

Decoder-Side Direct Mode Prediction

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Summary of JVET-E0027

■ Decoder-side direct mode (DDM) prediction

- The DDM technique derives the chroma intra prediction mode at both encoder-side and decoder-side based on the reconstructed luma pixels and reduces the overhead of intra mode signaling.
- Compared to the HM16.6-JEM4.0 anchor, the proposed DDM technique achieves an average BD bitrate improvement of -0.29% on Y, -0.16% on Cb, -0.25% on Cr for the common test condition of AI cases.

Introduction

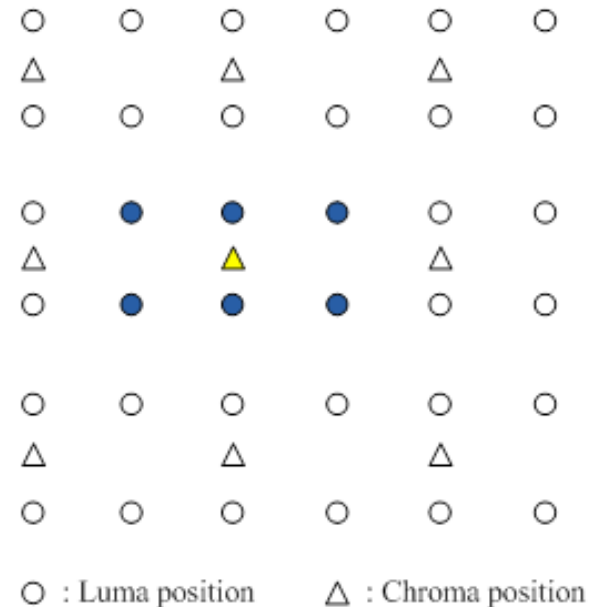
■ Intra chroma prediction in JEM4.0

- One direct mode (DM) which is derived from the co-located luma CB
- One cross-component linear model (CCLM) mode
- Four default modes: Planar, Vertical, Horizontal, and DC. If one of them is identical to the DM mode, it is replaced by the vertical diagonal (mode index is 66) mode

Intra chroma prediction mode	Bin string
DM	0
CCLM	10
0	1100
1	1101
2	1110
3	1111

Decoder-Side Direction Mode Prediction

- At the first step, down-sample the co-located reconstructed luma CB using a 2D 3x2 $\{\{1 \ 2 \ 1\}, \{1 \ 2 \ 1\}\}$ filter (the same down-sampling filter as used in CCLM mode)
- Iterative search. Calculate the SATD between the prediction and reconstruction of the down-sampled luma CB. The intra mode that yields the minimum SATD is selected as the best mode, i.e., DDM



$$\begin{bmatrix} 1 & 2 & 1 \\ 1 & 2 & 1 \end{bmatrix} / 8$$

Decoder-Side Direction Mode Prediction

■ Modify the intra chroma mode list

- One cross-component linear model (CCLM) mode.
- One proposed DDM mode.
- One DM mode which is derived from the co-located luma CB.
- Three default modes: Planar, Vertical and Horizontal. If one of them is identical to the DM mode, it is replaced by the DC mode.

Intra chroma prediction mode	Bin string
CCLM	0
DDM	10
DM	110
0	1110
1	11110
2	11111

Simulation

- **Implemented onto JEM4.0**
- **Evaluated under the common test condition**
 - AI
- **Encoding and Decoding tests**
 - Compiled with VS2013 and tested on servers with the configuration:
Windows Server 2012 R2 Datacenter 64-bit, Intel Xeon CUP E5-2690 v3 @ 2.60GHz (2 processors), 384 GB RAM
- **Cross verified by MediaTek (JVET-Exxxx)**

Performance of DDM prediction

	All Intra Main10				
	Over HM-16.6-JEM-4 (parallel)				
	Y	U	V	EncT	DecT
Class A1	-0.21%	0.03%	-0.26%	101%	116%
Class A2	-0.41%	0.14%	-0.11%	101%	125%
Class B	-0.26%	-0.01%	-0.08%	103%	116%
Class C	-0.30%	-0.53%	-0.34%	101%	111%
Class D	-0.23%	-0.40%	-0.64%	101%	105%
Class E	-0.37%	-0.27%	-0.09%	101%	118%
Overall	-0.29%	-0.16%	-0.25%	101%	115%
Class F (optional)	-0.16%	-0.08%	-0.09%	101%	114%

Thank You

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