

JVET-Q0314

# NON-CE: RETRAINED LFNST MATRICES

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# LFNST in VVC

- Eight  $16 \times 16$  matrices and eight  $16 \times 48$  matrices are defined for LFNST.
  - *These  $16 \times 16$  matrices are used for the left-top  $4 \times 4$  coefficients in  $4 \times N$  or  $N \times 4$  ( $N \geq 4$ ) blocks.*
  - *These  $16 \times 48$  matrices are applied to the left-top  $8 \times 8$  coefficients in  $8 \times N$  or  $N \times 8$  ( $N \geq 8$ ) blocks.*

# Proposed method

- A new set of LFNST transform matrices (kernels) are proposed to replace existing  $16 \times 16$  and  $16 \times 48$  matrices
- The proposed matrices are trained from non-CTC images (DIV2K Dataset)
- The original LFNST design is kept unchanged except for the matrices.

# Simulations results on VTM-7.0

	AI					RA				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class A1	-0.12%	-0.04%	0.28%	97%	99%	-0.06%	0.09%	-0.01%	99%	98%
Class A2	-0.09%	0.19%	0.10%	100%	101%	-0.08%	0.19%	0.19%	98%	98%
Class B	-0.08%	0.04%	0.08%	100%	101%	-0.05%	0.19%	0.11%	101%	101%
Class C	-0.26%	-0.06%	-0.04%	106%	106%	-0.17%	0.07%	0.08%	103%	104%
Class E	-0.14%	-0.03%	0.20%	103%	103%					
Overall	<b>-0.14%</b>	<b>0.02%</b>	<b>0.11%</b>	<b>101%</b>	<b>102%</b>	<b>-0.09%</b>	<b>0.14%</b>	<b>0.09%</b>	<b>101%</b>	<b>101%</b>
Class D	-0.17%	0.07%	-0.07%	101%	101%	-0.12%	-0.15%	0.17%	102%	101%
Class F	-0.21%	-0.01%	-0.13%	101%	99%	-0.15%	0.06%	-0.14%	101%	102%

# Conclusion

- The proposed method brings -0.14% and -0.09% BD-rates in the AI and RA configurations without any extra computational burden
- It is recommended to adopt this method in the next version of VVC WD and VTM software
- Many thanks to HHI and DJI for cross-checking!