

Non-EE2: An extrapolation filter-based intra prediction mode

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Luhang Xu, Yue Yu, Haoping Yu, Dong Wang

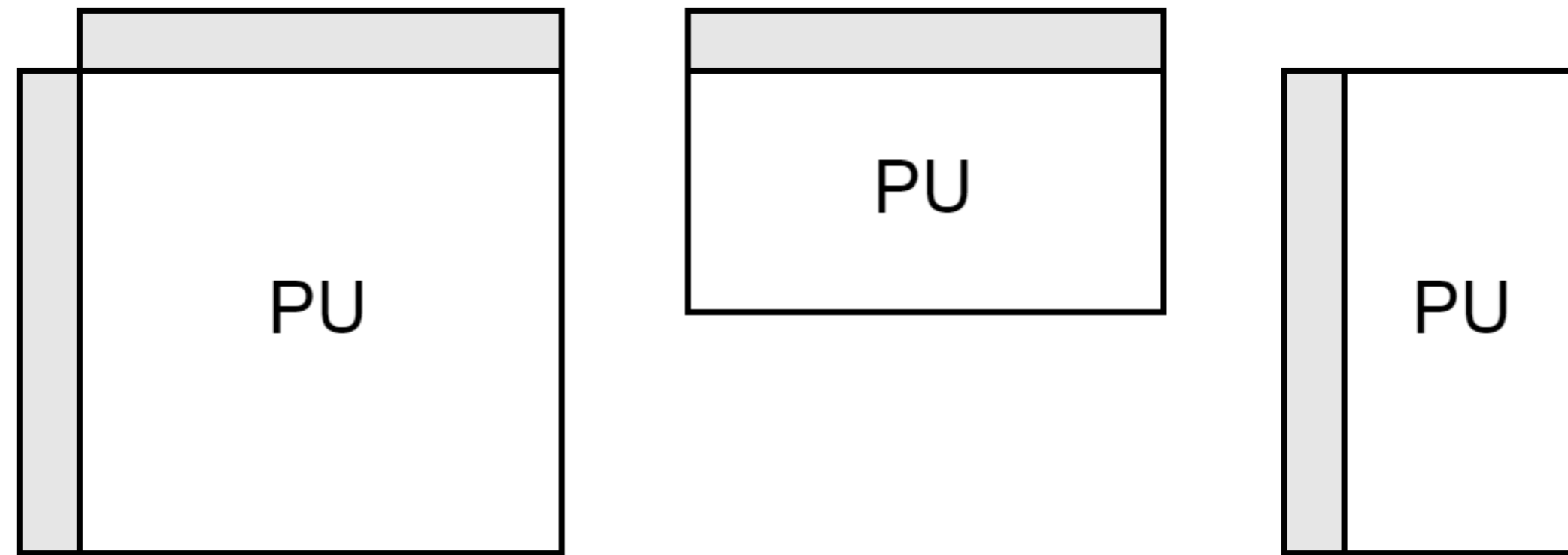
Introduction

The extrapolation filter-based intra prediction mode makes prediction in following three steps.

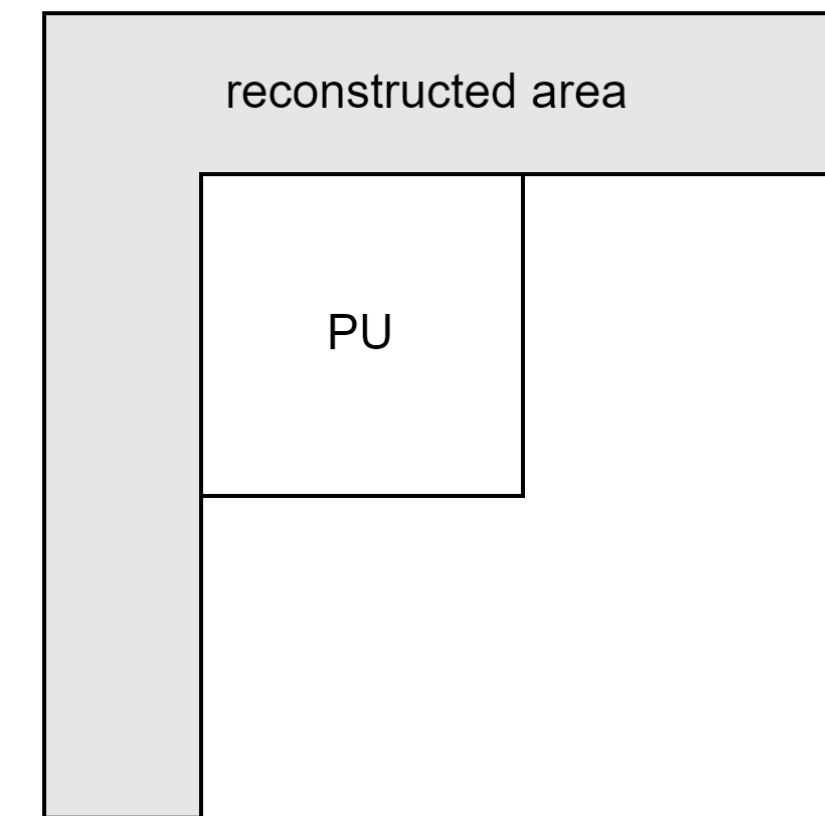
1. Searching mean, min and max value among the reconstructed samples,
2. Deriving coefficients of the extrapolation filter,
3. Making prediction for the current block.

Searching mean, min and max value

- The value of the DC mode is used as a mean value.



Mean value is average of above and left reconstructed line for square block, average of above reconstructed line for $W > H$ rectangle block, average of left reconstructed line for $H > W$ rectangle block.

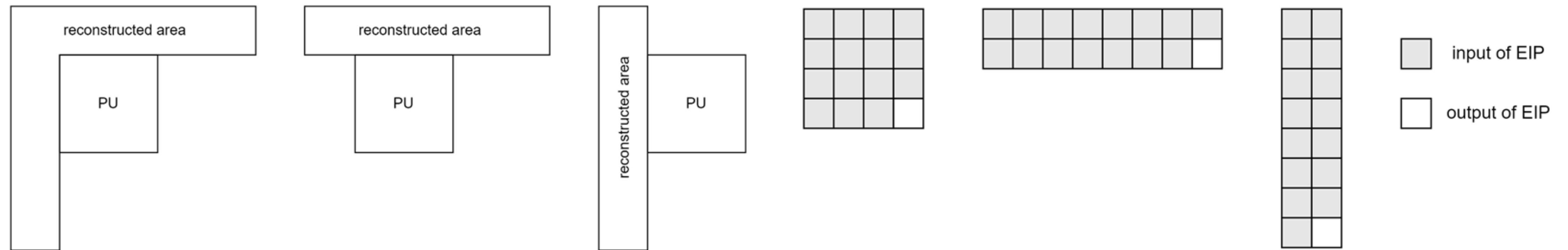


The min and max value are searched from the neighboring reconstructed area consisting of 13 columns and 13 Rows.

- The min and max values are searched from L-shape reconstructed area.

Deriving coefficients for the EIP filter

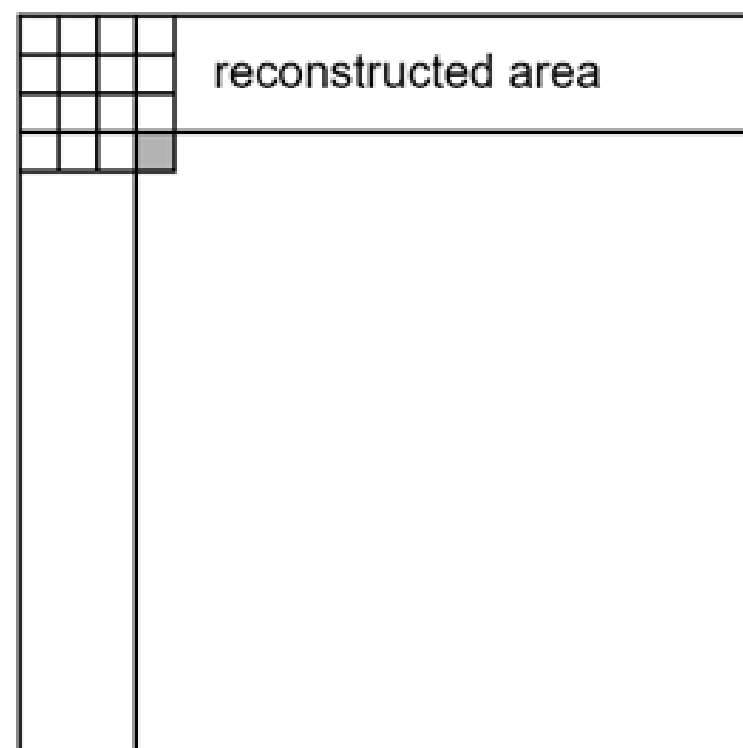
- Three defined types of reconstructed areas and three defined types of EIP filter shapes are proposed.



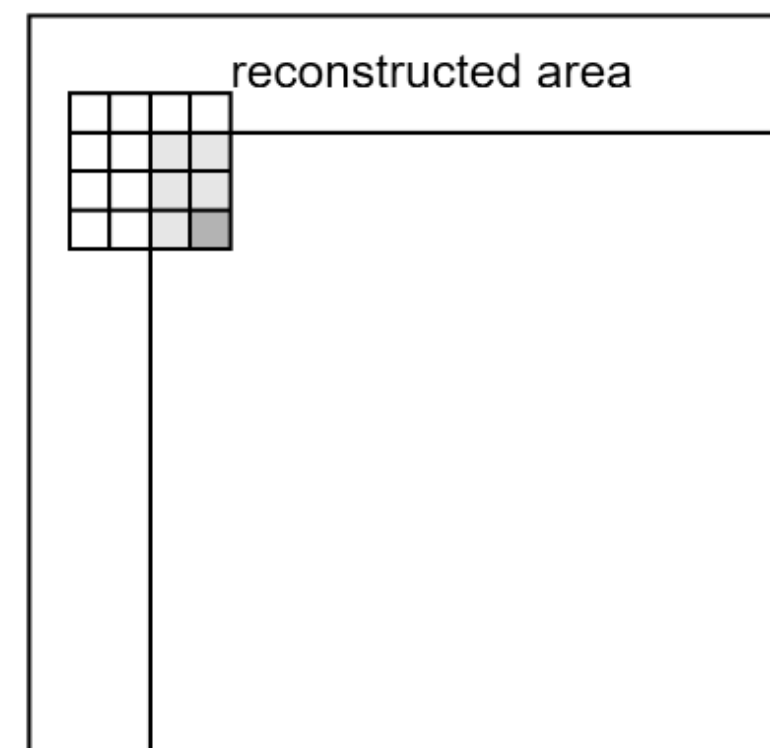
- Decoder decodes relevant syntax to determine the reconstructed area and EIP filter shape. The coefficients are adaptively obtained by solving linear function constructed from the determined reconstructed area.

Making prediction for the current block (1/2)

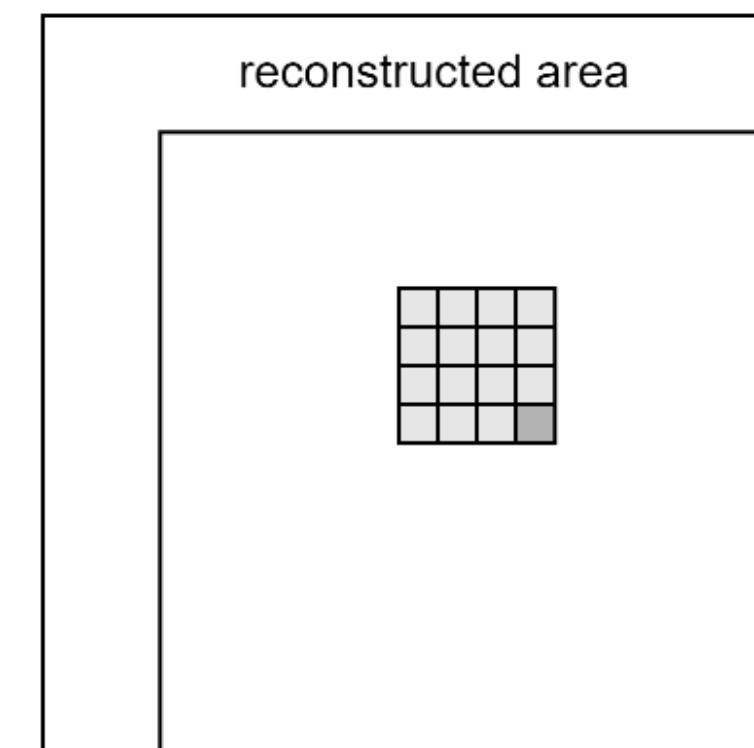
- The EIP mode makes prediction from top-left to bottom-right for the current block.



For the position located at top-left of the current block, the inputs to the EIP filter are reconstructed samples.



For the positions located along the boundaries of the current block, partial inputs to the EIP filter are reference samples, and partial inputs to the EIP filter are previously predicted samples.



For other positions in the current block, the inputs to the EIP filter are previously predicted samples.

Making prediction for the current block (2/2)

The prediction process for a position in the current block is,

$$pred_{(x,y)} = clip(min, max, (\sum_{i=0}^n (c_i \times (t_{(x-xoffset, y-yoffset)} - mean))) + mean)$$

- $pred_{(x,y)}$ is the predicted value at (x, y) in the current block,
- min, max are searched min and max,
- c_i is the i^{th} coefficient of the derived EIP filter,
- $t_{(x-xoffset, y-yoffset)}$ is reconstructed or predicted value used for the current position's prediction,
- $mean$ is a value calculated by the DC prediction mode.

Simulation results

	All Intra Main 10					Random Access Main 10				
	Proposed method over ECM-8.0									
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class A1	-0.16%	-0.10%	-0.04%	107%	100%					
Class A2	-0.25%	-0.16%	-0.18%	107%	101%					
Class B	-0.22%	-0.19%	-0.12%	109%	102%	-0.08%	-0.04%	-0.07%	100%	100%
Class C	-0.25%	-0.13%	-0.23%	107%	101%	-0.08%	-0.06%	0.01%	101%	101%
Class E	-0.53%	-0.40%	-0.48%	109%	101%					
Overall	-0.27%	-0.19%	-0.20%	108%	101%					
Class D	-0.14%	-0.19%	-0.09%	107%	101%	-0.11%	0.19%	-0.10%	101%	99%
Class F	-0.10%	-0.04%	0.03%	106%	102%	-0.07%	-0.29%	-0.28%	100%	100%

Conclusions

- The proposed method achieves -0.27%/-0.19%/-0.20% all-intra coding performance changes against ECM-8.0 with reasonable encoding and decoding time increase.
- It is proposed to further study in EE.
- Thanks vivo and Kwai for crosschecking this proposal.

Thank you

oppo