

JVET-AD0237

EE1-RELATED: RESIDUE INPUT FOR FILTER SET #1

Yue Li, Kai Zhang, Li Zhang

Overview

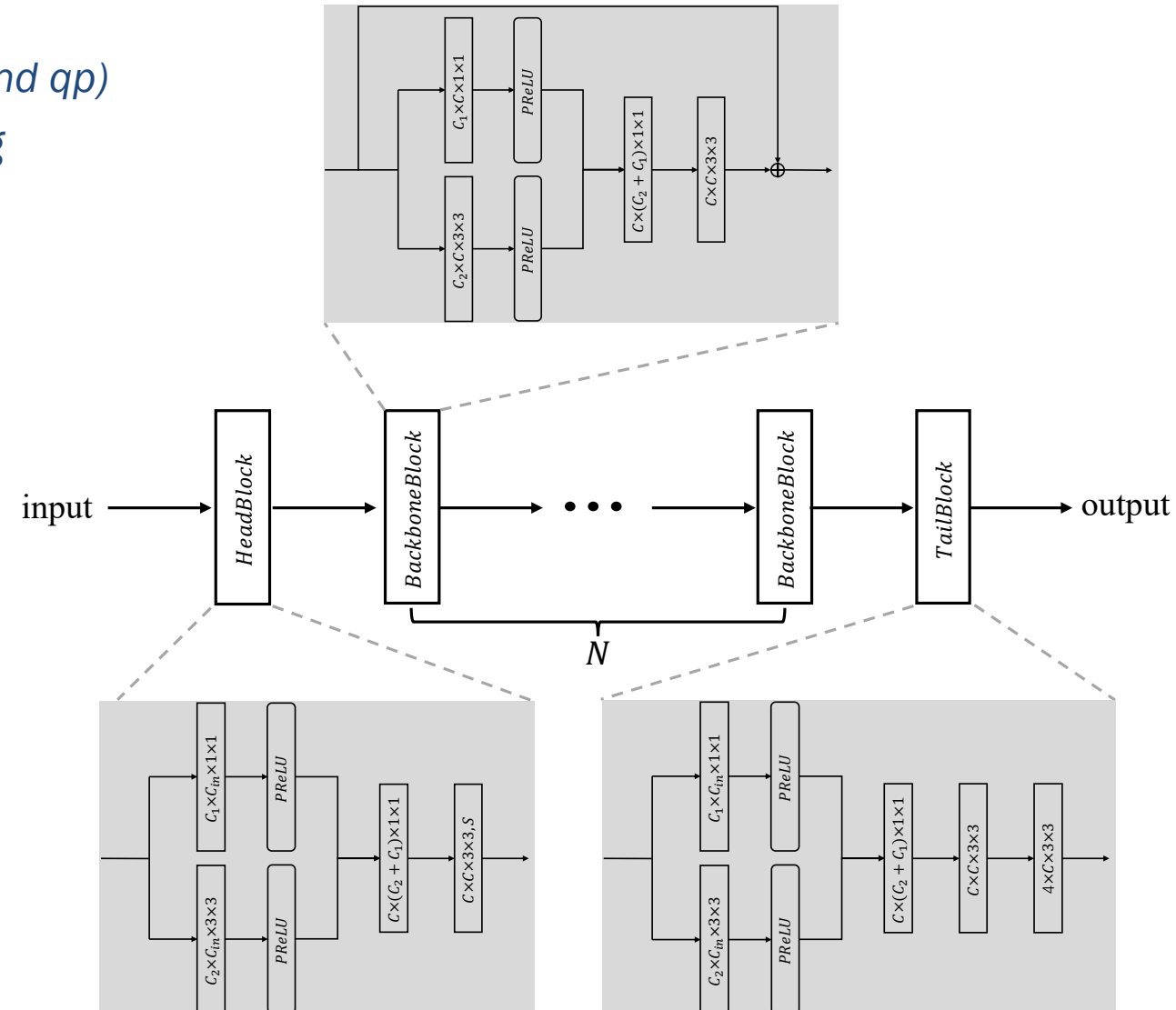
- Introduce the residue as additional input on top of EE1-1.6.2
- Compared with current filter set #1
 - RA: {-1.78%, -3.40%, -0.87%}, EncT 101%, DecT 106%
 - LDB: {-2.93%, -4.87%, -1.53%}, EncT 102%, DecT 115%
 - AI: {-1.23%, -0.25%, 0.94%}, EncT 102%, DecT 102%
- Compared with EE1-1.6.2
 - RA: {-0.13%, -0.01%, -0.01%}, EncT 102%, DecT 101%
 - LDB: {-0.22%, 0.19%, -0.03%}, EncT 102%, DecT 102%
 - AI: {-0.20%, 0.68%, 0.37%}, EncT 100%, DecT 102%

Proposed method

■ Network configuration

- $C_{in} = 6$ (rec, pred, slice type, bs, **resi**, and qp)
- $S = 2$ to achieve feature down-sampling
- $C = 64, C_1 > C, C_2 < C$
- $N = 19$

■ resi = rec - pred



Inference

- SADL is used for performing the inference of the proposed CNN filters
- Both weights and internal computations are represented with int16 precision

	kMAC/pixel (frame basis)	kMAC/pixel (block basis)	Total Parameter Number	Total parameter memory (int16)
NNVC-4.0 filter set #1	532	673	3.10M	6.20M
EE1-1.6.2	446.1	564.6	2.055M	4.110M
Proposed	446.6	565.2	2.055M	4.110M

Experimental results

■ Compared with NNVC-4.0 filter set #1

Random access Main10					
BD-rate Over NNVC-4.0-NnIntra-NnFilterSet1					
	Y-PSNR	U-PSNR	V-PSNR	EncT	DecT CPU
Class A1	-1.88%	-4.77%	-1.16%	101%	102%
Class A2	-2.14%	-2.50%	-3.12%	102%	105%
Class B	-1.79%	-4.76%	-0.74%	102%	108%
Class C	-1.41%	-1.37%	0.88%	100%	108%
Class E					
Overall	-1.78%	-3.40%	-0.87%	101%	106%
Class D	-0.75%	-1.33%	3.89%	103%	114%
Class F	-0.52%	-2.17%	-2.74%	102%	97%

Low delay B Main10					
BD-rate Over NNVC-4.0-NnIntra-NnFilterSet1					
	Y-PSNR	U-PSNR	V-PSNR	EncT	DecT CPU
Class A1					
Class A2					
Class B	-2.88%	-4.40%	0.74%	102%	109%
Class C	-2.59%	-4.31%	-0.65%	100%	108%
Class E	-3.47%	-6.39%	-6.49%	105%	140%
Overall	-2.93%	-4.87%	-1.53%	102%	115%
Class D	-2.29%	-1.57%	4.26%	100%	110%
Class F	-1.96%	-2.99%	-3.53%	104%	96%

All Intra Main10					
BD-rate Over NNVC-4.0-NnIntra-NnFilterSet1					
	Y-PSNR	U-PSNR	V-PSNR	EncT	DecT CPU
Class A1	-1.03%	-1.51%	-0.50%	103%	101%
Class A2	-1.01%	-0.08%	-0.21%	99%	103%
Class B	-1.04%	0.46%	2.43%	100%	101%
Class C	-1.54%	0.34%	1.82%	104%	103%
Class E	-1.58%	-1.14%	-0.16%	104%	104%
Overall	-1.23%	-0.25%	0.94%	102%	102%
Class D	-1.26%	-0.52%	2.99%	98%	100%
Class F	0.42%	2.43%	0.72%	100%	87%

Experimental results

■ Compared with EE1-1.6.2

Random access Main10					
BD-rate Over EE1-1.6.2					
	Y-PSNR	U-PSNR	V-PSNR	EncT	DecT CPU
Class A1	-0.11%	-0.05%	-0.11%	101%	101%
Class A2	-0.10%	0.12%	0.11%	102%	101%
Class B	-0.12%	-0.03%	0.08%	102%	102%
Class C	-0.16%	-0.05%	-0.12%	102%	101%
Class E					
Overall	-0.13%	-0.01%	-0.01%	102%	101%
Class D	-0.41%	-0.21%	-0.02%	100%	102%
Class F	-0.08%	0.05%	0.00%	101%	97%

Low delay B Main10					
BD-rate Over EE1-1.6.2					
	Y-PSNR	U-PSNR	V-PSNR	EncT	DecT CPU
Class A1					
Class A2					
Class B	-0.18%	0.32%	0.27%	102%	101%
Class C	-0.02%	0.26%	-0.50%	101%	100%
Class E	-0.53%	-0.14%	0.10%	102%	105%
Overall	-0.22%	0.19%	-0.03%	102%	102%
Class D	0.00%	0.18%	1.14%	98%	100%
Class F	-0.12%	-0.64%	-0.63%	100%	98%

All Intra Main10					
BD-rate Over EE1-1.6.2					
	Y-PSNR	U-PSNR	V-PSNR	EncT	DecT CPU
Class A1	-0.17%	1.16%	0.38%	102%	100%
Class A2	-0.20%	0.13%	0.50%	102%	103%
Class B	-0.20%	1.40%	0.57%	97%	103%
Class C	-0.18%	0.33%	0.31%	100%	102%
Class E	-0.24%	0.00%	0.00%	101%	100%
Overall	-0.20%	0.68%	0.37%	100%	102%
Class D	-0.10%	0.06%	0.10%	99%	98%
Class F	-0.30%	-0.01%	-0.01%	103%	105%

Conclusions

- Introduce the residue as additional input on top of EE1-1.6.2
- Compared with current filter set #1
 - RA: {-1.78%, -3.40%, -0.87%}, EncT 101%, DecT 106%
 - LDB: {-2.93%, -4.87%, -1.53%}, EncT 102%, DecT 115%
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