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JCTVC-I0075

AHG07: A restriction of motion vector for small PU size

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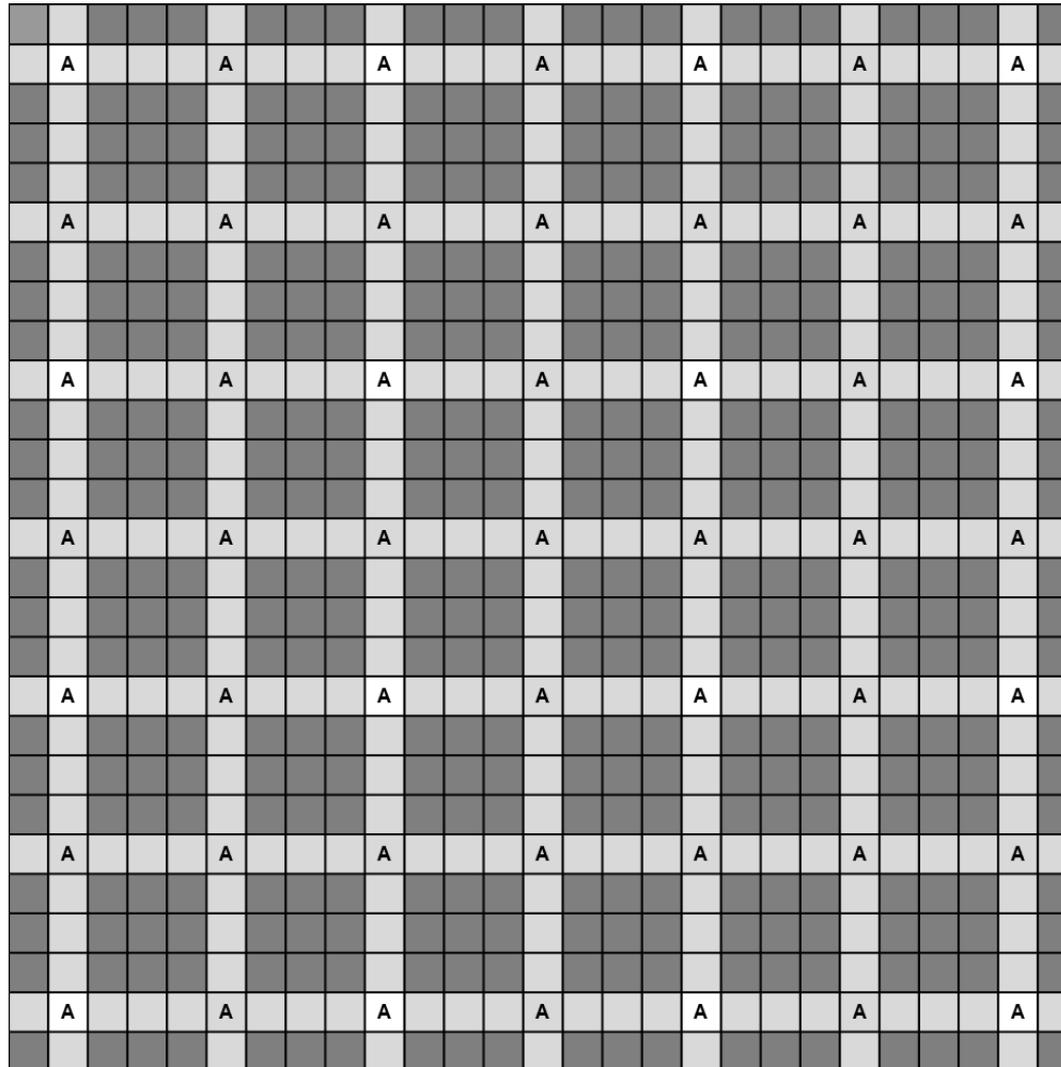
TOSHIBA CORPORATION

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Purpose

- **Memory bandwidth reduction for motion compensation**
- **The worst case is bi-prediction, small PU and 2-D interpolation for both luma and chroma, because current interpolation filters are 8 or 7-tap for luma and 4-tap for chroma**
- **How to restrict motion vectors for small PU without changes of syntax, semantics and decoding process**

Fractional position (4:2:0)



Point

- **When motion vectors are restricted, fractional position for Chroma should be considered.**
- **An example of MV restriction**
 - 4x8 bi-prediction is prohibited.
 - One motion vector of L0 or L1 shall indicate the integer position for Chroma when PU size is 8x4 bi-prediction.

Experimental results (Summary)

	Proposal			8x4 and 4x8 bi-prediction prohibition		
	Y	U	V	Y	U	V
Class A	0.17%	0.21%	0.21%	0.25%	0.34%	0.24%
Class B	0.30%	0.07%	0.20%	0.32%	0.15%	0.33%
Class C	0.59%	0.62%	0.56%	0.63%	0.67%	0.62%
Class D	0.82%	0.64%	0.60%	0.87%	0.65%	0.68%
Class E	0.34%	-0.05%	0.12%	0.43%	0.28%	0.46%
Class F	0.28%	0.26%	0.51%	0.32%	0.26%	0.65%
Overall	0.44%	0.33%	0.41%	0.49%	0.40%	0.52%
Enc Time[%]	95.36%			91.69%		
Dec Time[%]	99.36%			99.79%		
MemBand(2D:4x2) Worst [%]	-35.23%			-36.36%		
MemBand(2D:8x2) Worst [%]	-42.19%			-43.75%		
MemBand(1D:4x1) Worst [%]	-31.25%			-31.25%		
MemBand(1D:8x1) Worst [%]	-50.00%			-50.00%		

Comparison to other normative methods

- The worst case of memory bandwidth reduction is the almost same as 8x4 and 4x8 bi-prediction prohibition

Number	I0075	I0106	I0107	I0216	I0297	I0351	I0425
Proponent	Toshiba	Sony	Sony & Sharp	Broadcom	JVC	Qualcomm	TI
Method		R2	R2		1	Case 1.1	1
Average loss of class A, B and E	0.28%	0.35%	0.15%	0.30%	0.14%	0.05%	0.15%



Encoder only restriction

Conclusion

- **An approach of reduction for memory bandwidth that does not need to change current syntax, semantics and decoding process**
 - When motion vectors are restricted, fractional position for Chroma should be considered.
 - More efficient than simple PU size restriction.
- **Small loss compared to other normative changed methods**
 - Do we need to change some normative specifications?
- **Cross-checked by Sharp (JCTVC-I0366)**

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