CE9:
Results of MRG_MVD series

JCTVC-G052

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1. Overview

Overview

- **Proposed technique**

  - Merge base MVD transmission

- **Algorithm**

  - Transmit one MVD

  - Almost same decoding process with the merge mode

- **Crosscheck**

  - JCTVC-G190 by Fujitsu (MRG_MVD01)

  - JCTVC-G536 by Panasonic (MRG_MVD02)

  - JCTVC-G688 by Qualcomm (MRG_MVD03)

- **Simulation results**

  - Overall BD-rate gain 0.5% for RA and 0.8% for LD (MRG_MVD02)
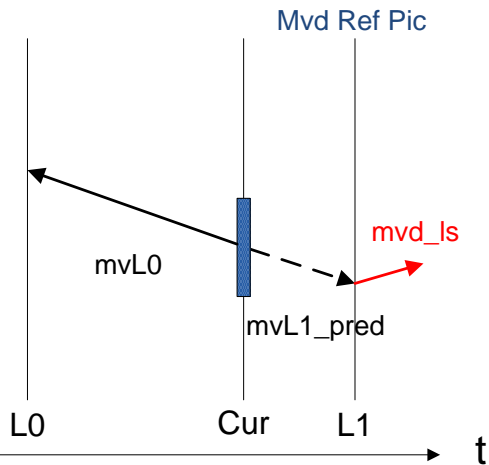
2. Algorithm

Algorithm

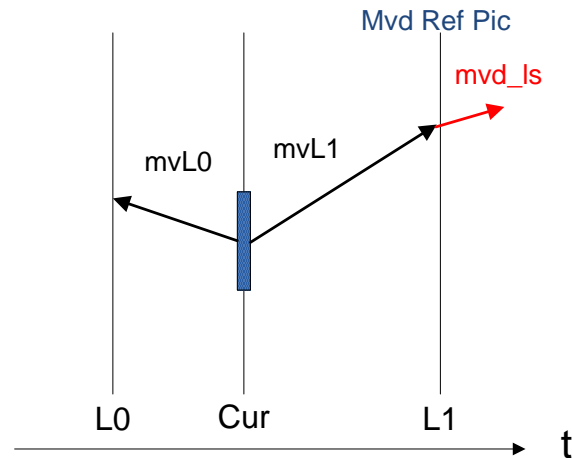|	Inter Pred	Merge Index	Ref Index	MVP Index	MVD
Merge mode	-	○ (1)	-	-	-
MergeMVD mode	○	○ (1)	-	-	○ (1)
AMVP mode	○	-	○ (1 or 2)	○ (1 or 2)	○ (1 or 2)

MergeMVD mode
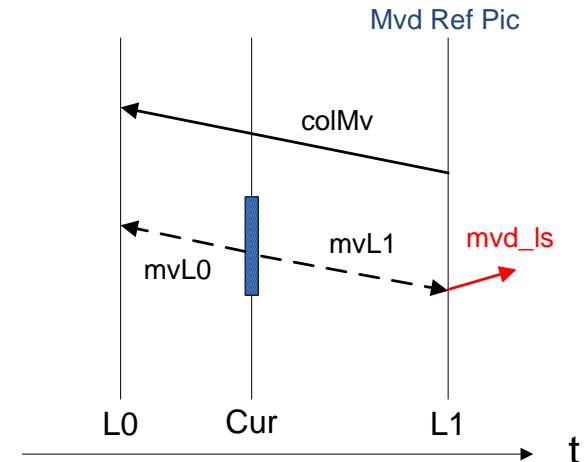- Transmit MergeIndex and one MVD
- Always bi-prediction

Algorithm

Spatial Uni-pred · Spatial Bi-pred · Temporal Bi-pred

1. Select the reference picture to add MVD
2. (In case that merge candidate type is uni-prediction,) calculate MVP of the other list for bi-prediction
3. Calculate motion vector by adding the MVD to MVP for the selected reference picture

3. Experiments

Test Conditions

Test	Description
MRG_MVD01	five candidates No additional ME
MRG_MVD02	five candidates Additional ME
MRG_MVD03	one candidate (merge_idx = 0) Additional ME

Simulation results of MRG_MVD01

■ Overall BD-rate gain 0.1% for RA and 0.2-0.3% for LD

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A	-0.1%	-0.5%	-0.4%	-0.2%	0.1%	-0.1%
Class B	-0.1%	-0.2%	-0.1%	-0.1%	-0.2%	-0.1%
Class C	-0.1%	-0.2%	-0.1%	-0.1%	-0.1%	-0.1%
Class D	-0.1%	0.0%	-0.1%	-0.1%	-0.2%	-0.2%
Class E						
Overall	**-0.1%**	**-0.2%**	**-0.2%**	**-0.1%**	**-0.1%**	**-0.1%**
	-0.1%	-0.2%	-0.2%	-0.1%	-0.1%	-0.1%
Enc Time[%]		105%			106%	
Dec Time[%]		100%			100%	

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	-0.2%	-0.3%	0.2%	-0.3%	-0.1%	-0.2%
Class C	-0.3%	-0.3%	-0.4%	-0.3%	-0.1%	-0.4%
Class D	-0.3%	0.0%	0.4%	-0.3%	0.2%	-0.3%
Class E	-0.2%	-0.1%	0.2%	-0.4%	0.3%	-0.2%
Overall	**-0.2%**	**-0.2%**	**0.1%**	**-0.3%**	**0.0%**	**-0.3%**
	-0.2%	-0.2%	0.0%	-0.3%	0.0%	-0.3%
Enc Time[%]		104%			104%	
Dec Time[%]		100%			100%	

Simulation results of MRG_MVD02

- Overall BD-rate gain 0.5% for RA and 0.8% for LD

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A	-0.5%	-0.9%	-0.9%	-0.7%	-0.2%	-0.2%
Class B	-0.6%	-0.6%	-0.5%	-0.6%	-0.5%	-0.5%
Class C	-0.5%	-0.6%	-0.5%	-0.4%	-0.5%	-0.4%
Class D	-0.4%	-0.4%	-0.5%	-0.4%	-0.5%	-0.4%
Class E						
Overall	-0.5%	-0.6%	-0.6%	-0.5%	-0.4%	-0.4%
	-0.5%	-0.6%	-0.6%	-0.5%	-0.4%	-0.4%
Enc Time[%]		114%			115%	
Dec Time[%]		100%			100%	

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	-0.6%	-0.8%	-0.9%	-0.8%	-0.4%	-0.4%
Class C	-0.9%	-0.9%	-1.0%	-0.8%	-0.3%	-0.6%
Class D	-0.8%	-0.4%	-0.5%	-0.7%	-0.3%	-0.8%
Class E	-0.8%	-0.6%	-0.3%	-0.7%	-0.5%	-0.3%
Overall	-0.8%	-0.7%	-0.7%	-0.8%	-0.4%	-0.5%
	-0.8%	-0.7%	-0.7%	-0.8%	-0.4%	-0.5%
Enc Time[%]		111%			111%	
Dec Time[%]		100%			100%	

Simulation results of MRG_MVD03

- Overall BD-rate gain 0.4% for RA and 0.7% for LD

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A	-0.4%	-0.8%	-0.7%	-0.6%	-0.1%	-0.3%
Class B	-0.4%	-0.4%	-0.4%	-0.5%	-0.4%	-0.5%
Class C	-0.4%	-0.4%	-0.4%	-0.3%	-0.3%	-0.2%
Class D	-0.4%	-0.4%	-0.3%	-0.2%	-0.5%	-0.5%
Class E						
Overall	-0.4%	-0.5%	-0.5%	-0.4%	-0.3%	-0.4%
	-0.4%	-0.5%	-0.5%	-0.4%	-0.3%	-0.4%
Enc Time[%]		109%			110%	
Dec Time[%]		101%			99%	

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	-0.5%	-0.6%	-0.8%	-0.7%	-0.4%	-0.4%
Class C	-0.7%	-0.7%	-0.7%	-0.7%	-0.2%	-0.6%
Class D	-0.8%	-0.2%	-0.9%	-0.6%	-0.2%	-0.5%
Class E	-0.7%	-0.7%	0.0%	-0.7%	-0.1%	-0.3%
Overall	-0.7%	-0.6%	-0.6%	-0.7%	-0.3%	-0.4%
	-0.7%	-0.5%	-0.6%	-0.7%	-0.3%	-0.4%
Enc Time[%]		107%			108%	
Dec Time[%]		100%			100%	

4. Conclusion

Conclusion

- Simulation results

    - BD-rate gain 0.1% for RA and 0.2-0.3% for LD (MRG_MVD01)

    - BD-rate gain 0.5% for RA and 0.8% for LD (MRG_MVD02)

    - BD-rate gain 0.4% for RA and 0.7% for LD (MRG_MVD03)

- Suggestion

    - Adopted MRG_MVD02 to the next WD and HM