

JCTVC-F549: Coding with a single, unified reference picture list

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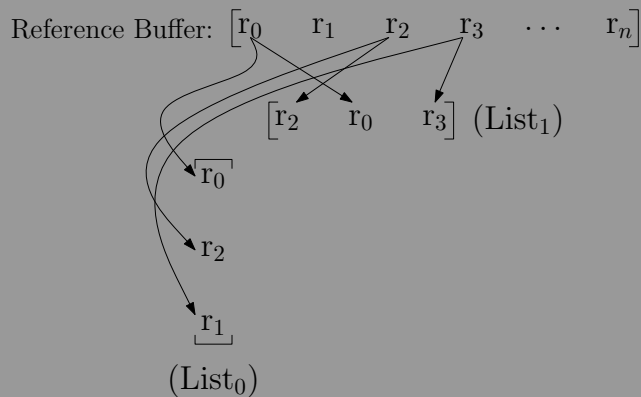
BBC Research & Development

2011-July

Background

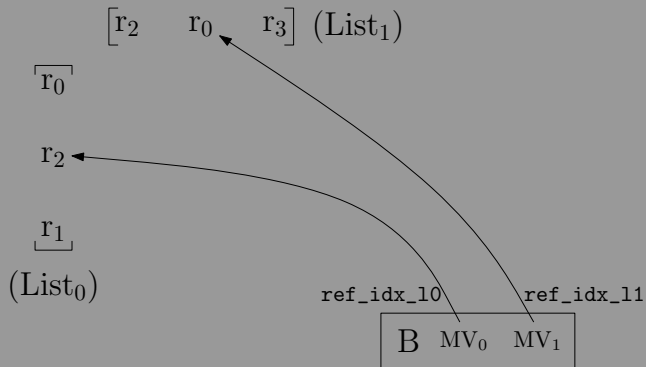
Reference Buffer: $\left[\mathbf{r}_0 \quad \mathbf{r}_1 \quad \mathbf{r}_2 \quad \mathbf{r}_3 \quad \dots \quad \mathbf{r}_n \right]$

Background



Background

Reference Buffer: $[r_0 \quad r_1 \quad r_2 \quad r_3 \quad \dots \quad r_n]$



A Solution

Reference Buffer: $\begin{bmatrix} r_0 & r_1 & r_2 & r_3 & \dots & r_n \end{bmatrix}$

$$\begin{array}{c} \begin{bmatrix} r_2 & r_0 & r_3 \end{bmatrix} \\ \overline{r_0} \quad (0,2) \quad (0,0) \quad (0,3) \end{array}$$

$$r_2 \quad (2,2) \quad (2,0) \quad (2,3)$$

$$\underline{r_1} \quad (1,2) \quad (1,0) \quad (1,3)$$

$B (MV_0, MV_1)$



A Solution

Reference Buffer: $\begin{bmatrix} \mathbf{r}_0 & \mathbf{r}_1 & \mathbf{r}_2 & \mathbf{r}_3 & \cdots & \mathbf{r}_n \end{bmatrix}$

$(0, 0)$	$(0, 1)$	$(0, 2)$	$(0, 3)$	\cdots	$(0, n)$
$(1, 0)$	$(1, 1)$	$(1, 2)$	$(1, 3)$	\cdots	$(1, n)$
$(2, 0)$	$(2, 1)$	$(2, 2)$	$(2, 3)$	\cdots	$(2, n)$
$(3, 0)$	$(3, 1)$	$(3, 2)$	$(3, 3)$	\cdots	$(3, n)$
\vdots	\vdots	\vdots	\vdots	\ddots	\vdots
$(n, 0)$	$(n, 1)$	$(n, 2)$	$(n, 3)$	\cdots	(n, n)

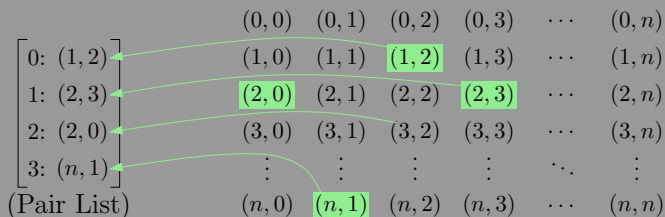
A Solution

Reference Buffer: $\begin{bmatrix} r_0 & r_1 & r_2 & r_3 & \dots & r_n \end{bmatrix}$

$(0, 0)$	$(0, 1)$	$(0, 2)$	$(0, 3)$	\dots	$(0, n)$
$(1, 0)$	$(1, 1)$	$(1, 2)$	$(1, 3)$	\dots	$(1, n)$
$(2, 0)$	$(2, 1)$	$(2, 2)$	$(2, 3)$	\dots	$(2, n)$
$(3, 0)$	$(3, 1)$	$(3, 2)$	$(3, 3)$	\dots	$(3, n)$
\vdots	\vdots	\vdots	\vdots	\ddots	\vdots
$(n, 0)$	$(n, 1)$	$(n, 2)$	$(n, 3)$	\dots	(n, n)

A Solution

Reference Buffer: $[r_0 \quad r_1 \quad r_2 \quad r_3 \quad \dots \quad r_n]$



A Solution

Reference Buffer: $[r_0 \quad r_1 \quad r_2 \quad r_3 \quad \dots \quad r_n]$

	(0, 0)	(0, 1)	(0, 2)	(0, 3)	...	(0, n)
0: (1, 2)	(1, 0)	(1, 1)	(1, 2)	(1, 3)	...	(1, n)
1: (2, 3)	(2, 0)	(2, 1)	(2, 2)	(2, 3)	...	(2, n)
2: (2, 0)	(3, 0)	(3, 1)	(3, 2)	(3, 3)	...	(3, n)
3: (n, 1)	\vdots	\vdots	\vdots	\vdots	\ddots	\vdots
(Pair List)	(n, 0)	(n, 1)	(n, 2)	(n, 3)	...	(n, n)

ref_idx_pair

B (MV_0, MV_1)

A Solution

Reference Buffer: $\begin{bmatrix} r_0 & r_1 & r_2 & r_3 & \dots & r_n \end{bmatrix}$

	$(0, 0)$	$(0, 1)$	$(0, 2)$	$(0, 3)$	\dots	$(0, n)$
$\left[\begin{array}{l} 0: (1, 2) \\ 1: (2, 3) \\ 2: (2, 0) \\ 3: (n, 1) \end{array} \right]$	$(1, 0)$	$(1, 1)$	$(1, 2)$	$(1, 3)$	\dots	$(1, n)$
(Pair List)	$(2, 0)$	$(2, 1)$	$(2, 2)$	$(2, 3)$	\dots	$(2, n)$
	$(3, 0)$	$(3, 1)$	$(3, 2)$	$(3, 3)$	\dots	$(3, n)$
	\vdots	\vdots	\vdots	\vdots	\ddots	\vdots
	$(n, 0)$	$(n, 1)$	$(n, 2)$	$(n, 3)$	\dots	(n, n)

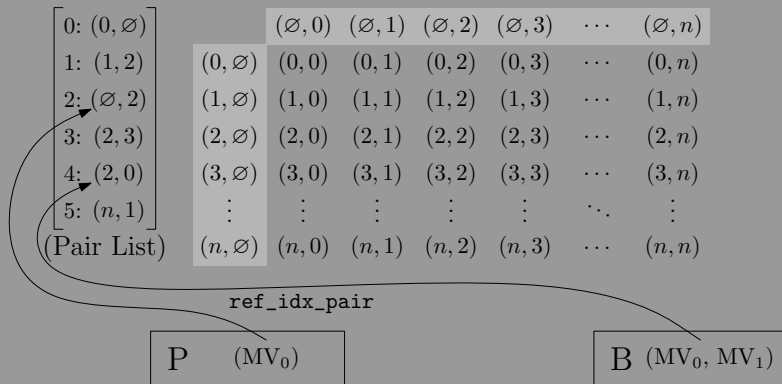
Extension to uni-prediction

Reference Buffer: $\begin{bmatrix} r_0 & r_1 & r_2 & r_3 & \dots & r_n \end{bmatrix}$

$\begin{bmatrix} 0: (\emptyset, \emptyset) \\ 1: (1, 2) \\ 2: (\emptyset, 2) \\ 3: (2, 3) \\ 4: (2, 0) \\ 5: (n, 1) \end{bmatrix}$		$(\emptyset, 0)$	$(\emptyset, 1)$	$(\emptyset, 2)$	$(\emptyset, 3)$	\dots	(\emptyset, n)
	$(0, \emptyset)$	$(0, 0)$	$(0, 1)$	$(0, 2)$	$(0, 3)$	\dots	$(0, n)$
	$(1, \emptyset)$	$(1, 0)$	$(1, 1)$	$(1, 2)$	$(1, 3)$	\dots	$(1, n)$
	$(2, \emptyset)$	$(2, 0)$	$(2, 1)$	$(2, 2)$	$(2, 3)$	\dots	$(2, n)$
	$(3, \emptyset)$	$(3, 0)$	$(3, 1)$	$(3, 2)$	$(3, 3)$	\dots	$(3, n)$
	\vdots	\vdots	\vdots	\vdots	\vdots	\ddots	\vdots
(Pair List)	(n, \emptyset)	$(n, 0)$	$(n, 1)$	$(n, 2)$	$(n, 3)$	\dots	(n, n)

Extension to uni-prediction

Reference Buffer: $[r_0 \quad r_1 \quad r_2 \quad r_3 \quad \dots \quad r_n]$



Syntax

prediction_unit() {	C	Descriptor
} else { /* MODE_INTER */		
...		
if(merge_flag[x0][y0] && NumMergeCand > 1) {		
merge_idx[x0][y0]		
} else {		
red_idx_pair[x0][y0]		ue(v) ae(v)
if(ref_pic_pair_list[ref_idx_pair[x0][y0]][0] > 0) {		
mvd0[x0][y0][0]		se(v) ae(v)
mvd0[x0][y0][1]		se(v) ae(v)
if(NumMVPCand(MV0) > 1)		
mvdp_idx0[x0][y0]		ue(v) ae(v)
}		
if(ref_pic_pair_list[ref_idx_pair[x0][y0]][1] > 0) {		
mvd1[x0][y0][0]		se(v) ae(v)
mvd1[x0][y0][1]		se(v) ae(v)
if(NumMVPCand(MV1) > 1)		
mvdp_idx1[x0][y0]		ue(v) ae(v)
}		
}		
}		

Results

Replicating the HM-3.0 ME and MVP selection process

	Y' BD-rate	U BD-rate	V BD-rate
Class A	0.0	0.0	0.2
Class B	0.1	0.0	0.0
Class C	-0.1	0.0	-0.1
Class D	-0.1	-0.1	-0.1
Class E			
All	0.0	0.0	0.0

(a) Random Access

	Y' BD-rate	U BD-rate	V BD-rate
Class A	-0.2	-0.2	0.0
Class B	-0.1	0.0	0.0
Class C	-0.1	-0.2	-0.1
Class D	-0.2	-0.1	-0.1
Class E			
All	-0.1	-0.1	-0.1

(b) Random Access, LoCo

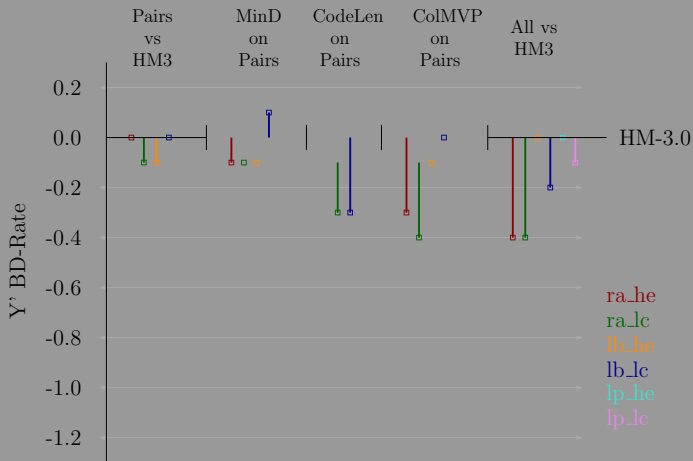
	Y' BD-rate	U BD-rate	V BD-rate
Class A			
Class B	0.0	0.3	0.3
Class C	0.0	0.0	0.0
Class D	-0.1	0.2	0.1
Class E	-0.2	-0.7	-0.3
All	-0.1	0.0	0.0

(c) Low Delay(B)

	Y' BD-rate	U BD-rate	V BD-rate
Class A			
Class B	0.1	0.0	-0.1
Class C	0.0	-0.1	0.0
Class D	0.1	-0.1	-0.1
Class E	0.0	-0.1	0.1
All	0.0	0.0	-0.1

(d) Low Delay(B), LoCo

Results



Results

