Merge based mvd transmission

JCTVC-F373

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1. Overview

Overview

- **Proposed technique**

  - Merge based mvd transmission

- **Algorithm**

  - Introduce merge mvd mode

  - Transmit mvd with merge predictor

  - Share the derivation process for merge mode

- **Simulation results**

  - Overall BD-rate gain 0.6% for RA, 1.3% for LD (with ME)

  - Overall BD-rate gain 0.2% for RA, 0.5% for LD (without ME)

2. Algorithm

Merge mvd mode

- Add new mode for inter prediction (Merge mvd mode)

- Transmit mvd based on merge

- Almost same decoding process with the merge mode

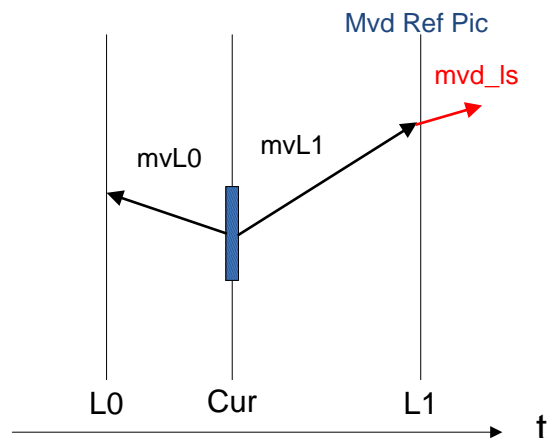|	Inter Pred	Merge Index	Ref Index	AMVP Index	Mvd
Merge mode	-	O (1)	-	-	-
MergeMvd mode	**O**	**O (1)**	**-**	**-**	**O (1)**
AMVP mode	O	-	O (1 or 2)	O (1 or 2)	O (1 or 2)

Derivation process for merge mvd mode

1. Select the reference picture to add mvd

2. (In case of uni-prediction), calculate mvp of the other list for bi-prediction

3. Calculate motion vector by adding mvd to mvp for the selected reference picture
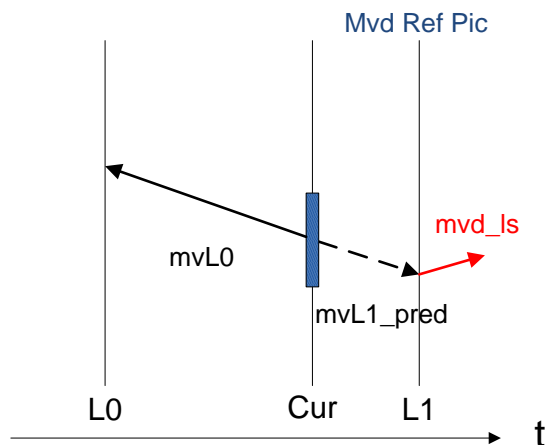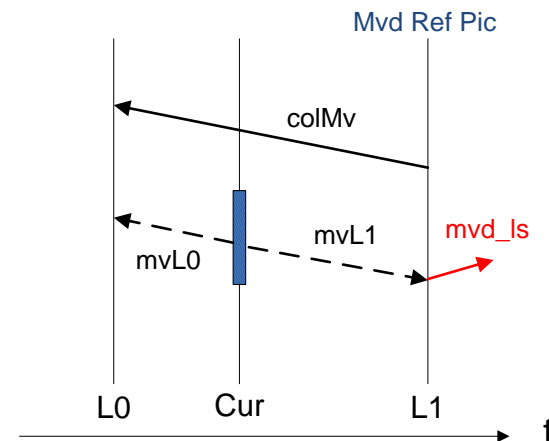
Syntax

- Transmit 1 bit flag (merge_mvd_flag) when bi-prediction

- Transmit merge_idx and mvd_ls when merge_mvd_mode

prediction_unit(x0, y0, log2PUWidth, log2PUHeight, PartIdx , InferredMergeFlag) {	Descriptor
...	
if(slice_type == B)	
inter_pred_flag[x0 **][** y0 **]**	ue(v) | ae(v)
...	
else { /* Inter_pred_type == Pred_BI*/	
merge_mvd_flag[x0 **][** y0 **]**	u(1) | ae(v)
if(merge_mvd_flag[x0][y0]){	
if(NumMergeCand > 1) {	
merge_idx[x0 **][** y0 **]**	ue(v) | ae(v)
}	
mvd_ls[x0 **][** y0 **][** 0 **]**	se(v) | ae(v)
mvd_ls[x0 **][** y0 **][** 1 **]**	se(v) | ae(v)
}	
...	

3. Experiments

Simulation results with additional ME

- Overall BD-rate gain 0.6% for RA, 1.3% for LD

- 12%-17% increase of encoder runtime

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A	-0.6	-0.5	-0.5	-0.8	0.2	-0.3
Class B	-0.7	-0.6	-0.7	-0.6	-0.6	-0.6
Class C	-0.6	-0.5	-0.5	-0.4	-0.5	-0.4
Class D	-0.7	-0.5	-0.5	-0.5	-0.6	-0.5
Class E						
Overall	**-0.6**	**-0.5**	**-0.6**	**-0.6**	**-0.4**	**-0.5**
Enc Time[%]	114%			117%		
Dec Time[%]	101%			100%		

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	-1.1	-1.7	-1.7	-1.7	-1.9	-1.7
Class C	-1.2	-1.2	-1.3	-1.2	-1.0	-1.1
Class D	-1.1	-1.0	-0.5	-0.9	-0.8	-1.1
Class E	-1.3	-1.5	-2.2	-1.9	-3.0	-2.0
Overall	**-1.2**	**-1.4**	**-1.4**	**-1.4**	**-1.6**	**-1.5**
Enc Time[%]	112%			114%		
Dec Time[%]	101%			101%		

Simulation results without additional ME

- Overall BD-rate gain 0.1-0.2% for RA, 0.4-0.5% for LD

- 3%-4% increase of encoder runtime

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A	-0.2	-0.2	-0.2	-0.2	-0.1	-0.3
Class B	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1
Class C	-0.2	-0.2	-0.2	-0.1	-0.1	0.0
Class D	-0.2	-0.2	-0.2	-0.1	-0.2	-0.2
Class E						
Overall	**-0.2**	**-0.2**	**-0.2**	**-0.1**	**-0.2**	**-0.2**
Enc Time[%]	104%			104%		
Dec Time[%]	100%			99%		

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	-0.3	-0.6	-1.0	-0.6	-0.6	-0.6
Class C	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
Class D	-0.4	-0.5	0.1	-0.3	-0.3	-0.4
Class E	-0.4	-0.3	-0.6	-0.9	-0.6	-0.4
Overall	**-0.4**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**-0.5**
Enc Time[%]	103%			103%		
Dec Time[%]	101%			100%		

4. Conclusion

Conclusion

- **Suggestion**

    - Further investigated in CE

- **Future work**

    - Non-normative algorithm for low complexity encoder

    - How to add mvd to mvp

    - Syntax position of the merge mvd mode