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SIMPLIFICATION OF ATMVP CANDIDATE DERIVATION

JVET-L0198

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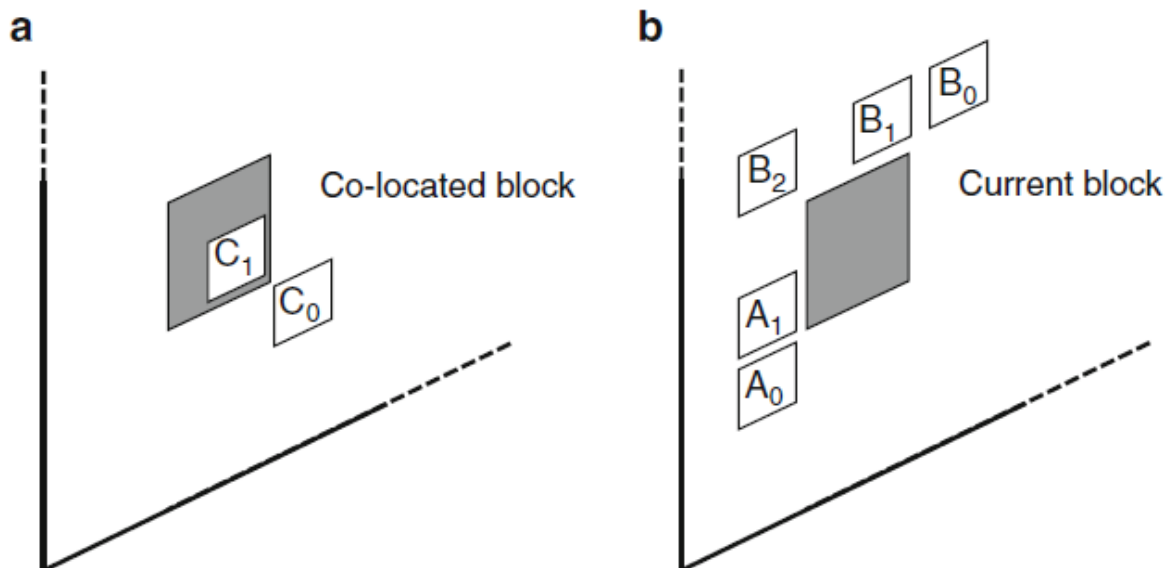
Overview

- Two simplifications for current ATMVP design
 - Restrict the number of neighboring block scan to 1 time
 - Restrict the subblock size for ATMVP to 8x8
- +/- 0.01% performance variation of the proposed methods compared to anchor



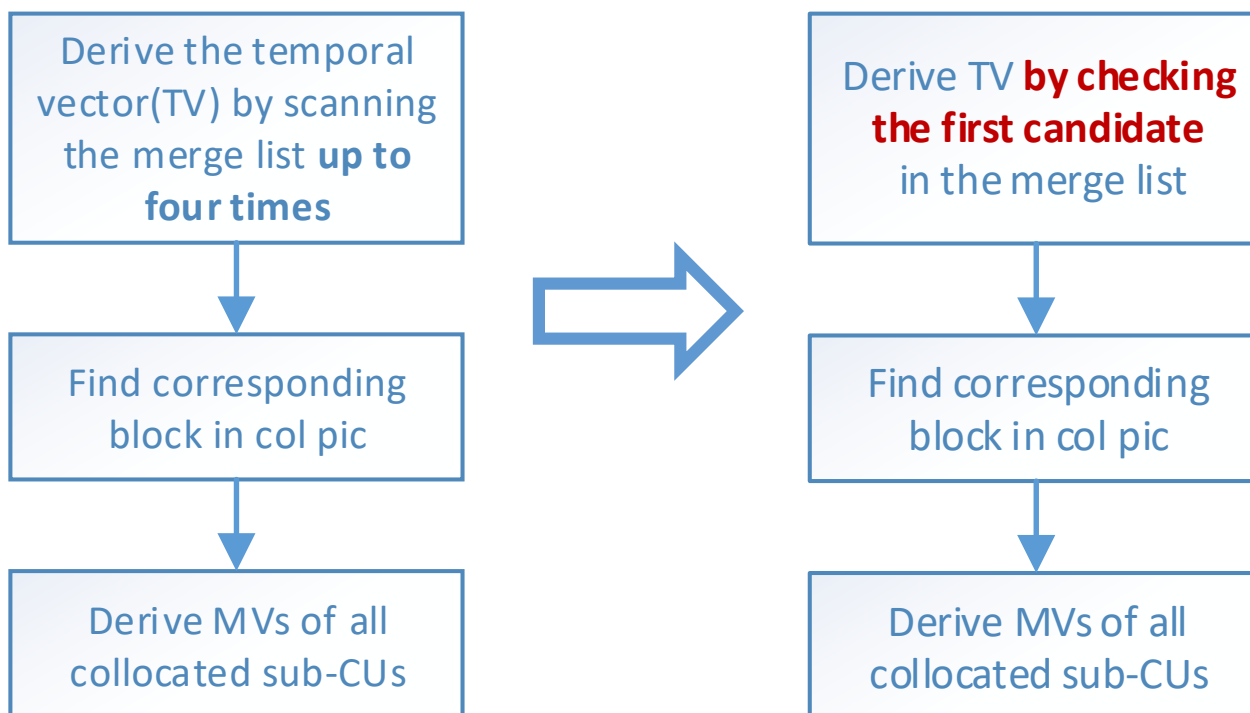
Restriction of the number of neighboring block scans

- In current ATMVP design, the first step is to Identify the corresponding block **by scanning the MVs of the spatial merge candidates list:** $A_1 \rightarrow B_1 \rightarrow B_0 \rightarrow A_0 \rightarrow \text{ATMVP} \rightarrow B_2 \rightarrow \text{TMVP}$
- Up to 4 checks will be processed.



Proposed method (1/2)

- ❑ Simplify derivation of the collocated block
- ❑ Restrict the number of scanning process to **one time**



Proposed method (2/2)

```
for (int uiN = 0; uiN < count && !terminate; uiN++)
{
    RefPicList currRefPicList = RefPicList(slice.getCheckLDC() ? (slice.getColFromL0Flag() ? currRefListId : 1 - currRefListId)
    : currRefListId);

    if ((mrgCtx.interDirNeighbours[uiN] & (1 << currRefPicList)) && slice.getRefPic(currRefPicList, mrgCtx.mvFieldNeighbours[uiN * 2 +
    currRefPicList].refIdx) == pColPic)
    {
        cTMv = mrgCtx.mvFieldNeighbours[uiN * 2 + currRefPicList].mv;
        terminate = true;
        fetchRefPicList = currRefPicList;
        break;
    }
}
```



```
if (count)
{
    RefPicList currRefPicList = RefPicList(slice.getCheckLDC() ? (slice.getColFromL0Flag() ? currRefListId : 1 - currRefListId)
    : currRefListId);

    if ((mrgCtx.interDirNeighbours[0] & (1 << currRefPicList)) && slice.getRefPic(currRefPicList, mrgCtx.mvFieldNeighbours[0 * 2 +
    currRefPicList].refIdx) == pColPic)
    {
        cTMv = mrgCtx.mvFieldNeighbours[0 * 2 + currRefPicList].mv;
        terminate = true;
        fetchRefPicList = currRefPicList;
        break;
    }
}
```



Experimental Results

- CTC Test(a) (restrict the number of scanning process to one time):

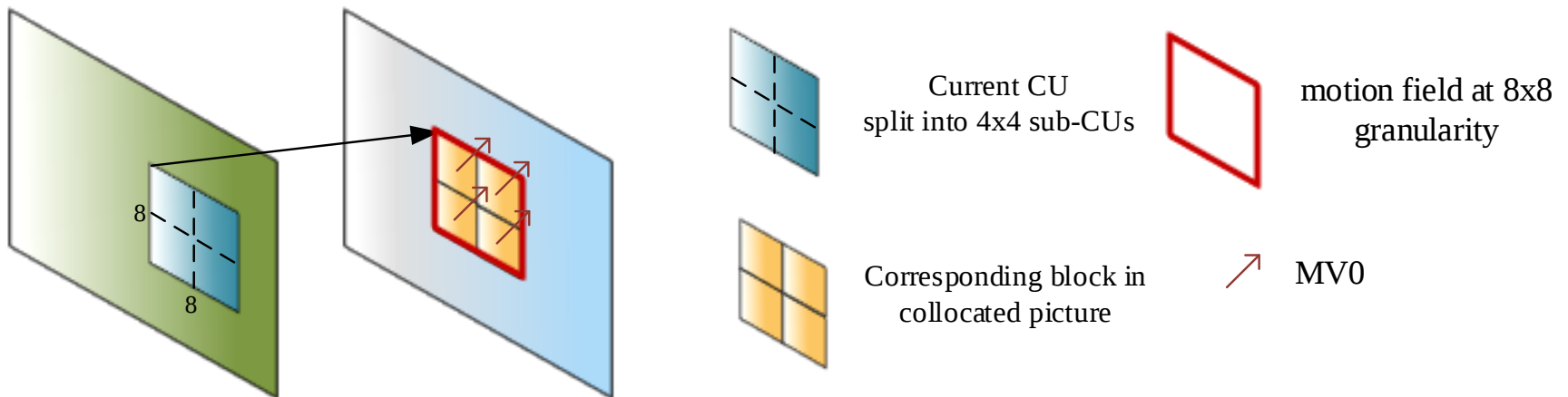
Random Access Main 10					
Over vtm2.0.1					
	Y	U	V	EncT	DecT
Class A1	0.00%	0.06%	0.04%	100%	101%
Class A2	0.01%	0.05%	0.01%	100%	100%
Class B	0.02%	0.01%	0.01%	100%	101%
Class C	0.02%	0.11%	0.11%	100%	97%
Class E					
Overall	0.01%	0.06%	0.04%	100%	100%
Class D	0.03%	0.07%	0.01%	100%	100%
Class F (optional)	#VALUE!	#VALUE!	#VALUE!	#DIV/0!	#DIV/0!

Low delay B Main10					
Over vtm2.0.1					
	Y	U	V	EncT	DecT
Class A1					
Class A2					
Class B	0.04%	-0.11%	-0.14%	100%	100%
Class C	0.01%	-0.07%	-0.11%	100%	100%
Class E	-0.04%	-0.07%	-0.34%	100%	100%
Overall	0.01%	-0.09%	-0.18%	100%	100%
Class D	0.04%	0.41%	-0.27%	101%	101%
Class F (optional)	#VALUE!	#VALUE!	#VALUE!	#DIV/0!	#DIV/0!



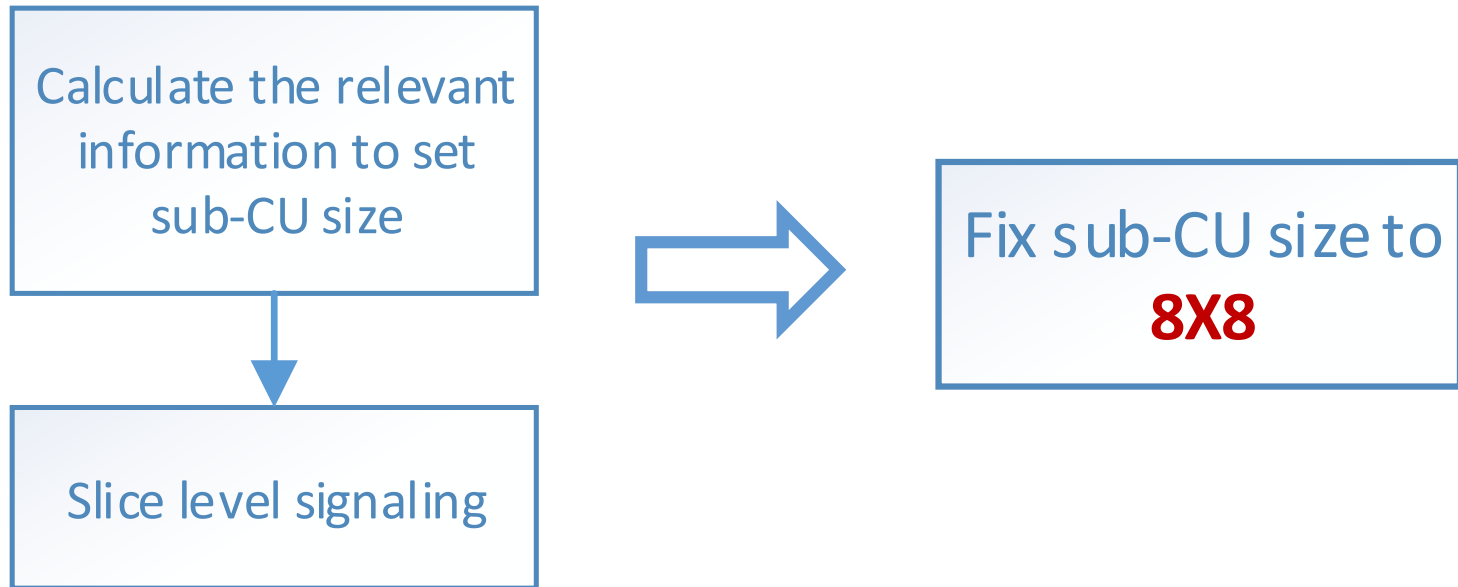
Restriction of subblock size for ATMVP

- ATMVP sub-CU size is adaptively set to 4x4 or 8x8, while temporal motion field are compressed at 8x8 granularity.
- 4x4 sub-CU size is unnecessary in some cases.



Proposed method

- Fix the sub-CU size to 8x8



Experimental Results

□ CTC Test(b) (fix the sub-block size for ATMVP to 8x8):

Random Access Main 10					
Over vtm2.0.1					
	Y	U	V	EncT	DecT
Class A1	-0.01%	0.03%	-0.03%	100%	100%
Class A2	0.01%	-0.02%	-0.07%	99%	99%
Class B	0.00%	0.05%	0.00%	99%	101%
Class C	0.00%	0.12%	0.03%	100%	96%
Class E					
Overall	0.00%	0.05%	-0.01%	100%	99%
Class D	0.00%	0.02%	-0.02%	100%	100%
Class F (optional)	#VALUE!	#VALUE!	#VALUE!	#DIV/0!	#DIV/0!

Low delay B Main10					
Over vtm2.0.1					
	Y	U	V	EncT	DecT
Class A1					
Class A2					
Class B	0.01%	-0.22%	-0.04%	99%	100%
Class C	0.06%	0.08%	-0.13%	99%	96%
Class E	-0.09%	-0.03%	-0.38%	100%	98%
Overall	0.00%	-0.07%	-0.16%	99%	98%
Class D	0.00%	0.14%	-0.38%	100%	99%
Class F (optional)	#VALUE!	#VALUE!	#VALUE!	#DIV/0!	#DIV/0!

Experimental Results for the combination of the two simplified methods

□ CTC Test(c) (a+b):

	Random Access Main 10				
	Over vtm2.0.1			EncT	DecT
	Y	U	V		
Class A1	0.00%	0.04%	-0.01%	100%	100%
Class A2	0.02%	-0.03%	-0.08%	100%	100%
Class B	0.00%	-0.02%	-0.03%	99%	101%
Class C	0.01%	0.15%	0.07%	100%	96%
Class E					
Overall	0.01%	0.03%	-0.01%	100%	99%
Class D	0.00%	-0.03%	0.03%	100%	98%
Class F (optional)	#VALUE!	#VALUE!	#VALUE!	#DIV/0!	#DIV/0!

	Low delay B Main10				
	Over vtm2.0.1			EncT	DecT
	Y	U	V		
Class A1					
Class A2					
Class B	0.02%	-0.09%	-0.11%	99%	99%
Class C	0.04%	-0.01%	-0.31%	99%	98%
Class E	-0.12%	0.41%	-0.13%	99%	97%
Overall	-0.01%	0.06%	-0.18%	99%	98%
Class D	-0.05%	0.45%	0.52%	100%	99%
Class F (optional)	#VALUE!	#VALUE!	#VALUE!	#DIV/0!	#DIV/0!

Conclusion

- This contribution proposed simplifications on ATMVP candidate derivation, which makes restriction on the scanning process for deriving the collocated block and fix the sub-block size to 8x8.
- It is recommended to adopt the proposed ATMVP simplification methods to the next version of VVC wording draft.

Thanks!

