CE3-RELATED: MODE-DEPENDENT MULTIPLE REFERENCE LINE (MRL) INTRA PREDICTION WITH BI-PREDICTION

JVET-K0276

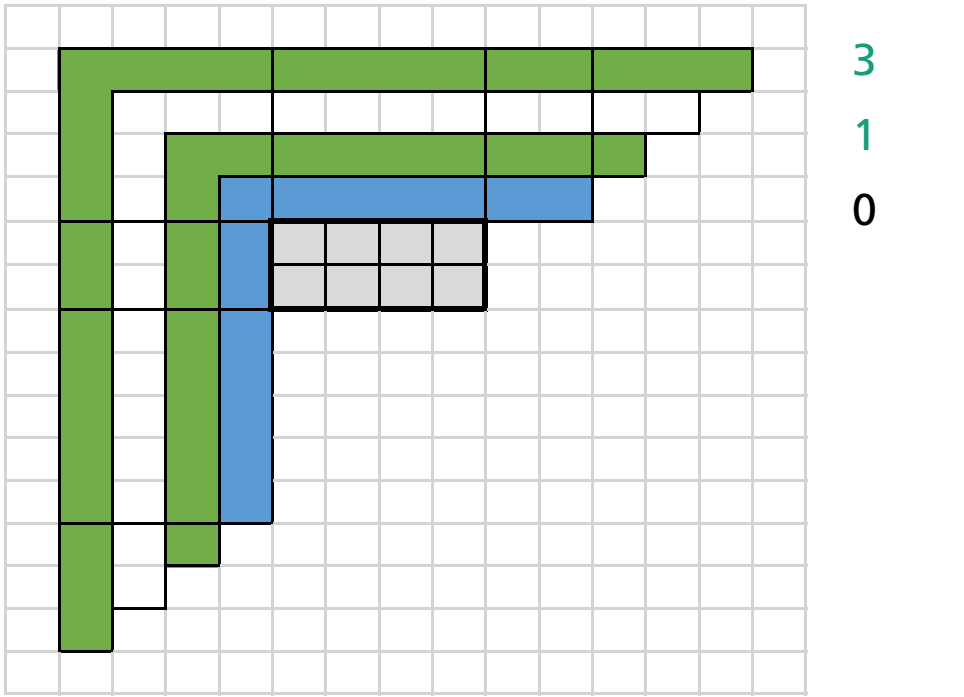
Fraunhofer

Mode-dependent MRL intra prediction
CE3 5.4.4

- 2 additional reference lines 1 and 3
- `mrl_idx` indicates which reference samples to use
- `mrl_idx` signaled before intra luma predidction mode
- Only applied for luma
- Reference samples used for:
  - ANGULAR
- Size restrictions:
  - No narrow blocks

    `abs(log2W - log2H) <= 1`
  - Minimum size 8

    `W >= 8 || H >= 8`



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Mode-dependent MRL intra prediction
Bi-Prediction

- Average (50/50)
  - p0 PLANAR prediction (mrl_idx=0)
  - p1 ANGULAR prediction (mrl_idx>0)
- If mrl_idx > 0 signal mrl_bi_flag

$$p(x,y) = w_0\, p_0(x,y) + w_i\, p_i(x,y)$$

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Mode-dependent MRL intra prediction

Bi-Prediction

VTM	All Intra					Random Access				
	Y	U	V	enc time	dec time	Y	U	V	enc time	dec time
Class A1	-1.65%	-1.07%	-0.89%	189%	99%	-0.82%	-0.98%	-0.92%	118%	97%
Class A2	-1.09%	-0.62%	-0.39%	187%	97%	-0.46%	-0.69%	-0.49%	111%	100%
Class B	-1.14%	-0.45%	-0.75%	183%	101%	-0.53%	-0.50%	-0.99%	113%	101%
Class C	-0.78%	-0.41%	-0.54%	182%	100%	-0.40%	-0.42%	-0.45%	112%	101%
Class E	-1.00%	-0.94%	-0.87%	178%	98%					
Overall	**-1.12%**	**-0.66%**	**-0.69%**	**183%**	**99%**	**-0.54%**	**-0.61%**	**-0.73%**	**113%**	**100%**
Class D	-0.56%	-0.15%	-0.25%	183%	103%	-0.21%	-0.12%	-0.47%	112%	98%

BMS	All Intra					Random Access				
	Y	U	V	enc time	dec time	Y	U	V	enc time	dec time
Class A1	-0.93%	-0.90%	-0.86%	133%	98%	-0.49%	-0.77%	-0.50%	120%	98%
Class A2	-0.67%	-0.39%	-0.07%	132%	93%	-0.31%	-0.48%	-0.16%	116%	98%
Class B	-0.77%	-0.30%	-0.41%	133%	95%	-0.40%	-0.14%	-0.43%	117%	95%
Class C	-0.59%	-0.31%	-0.46%	131%	94%	-0.25%	0.01%	-0.36%	116%	96%
Class E	-0.66%	-0.55%	-0.58%	132%	95%					
Overall	**-0.72%**	**-0.46%**	**-0.47%**	**132%**	**95%**	**-0.36%**	**-0.29%**	**-0.37%**	**117%**	**97%**
Class D	-0.35%	-0.14%	-0.15%	131%	93%	-0.09%	-0.31%	-0.34%	116%	95%

Mode-dependent MRL intra prediction
Bi-Prediction

- Gains (BDR Y):
  - -1.12% (AI) / -0.54% (RA)
  - -0.72% (AI) / -0.36% (RA)
- Proposed to study in a CE on MRL:
  - On top of alternative MRL implementations besides CE3 Test 5.4.4
  - Encoder runtime reductions by fast searches