

JVET-AG0179

EE1-1.1-RELATED: HOP FILTER COMPLEXITY ALIGNMENT WITH WIDER ACTIVATION

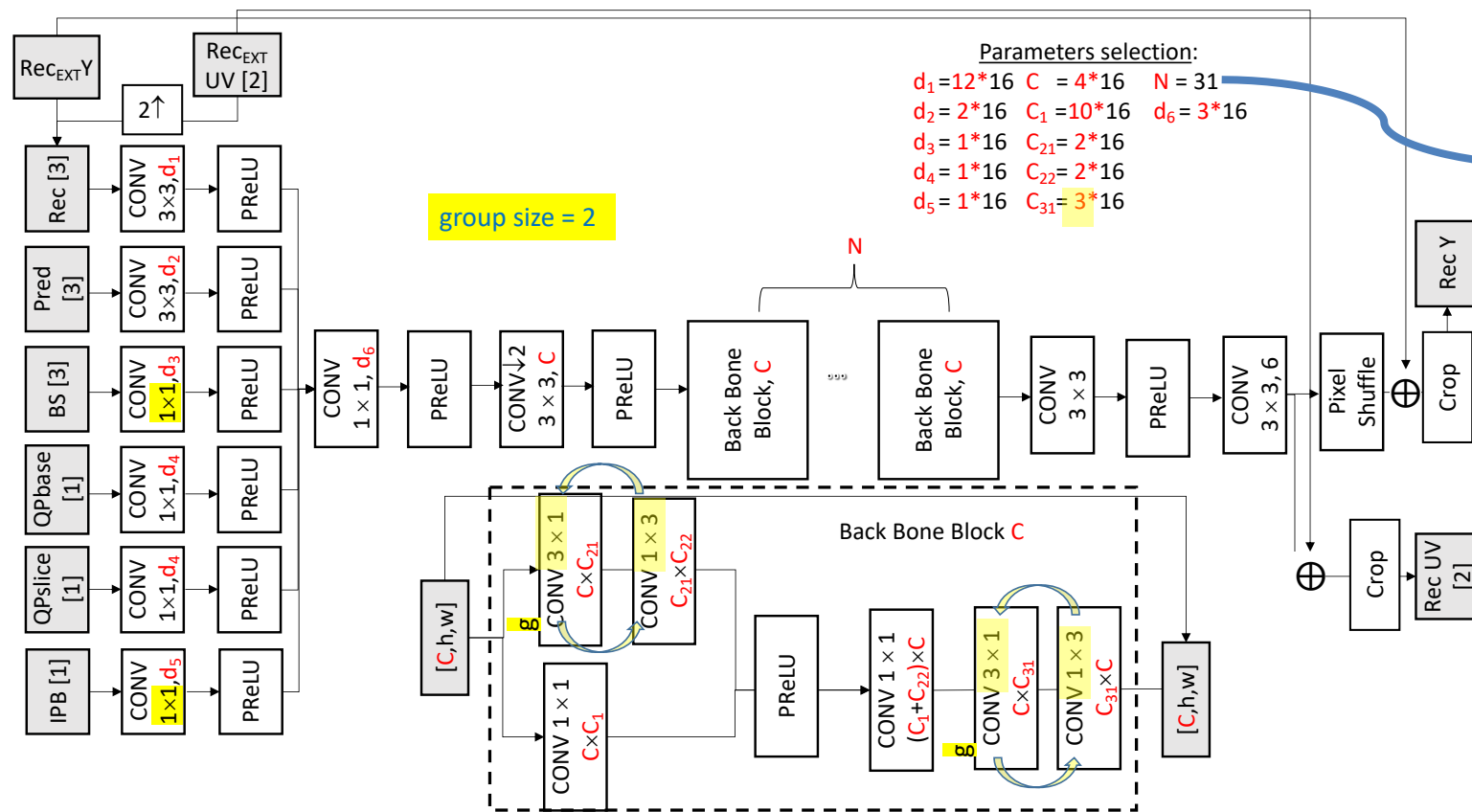
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Overview

- EE1-1.1 studied a joint filter architecture for HOP by combining key components from several JVET-AF contributions including JVET-AF0102, JVET-AF0103, JVET-AF0182. Complexity alignment with the HOP.2 filter in NNVC-7.1 by increasing the number of residual blocks
- This contribution proposes to achieve the complexity alignment in the other way around, i.e. by increasing the number of feature maps before the activation layer
- Preliminary results show similar gain as EE1-1.1, with reduced kMAC/pixel and less number of layers
- BD-rate changes anchored on HOP.2 + nn intra and kMAC/pixel
 - RA: -0.16%, -0.38%, -0.69%, AI: -0.21%, -0.40%, -0.12%
 - kMAC/pixel: 442

EE1-1.1

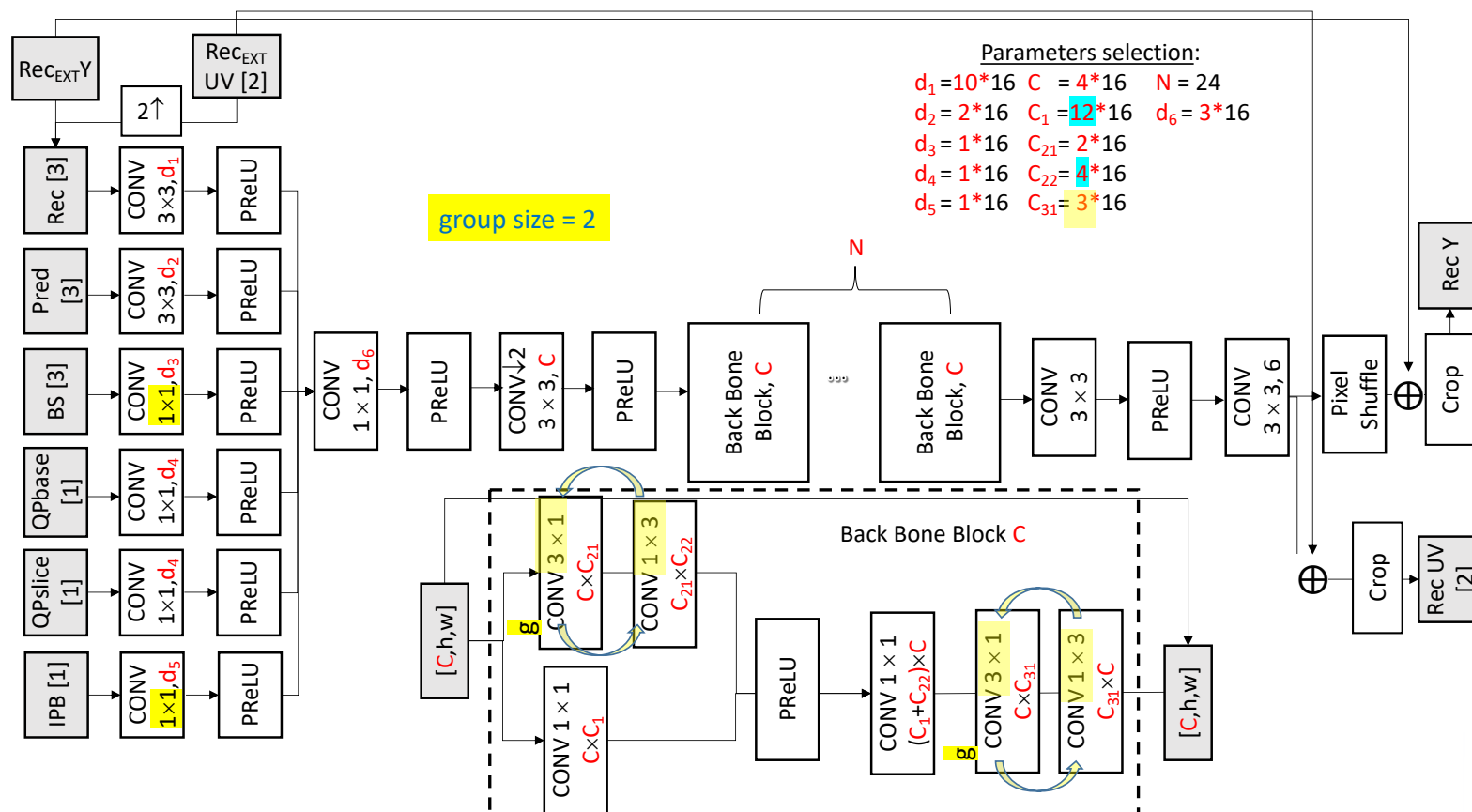
- Group convolution
- 1x1 Convolution for IPB and BS
- Decomposition rank reduction and alternation of two types of residual block



To utilize the budget due to simplifications: use more residual blocks, $N: 24 \Rightarrow 31$

Proposed method

- Developed on top of EE1-1.1
- Complexity alignment achieved by increasing the number of feature maps before the activation layer in a residual block, i.e. C1 and C22



Training

- Following the training procedure of EE1-1.1

Inference

	Random access Main10				
	BD-rate Over NNVC-7.1 HOP2 Anchor				
	Y-PSNR	U-PSNR	V-PSNR	EncT	DecT CPU
Class A1	-0.08%	0.78%	-0.28%	72%	61%
Class A2	-0.21%	0.06%	-0.44%	74%	62%
Class B	-0.18%	-1.12%	-0.43%	71%	60%
Class C	-0.16%	-0.63%	-1.53%	73%	58%
Class E					
Overall	-0.16%	-0.38%	-0.69%	72%	60%
Class D	-0.08%	-0.57%	-2.13%	72%	58%
Class F	-0.18%	0.01%	-0.28%	68%	61%

	All Intra Main10				
	BD-rate Over NNVC-7.1 HOP2 Anchor				
	Y-PSNR	U-PSNR	V-PSNR	EncT	DecT CPU
Class A1	-0.34%	-0.41%	-0.60%	77%	61%
Class A2	-0.19%	-0.18%	-0.28%	84%	62%
Class B	-0.17%	-0.42%	0.39%	85%	56%
Class C	-0.18%	-0.33%	-0.19%	86%	62%
Class E	-0.22%	-0.68%	-0.27%	75%	59%
Overall	-0.21%	-0.40%	-0.12%	82%	60%
Class D	-0.14%	0.11%	-0.59%	93%	60%
Class F	0.00%	-0.34%	0.59%	89%	60%

NNVC-7.1 HOP2: 477kmac/pixel, 154 layers, 1.45M params

EE1-1.1 filter: 466kmac/pixel, 196 layers, 1.42M params

Proposed filter: 442kmac/pixel, 154 layers, 1.34M params

Conclusion

- Exploit the budget due to simplifications introduced into HOP by adopting wider activation design
- Preliminary results show similar gain as EE1-1.1, with reduced kMAC/pixel and less number of layers
- Compared with NNVC-7.1 HOP.2 (kmac/pixel: 477, #params: 1.45M)
 - *RA: -0.16%, -0.38%, -0.69%, AI: -0.21%, -0.40%, -0.12%, kMAC/pixel: 442, #params: 1.34M*
- Recommend to study the proposed method in EE