4:4 Animation	0.0%	0.0%
RangeExt	0.0%	0.0%
RGB 4:4:4 SC (Optional)	-0.2%	-0.2%
YCbCr 4:4:4 SC (Optional)	-0.2%	-0.2%
Enc Time[%]	90%	91%
Dec Time[%]	101%	100%

Lossy Coding Results of Method-1+2 on Top of RCE1 Test2

- Anchor: HM-13.0+RExt-6.0
- 0.9% / 1.3% BD-rate gain for SC YUV 444 sequences under RA-MT / LB-MT

BD-rate Y	RA-MT	RA-HT	LB-MT	LB-HT
Class F	-1.5%	-1.5%	-1.8%	-1.6%
Class B	-0.6%	-0.5%	-0.5%	-0.4%
SC RGB 444	-1.1%	-1.3%	-1.4%	-1.7%
Animation RGB 444	-1.1%	-1.3%	-1.8%	-2.2%
SC YUV 444	-0.9%	-0.9%	-1.3%	-1.5%
Animation YUV 444	-1.2%	-1.0%	-1.0%	-1.0%
RangeExt	-0.5%	-0.3%	-0.4%	-0.3%
SC(444) GBR Optional	-1.9%	-1.9%	-4.2%	-3.6%
SC(444) YUV Optional	-2.0%	-2.3%	-4.7%	-4.3%

Lossless Coding Results of Method-1+2 on Top of RCE1 Test2

- Anchor: HM-13.0+RExt-6.0
- 1.2% / 0.9% BD-rate gain for SC YUV 444 sequences under RA-MT / LB-MT

	RA	LB
Class F	-0.5%	-0.5%
Class B	0.0%	0.0%
RGB 4:4:4 SC	-1.2%	-1.8%
RGB 4:4:4 Animation	-0.9%	-0.9%
YCbCr 4:4:4 SC	-1.2%	-0.9%
YCbCr 4:4:4 Animation	-0.5%	-0.4%
RangeExt	0.0%	0.0%
RGB 4:4:4 SC (Optional)	-0.7%	0.2%
YCbCr 4:4:4 SC (Optional)	-1.5%	-2.8%

Conclusions

- Two methods are proposed to reduce the line buffer and improve the coding efficiency
  - A single context adaptive MV precision flag coding is proposed to reduce the line buffer
  - The adaptive MV precision is disabled for merge mode PUs to improve the coding efficiency
- Results (SC YUV 444 sequences)

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