Unified motion vector removal process for AMVP

JCTVC-E095

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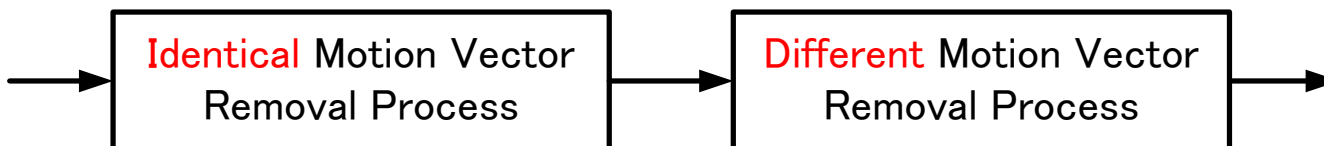
1. Overview

Overview

- **Proposed technique**

  - Unified motion vector removal process

    crosschecked by NTT DOCOMO (JCTVC-E157)

- **Algorithm**

  - Delete the identical motion vector removal process in HM2.0

  - Restore the different motion vector removal process in HM1.0

  - Consider the index cost of MVP when the cost of MVD is same

- **Software**

  - HM2.0 based

- **Simulation results**

  - Overall BD-rate gain 0.2%

  - Same complexity as the anchor (both encoder and decoder)
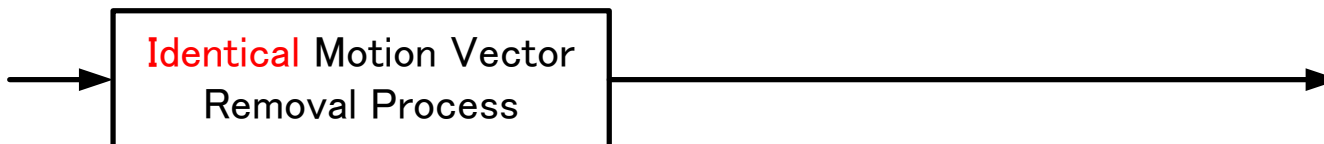
2. Algorithm

Algorithm comparison

- Delete the identical motion vector removal process in the HM2.0

- Restore the different motion vector removal process in the HM1.0

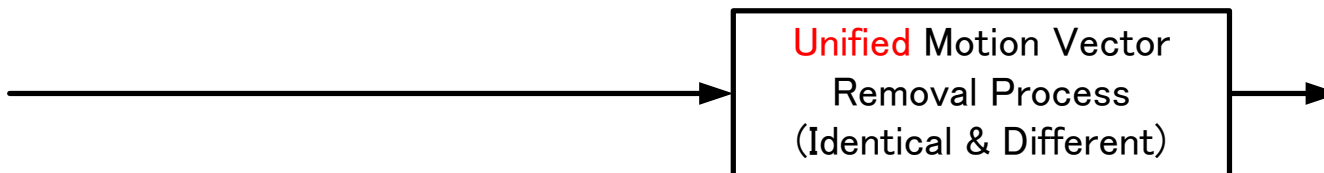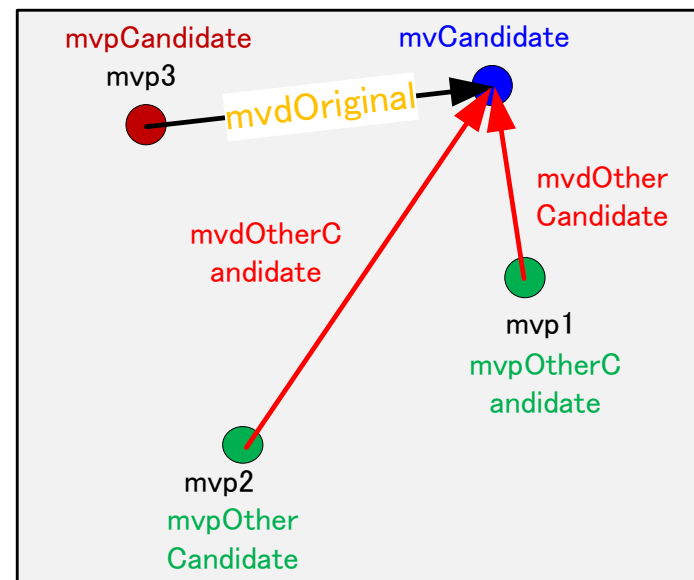- Consider the index cost of MVP when the cost of MVD is same

Unified motion vector removal process

1. Calculate mvCandidate

2. Calculate mvdOtherCandidate

3. Remove mvpCandidate

(1) if the cost of mvdOtherCandidate is smaller than the cost of mvdOriginal

Same as previous algorithm

Added by this proposal

(2) else if the cost of mvdOtherCandidate is same as the cost of mvdOriginal

and the index of mvpOtherCandidate is smaller than the index of mvpCandidate

Benefit

- **Coding efficiency**

  - Remove useless more MVP candidates

- **Complexity**

  - Remove the identical and different motion vector at the same stage (i.e. in unified motion vector removal process)

  - Same checking times as the HM2.0

Algorithm	Identical Motion Vector Removal Process	Unified (or Different) Motion Vector Removal Process	Sum of the maximum number required to be checked
HM1.0	N	M (M<=N)	2N
HM2.0	N	-	N
Proposal	-	N	N

3. Experiments

Simulation results

- Overall BD-rate gain 0.2%

- Same complexity as the anchor (both encoder and decoder)

	Random access			Random access LoCo		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A	-0.1	0.0	-0.2	-0.2	-0.2	0.0
Class B	-0.1	0.0	0.0	-0.1	-0.1	-0.1
Class C	-0.2	-0.1	-0.2	-0.2	-0.1	-0.1
Class D	-0.1	-0.3	-0.1	-0.2	-0.3	-0.2
Class E						
All	-0.1	-0.1	-0.1	-0.2	-0.2	-0.1
Enc Time[%]	100%			100%		
Dec Time[%]	99%			100%		

	Low delay			Low delay LoCo		
	Y BD-rate	U BD-rate	V BD-rate	Y BD-rate	U BD-rate	V BD-rate
Class A						
Class B	-0.1	0.2	-0.1	-0.1	-0.1	0.1
Class C	-0.1	0.1	-0.1	-0.2	-0.2	-0.3
Class D	-0.3	-0.1	-0.5	-0.2	-0.3	-0.2
Class E	-0.2	0.0	0.0	-0.1	0.1	-0.3
All	-0.2	0.1	-0.2	-0.2	-0.1	-0.1
Enc Time[%]	100%			100%		
Dec Time[%]	100%			100%		

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Simulation results (each sequence)

- **Steady coding gain** for each sequence and configuration

Class	Test Sequence	Random Access	Random Access LoCo	Low Delay	Low Delay LoCo
Class A	Traffic	-0.2	-0.1	-	-
	PeopleOnStreet	-0.2	-0.2	-	-
	Nebuta	-0.1	-0.1	-	-
	StremLocomotive	0.0	-0.1	-	-
Class B	Kimono	-0.2	-0.1	-0.1	-0.2
	ParkScene	-0.1	-0.1	-0.1	-0.2
	Cactus	-0.1	-0.1	-0.2	-0.2
	BasketballDrive	-0.1	-0.1	-0.1	-0.1
	BQTerrace	-0.1	-0.2	-0.1	-0.1
Class C	BasketballDrill	-0.2	-0.2	-0.2	-0.2
	BQMall	-0.2	-0.2	-0.2	-0.1
	PartyScene	-0.1	-0.2	-0.1	-0.2
	RaceHorses	-0.2	-0.2	-0.1	-0.3
Class D	BasketballPass	-0.2	-0.2	-0.3	-0.2
	BQSquare	-0.1	-0.1	-0.2	-0.1
	BlowingBubbles	-0.1	-0.2	-0.2	-0.2
	RaceHorses	-0.2	-0.2	-0.5	-0.2
Class E	Vidyo1	-	-	-0.2	-0.2
	Vidyo3	-	-	-0.3	0.0
	Vidyo4	-	-	-0.1	-0.1
Average		-0.1	-0.2	-0.2	-0.2

4. Discussion

Discussion about the hardware complexity

- **Issue of this proposal**

    - Dependency between MVD and MVP in parsing process

- **Main issue in parsing process for AMVP**

    - Non-fixed number of MVP

    - Already exist in the HM2.0

- **Investigation**

    - Investigate to fix the number of MVP

    - The issue of this proposal automatically resolved

5. Conclusion

Conclusion

- **Proposed technique**

  - Unified motion vector removal process

- **Benefit**

  - Remove useless more MVP candidates

  - Remove "different" and "identical" motion vector at the same stage

- **Simulation results**

  - Overall BD-rate gain 0.2%

  - Same complexity as the anchor (both encoder and decoder)

- **Suggestion**

  - This proposal be adopted to HM

  - Investigate to fix the number of MVP after adopted this technique

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