



*Changes for the Better*

JCTVC-B027

# Performance report of Iterative Adjustment Intra Prediction (IAIP)

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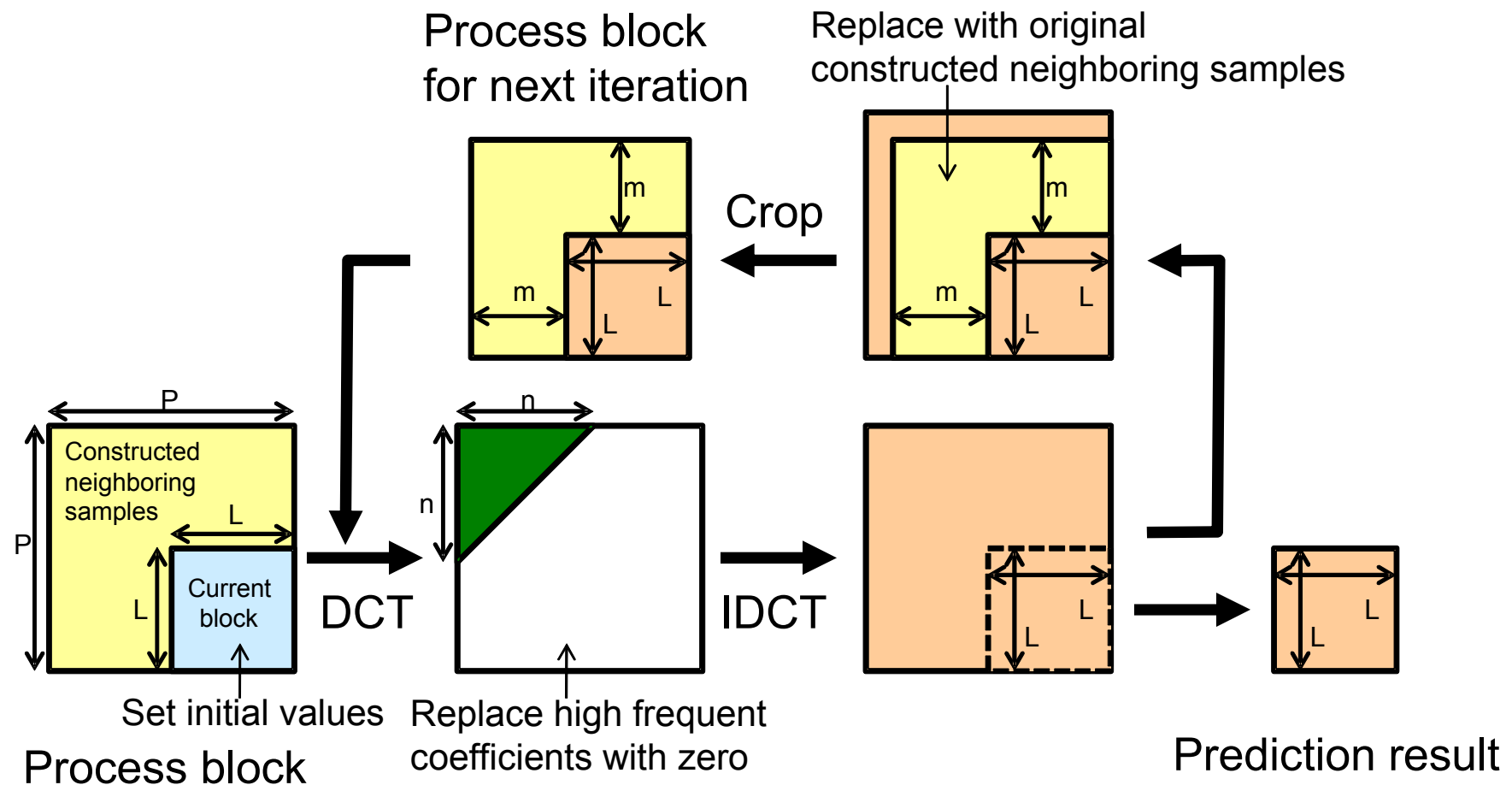
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# Introduction

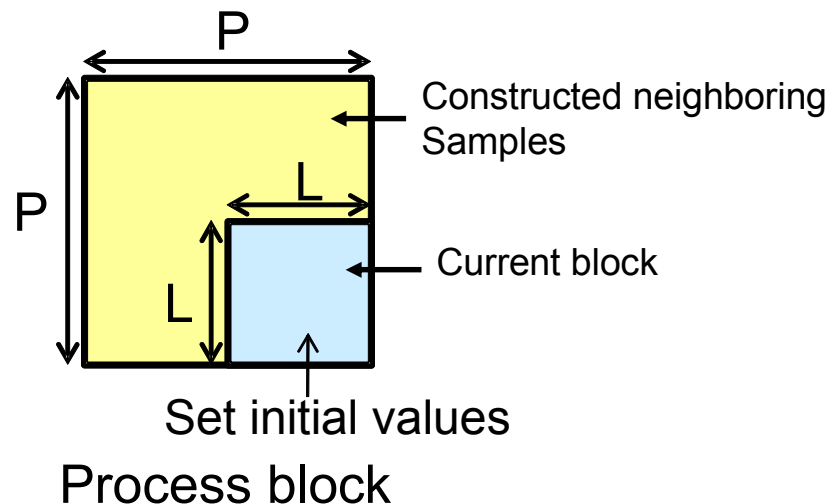
- Iterative Adjustment Intra Prediction (IAIP) is a new intra prediction mode proposed in JCTVC-A122.
- IAIP can reflect comprehensive signal fluctuation into the prediction results.
- This report describes the detail of IAIP and its performance

# Overview of IAIP process



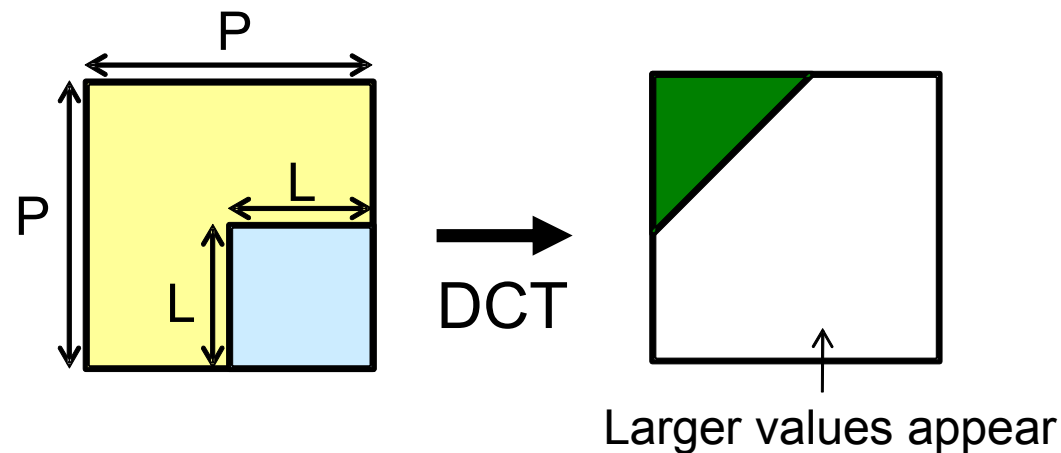
# Process of IAIP

- The  $P \times P$  process block contains the  $L \times L$  current block and constructed neighboring area as reference.
- An initial  $P$  value is set to be  $2L$ .
- DC value of neighboring samples is set as initial prediction values at current block.



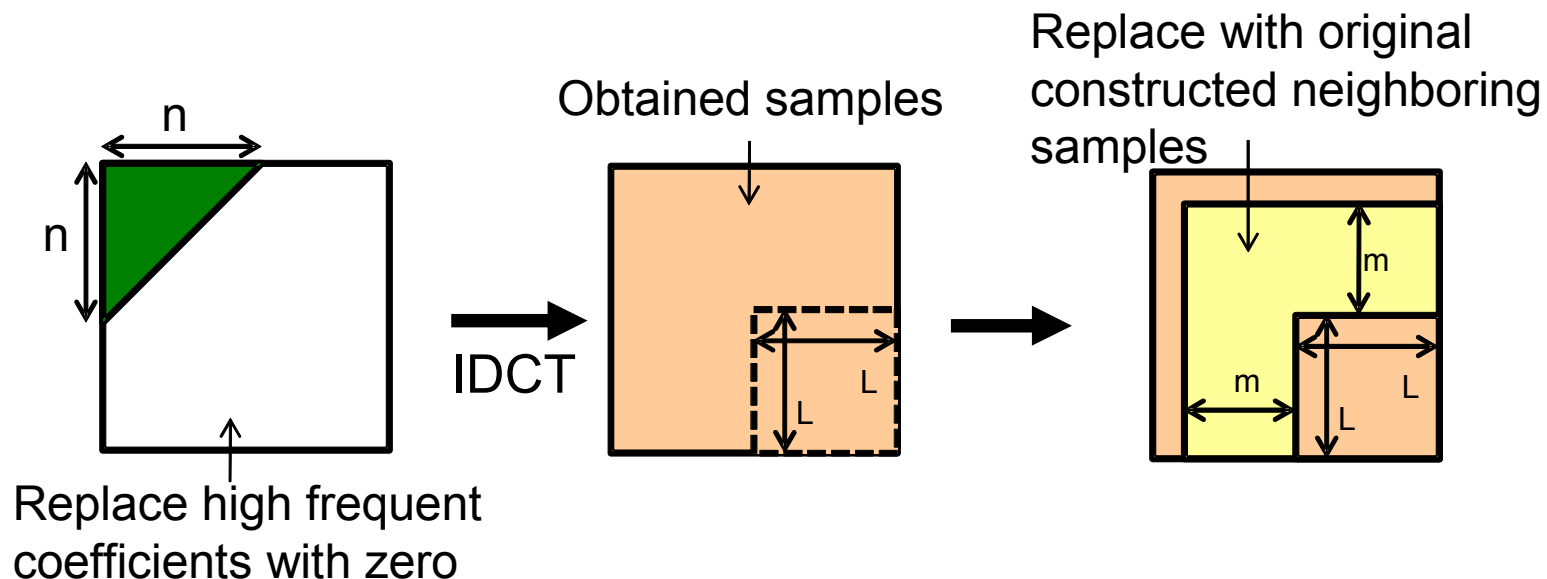
# Process of IAIP (cont.)

- DCT is applied to the process block.
- Higher frequency coefficients of DCT appear because of discontinuity between the current block and neighboring area.



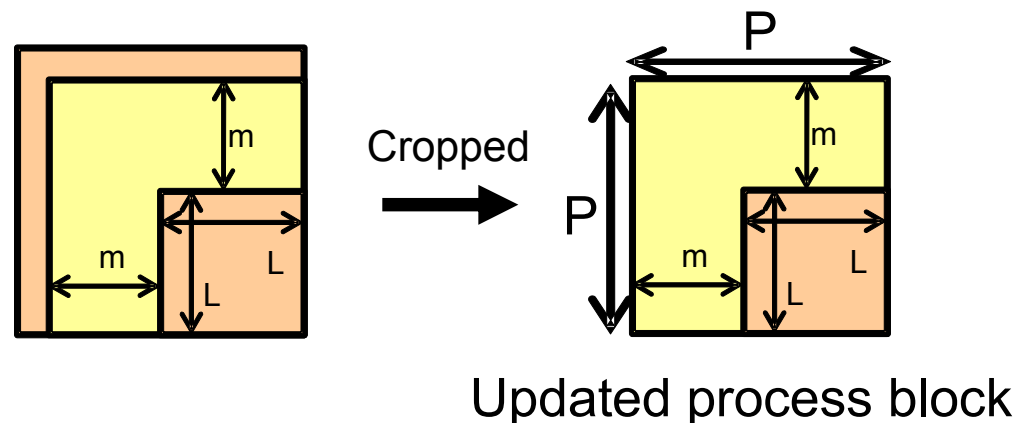
# Process of IAIP (cont.)

- Higher frequency coefficients are replaced with 0 to make the border smooth.
- IDCT is applied to the process block.
- The obtained samples at neighboring area are replaced with original constructed values.



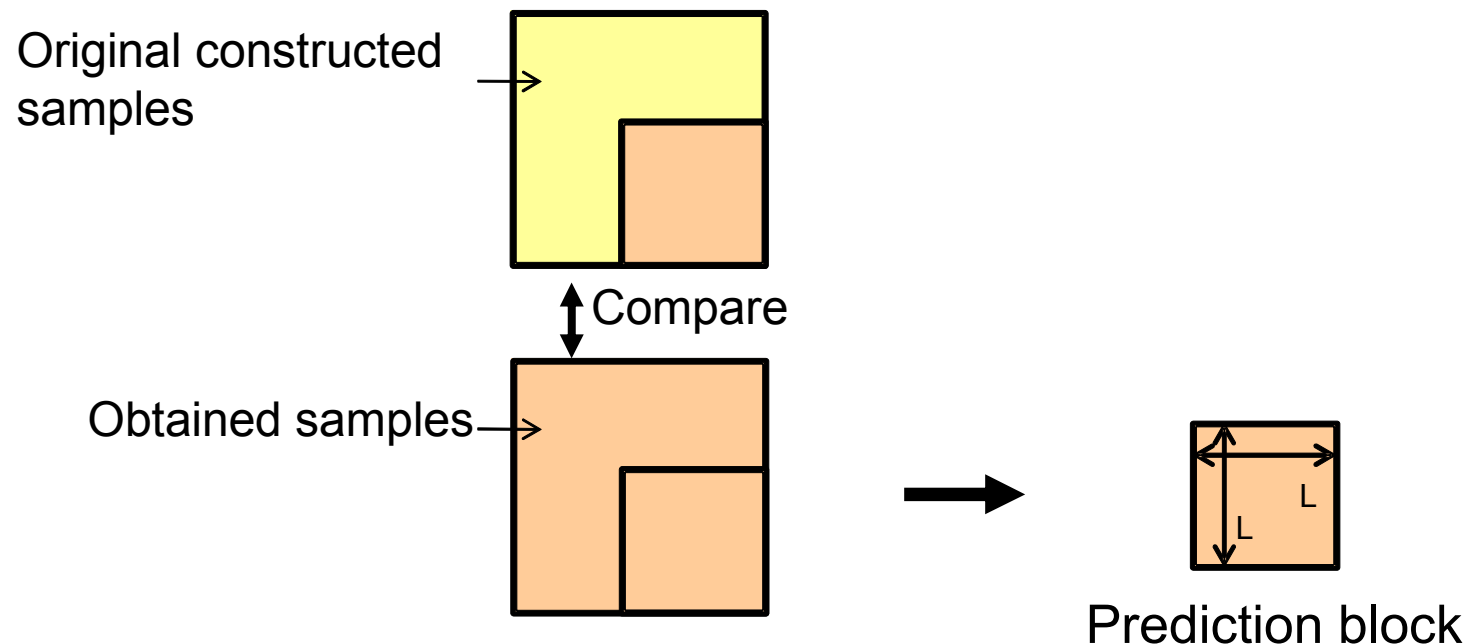
# Process of IAIP (cont.)

- Next process block size,  $P$ , is decreased to  $m+L$  ( $m < L$ ).
- The new process block moves to DCT process
- By repeating this process, characteristics of neighboring samples can effectively be incorporated into the prediction samples.



# Process of IAIP (cont.)

- If the obtained and original samples at neighboring area are almost same or the number of iteration is larger than maximum, fix the prediction signals.





# The performance of IAIP

## Condition of experiments

- JM 16.2 as the base software.
- No syntax change.
- In semantics, DC prediction mode is replaced with IAIP.
- IAIP is applied to both Y and C components.
- All test sequences specified in the CfP and SHV test sequences are used.
- Intra only coding
- QP=25, 30, 35, 40

# The performance of IAIP

- The result of high resolution sequences
  - Class SHV: Steam locomotive train, Nebuta
  - Class A: Traffic, People on street
  - Class B: Kimono1, Park scene, Cactus, Basket drive, BQ terrace

	BD-PSNR [dB]			BD_RATE [%]		
	Y	U	V	Y	U	V
Steam locomotive train	0.02	0.32	0.38	-0.74	-18.47	-18.58
Nebuta festival	0.08	-0.01	0.00	-1.25	0.31	0.11
Traffic	0.06	0.02	0.05	-1.21	-0.66	-1.86
PeopleOnStreet	0.04	0.04	0.08	-0.71	-1.31	-2.75
Kimono1	0.07	0.07	0.10	-1.86	-2.91	-3.83
ParkScene	0.05	0.03	0.06	-1.17	-1.22	-2.72
Cactus	0.03	0.01	0.00	-0.89	-0.66	-0.11
BasketballDrive	0.02	0.03	0.02	-0.76	-1.27	-0.53
BQTerrace	0.01	0.02	0.07	-0.26	-0.67	-3.45
Average				<b>-0.98</b>	<b>-2.99</b>	<b>-3.75</b>

# The performance of IAIP

- The result of low resolution sequences
  - Class C: Basketball drill, BQ mall, Party scene, Race horses
  - Class D: Basketball pass, BQ square, Blowing Bubbles, Race horses
  - Class E: Vidyo1, Vidyo3, Vidyo4

	BD-PSNR [dB]			BD_RATE [%]		
	Y	U	V	Y	U	V
BasketballDrill	-0.01	-0.05	-0.11	0.26	1.20	2.34
BQMall	0.05	0.00	0.01	-0.88	-0.04	-0.27
PartyScene	0.04	-0.02	-0.03	-0.54	0.53	0.63
RaceHorses	0.02	-0.03	-0.02	-0.35	0.77	0.64
BasketballPass	0.05	-0.03	-0.03	-0.88	0.55	0.62
BQSquare	0.01	0.00	-0.04	-0.08	-0.32	0.90
BlowingBubbles	0.04	-0.04	-0.04	-0.56	0.79	0.96
RaceHorses	0.02	-0.07	-0.07	-0.37	1.64	1.76
vidyo1	0.04	0.11	0.11	-0.73	-3.54	-2.86
vidyo3	0.02	0.19	0.13	-0.33	-5.82	-3.32
vidyo4	0.03	0.16	0.16	-0.63	-4.78	-4.25
Average				<b>-0.46</b>	<b>-0.82</b>	<b>-0.26</b>

# Conclusion

- IAIP outperformed JM especially with high resolution sequences
- There may be some blocks where DC pred. works well which was replaced with IAIP.
- Therefore there is room of further performance improvement to use both DC pred. and IAIP with relevant syntax modifications.
- We propose to include IAIP into TMuC as the new intra prediction mode.