

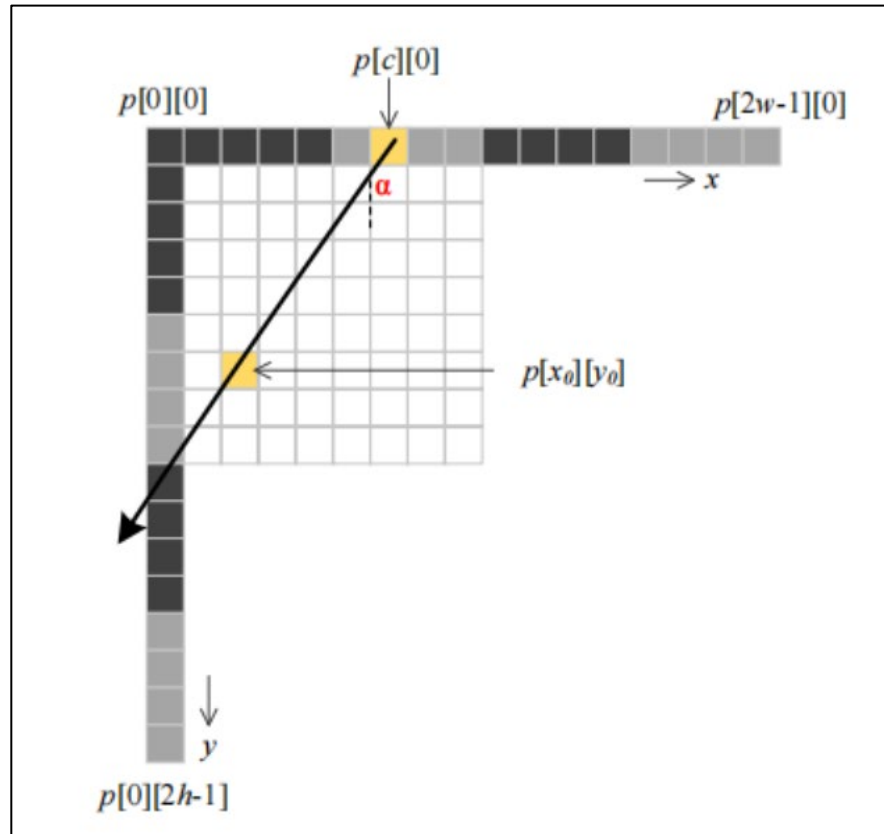
[Non-EE2] Intra Angle Prediction Extension

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Motivation

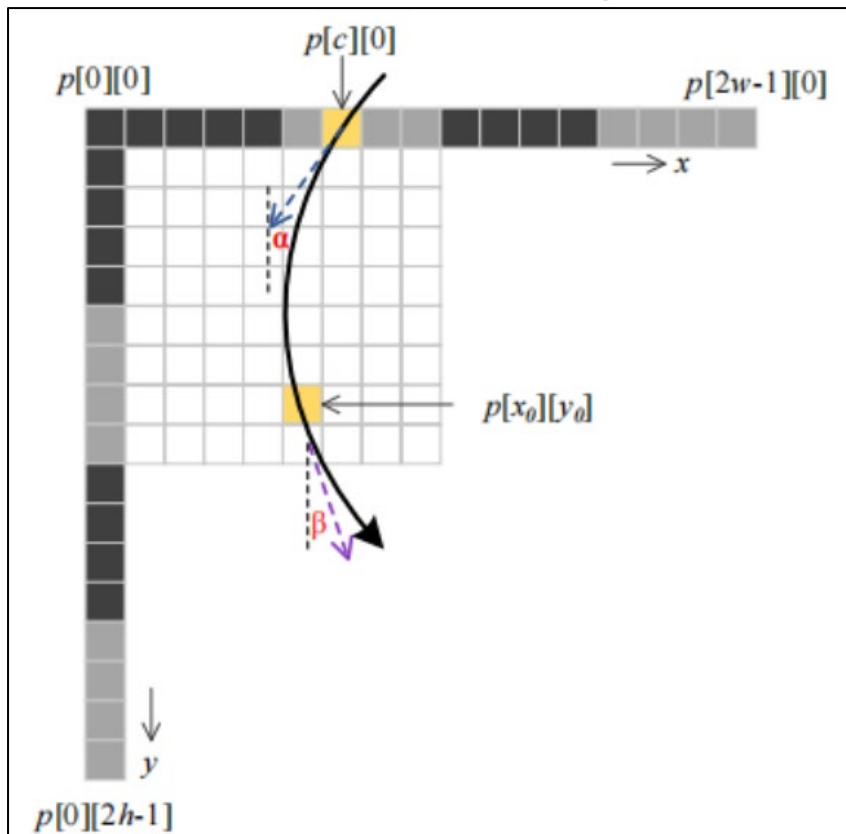
- Current ECM intra angle prediction is based on the linear projection.



Linear Projection can't predict non-linear texture efficiently with high fidelity

Idea

- Using a nonlinear function such as a quadratic function as a projection function in intra angle prediction.



Projection of nonlinear functions allows for more **efficient** and **high-fidelity** prediction of nonlinear textures

Methodology

- A group of regular intra prediction mode and extend intra prediction mode
 - Chose from 65 intra angular prediction mode

Group Idx	The group of regular mode	The group of extend mode
1	[DC_IDX+1, HOR_IDX]	[DC_IDX+1, HOR_IDX]
2	[HOR_IDX+1, DIA_IDX]	[HOR_IDX+1, DIA_IDX]
3	[DIA_IDX+1, VER_IDX]	[DIA_IDX+1, VER_IDX]
4	[VER_IDX+1, VDIA_IDX]	[VER_IDX+1, VDIA_IDX]

Methodology

Coding Unit Syntax

Syntax	Descriptor	Binarization	Input parameters
... isp_mode() extend_intra_pred_flag() ... if (cu_extend_intra_pred_flag) extend_intra_mode_index ...	 ae(v) ae(v)	 FL TB	 cMax=1 cMax = 17

Methodology

□ The function of quadratic projection:

- If angle α 、 β belongs to the set of vertical intra prediction mode:

$$c = x_0 - \frac{\tan \beta - \tan \alpha}{2 * h} * y_0^2 - \tan \alpha * y_0$$

- If angle α 、 β belongs to the set of horizontal intra prediction mode:

$$c = y_0 - \frac{\tan \beta - \tan \alpha}{2 * w} * x_0^2 - \tan \alpha * x_0$$

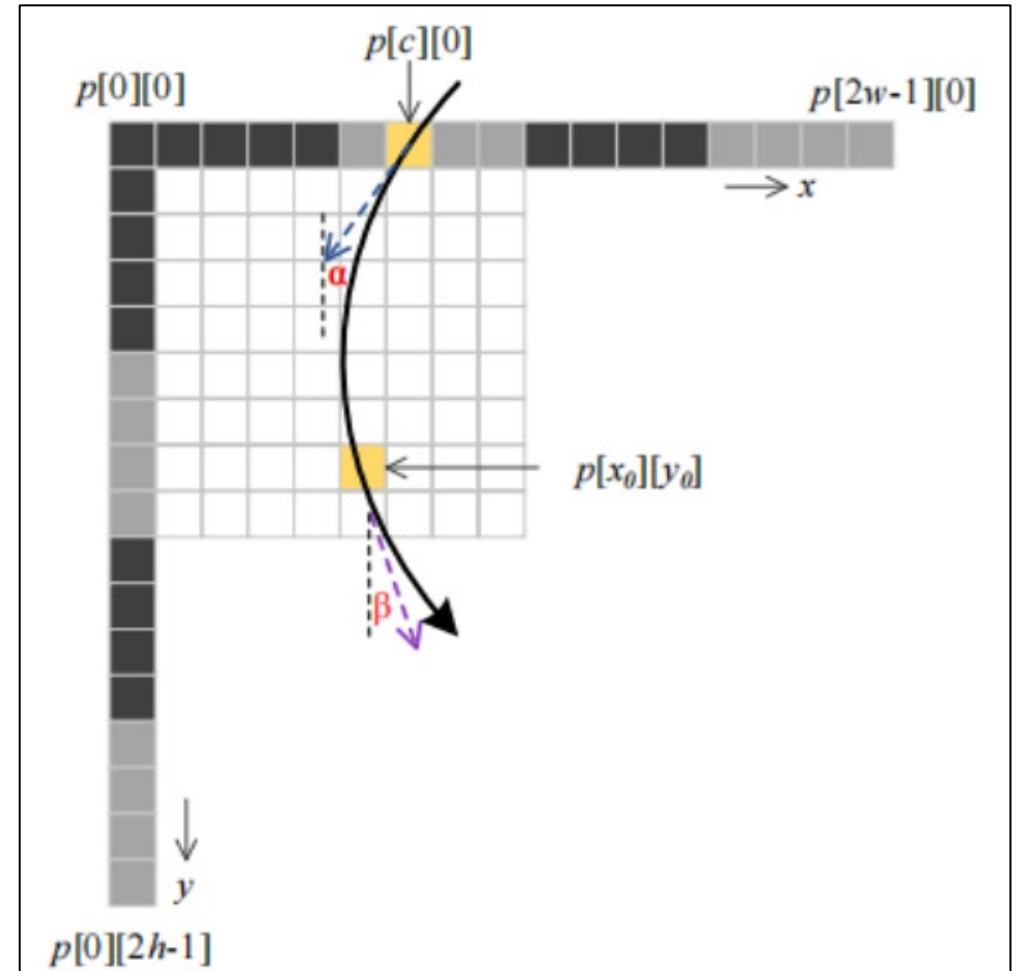
(x_0, y_0) : The location of predicting pixel

α : Regular mode for intra angle prediction extension

β : Extend mode for intra angle prediction extension

w : The width of Coding Unit

h : The height of Coding Unit



Performance in ECM-9.0

	All Intra Main 10				
	Over ECM-9.0				
	Y	U	V	EncT	DecT
Class A1	-0.08%	-0.29%	0.23%	189.2%	136.3%
Class A2	0.01%	0.06%	0.22%	145.6%	120.3%
Class B	-0.04%	0.58%	0.14%	112.0%	102.0%
Class C	0.04%	-0.26%	0.02%	101.8%	95.0%
Class E	-0.03%	-0.45%	0.58%	109.8%	99.9%
Overall	-0.02%	-0.01%	0.21%	124.6%	107.9%
Class D	0.05%	-0.54%	-0.31%	103.8%	100.7%
Class F	0.00%	0.07%	0.45%	97.8%	91.1%
Class TGM	-0.09%	-0.02%	-0.22%	103.5%	100.1%

What's next?

- Optimize the encoding of flag and the index of the extend mode
 - Derive the second mode in the decoder side...
- Combine with other intra prediction tools
 - Such as DIMD, TIMD, TMP...



Q & A