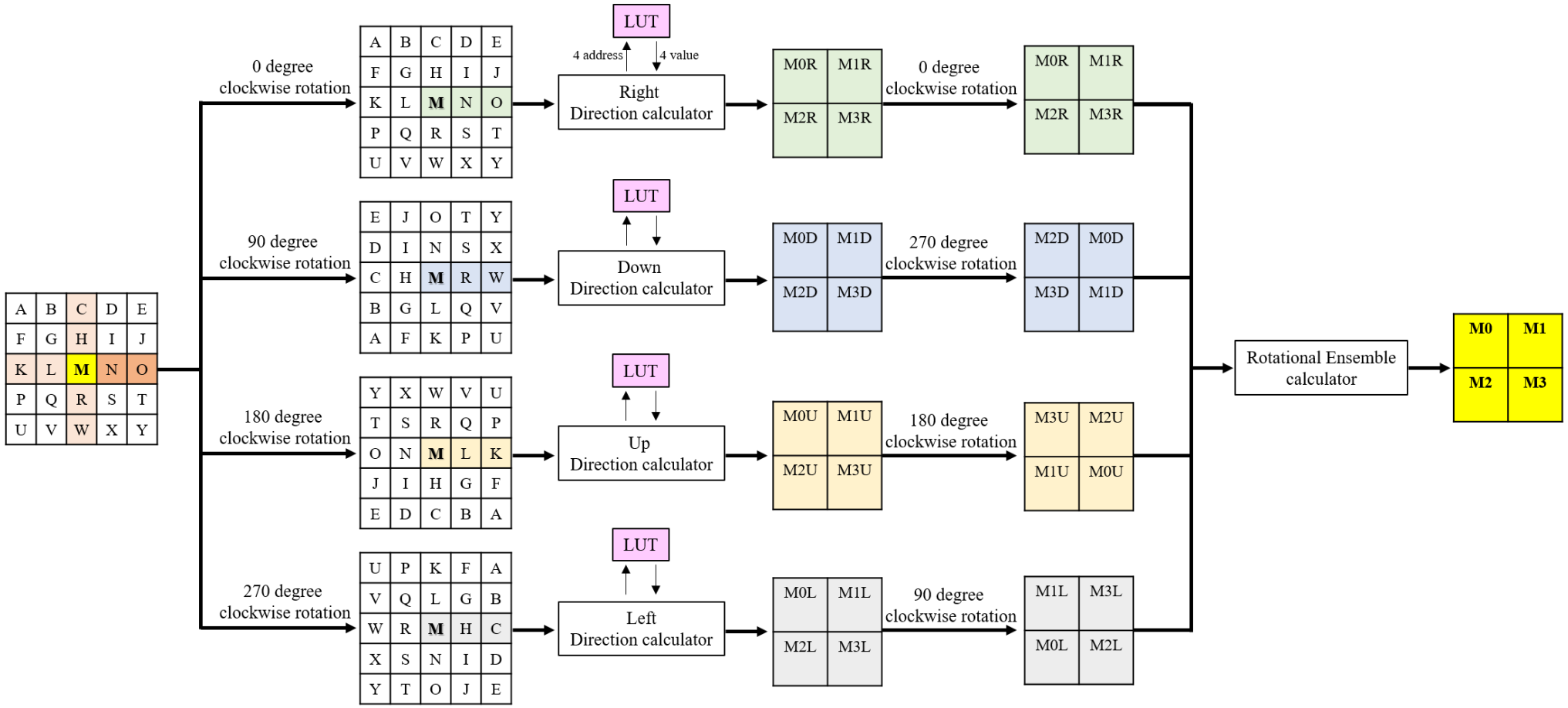
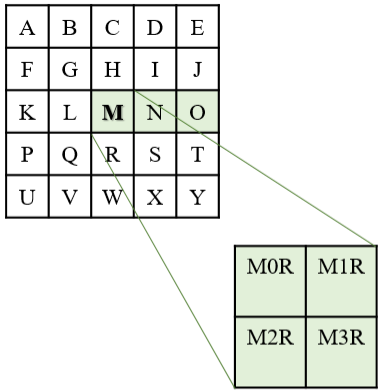
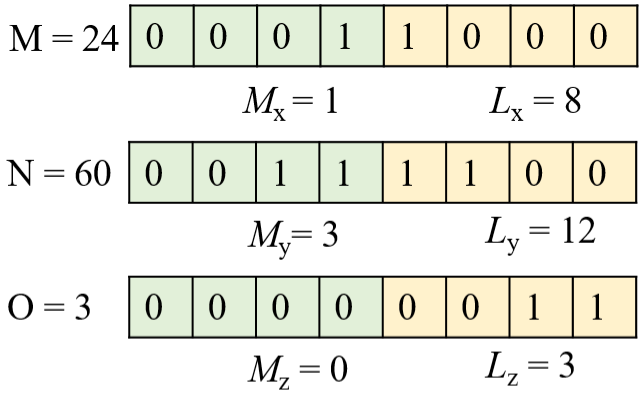
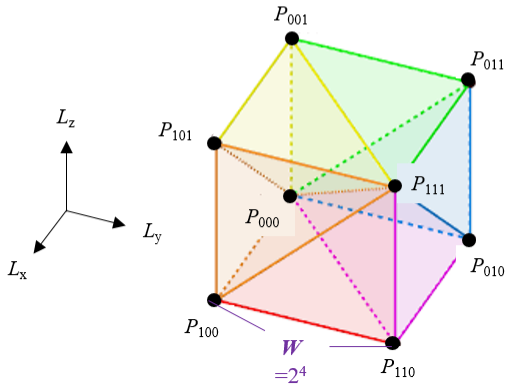
演算法簡單說明 兩倍放大-SRLUT



演算法簡單說明







(the sampling interval).

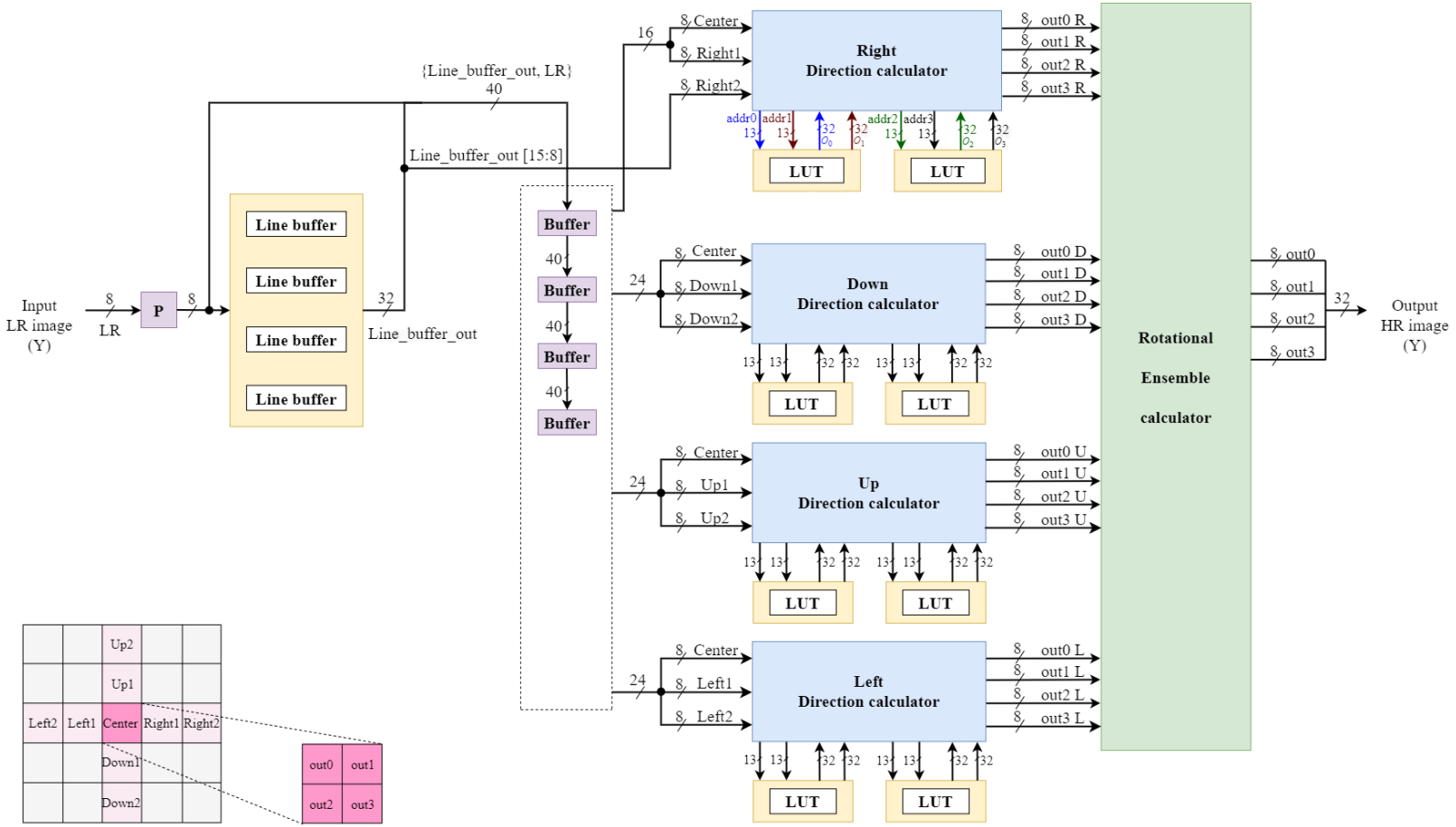
$$P_{000} = \mathrm{LUT}[M_x][M_y][M_z]$$
$$P_{001} = \mathrm{LUT}[M_x][M_y][M_z+1]$$
$$P_{010} = \mathrm{LUT}[M_x][M_y][M_z]$$
$$P_{011} = \mathrm{LUT}[M_x][M_y][M_z+1]$$
$$P_{100} = \mathrm{LUT}[M_x+1][M_y][M_z]$$
$$P_{101} = \mathrm{LUT}[M_x+1][M_y][M_z+1]$$
$$P_{110} = \mathrm{LUT}[M_x+1][M_y+1][M_z]$$
$$P_{111} = \mathrm{LUT}[M_x+1][M_y+1][M_z+1]$$

四面體插補，用Lx,Ly,Lz大小決定哪個case，決定wo~w3及要到LUT取的O0~O3
我做的是長寬都x2放大，所以1個像素放大後會得到4個值

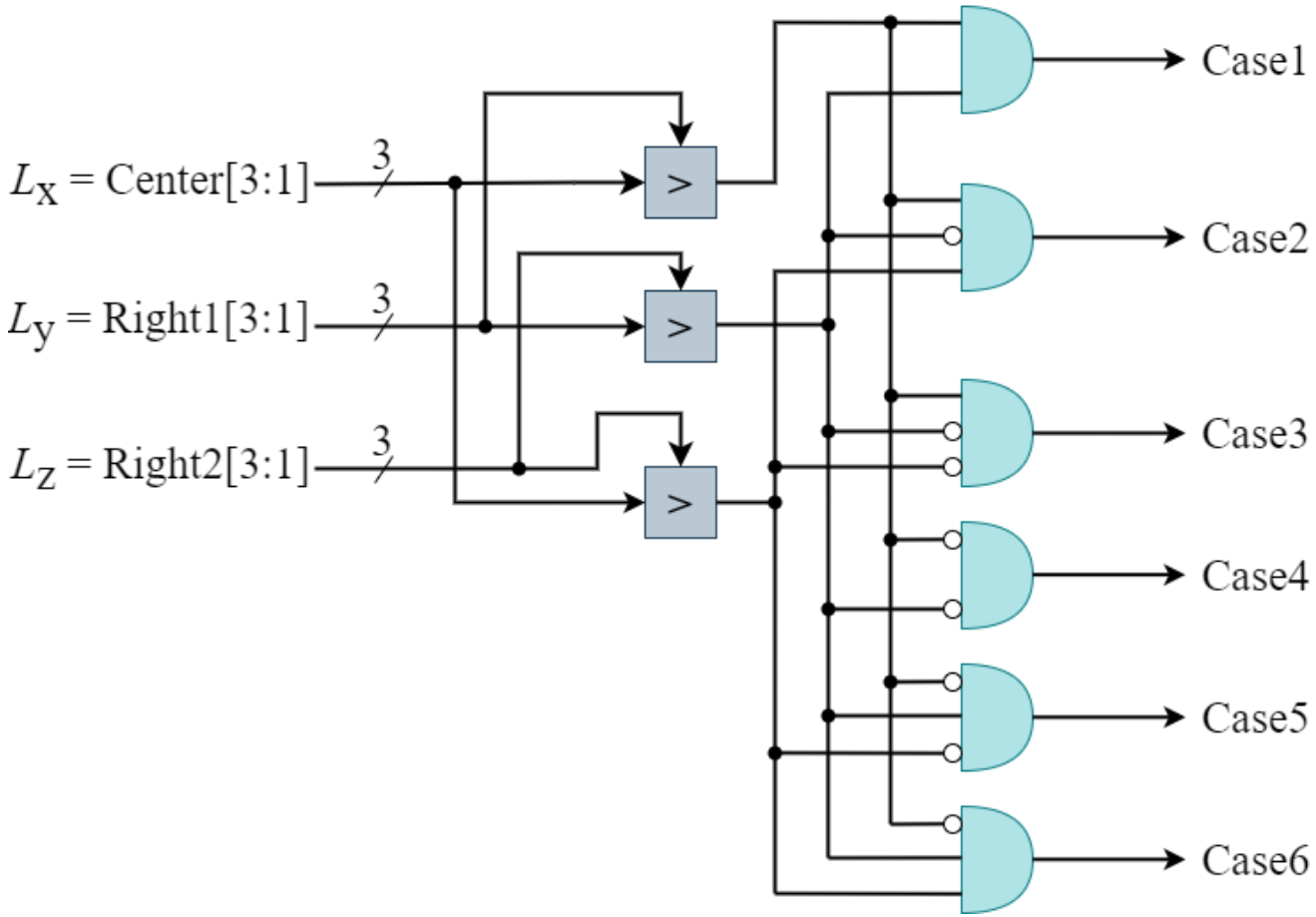
M0R = out0 = O0[31:24]*W0 + O1[31:24]*W1 + O2[31:24]*W2 + O3[31:24]*W3;
M1R = out1 = O0[23:16]*W0 + O1[23:16]*W1 + O2[23:16]*W2 + O3[23:16]*W3;
M2R = out2 = O0[15:8]*W0 + O1[15:8]*W1 + O2[15:8]*W2 + O3[15:8]*W3;
M3R = out3 = O0[7:0]*W0 + O1[7:0]*W1 + O2[7:0]*W2 + O3[7:0]*W3;

Case	Condition	w_0	w_1	w_2	w_3	O_0	O_1	O_2	O_3
1	$L_x > L_y > L_z$	$W-L_x$	L_x-L_y	L_y-L_z	L_z	P_{000}	P_{100}	P_{110}	P_{111}
2	$L_x > L_z \geq L_y$	$W-L_x$	L_x-L_z	L_z-L_y	L_y	P_{000}	P_{100}	P_{101}	P_{111}
3	$L_z \geq L_x > L_y$	$W-L_z$	L_z-L_x	L_x-L_y	L_y	P_{000}	P_{001}	P_{101}	P_{111}
4	$L_z > L_y \geq L_x$	$W-L_z$	L_z-L_y	L_y-L_x	L_x	P_{000}	P_{001}	P_{011}	P_{111}
5	$L_y \geq L_z > L_x$	$W-L_y$	L_y-L_z	L_z-L_x	L_x	P_{000}	P_{010}	P_{011}	P_{111}
6	$L_y \geq L_x \geq L_z$	$W-L_y$	L_y-L_x	L_x-L_z	L_z	P_{000}	P_{010}	P_{110}	P_{111}

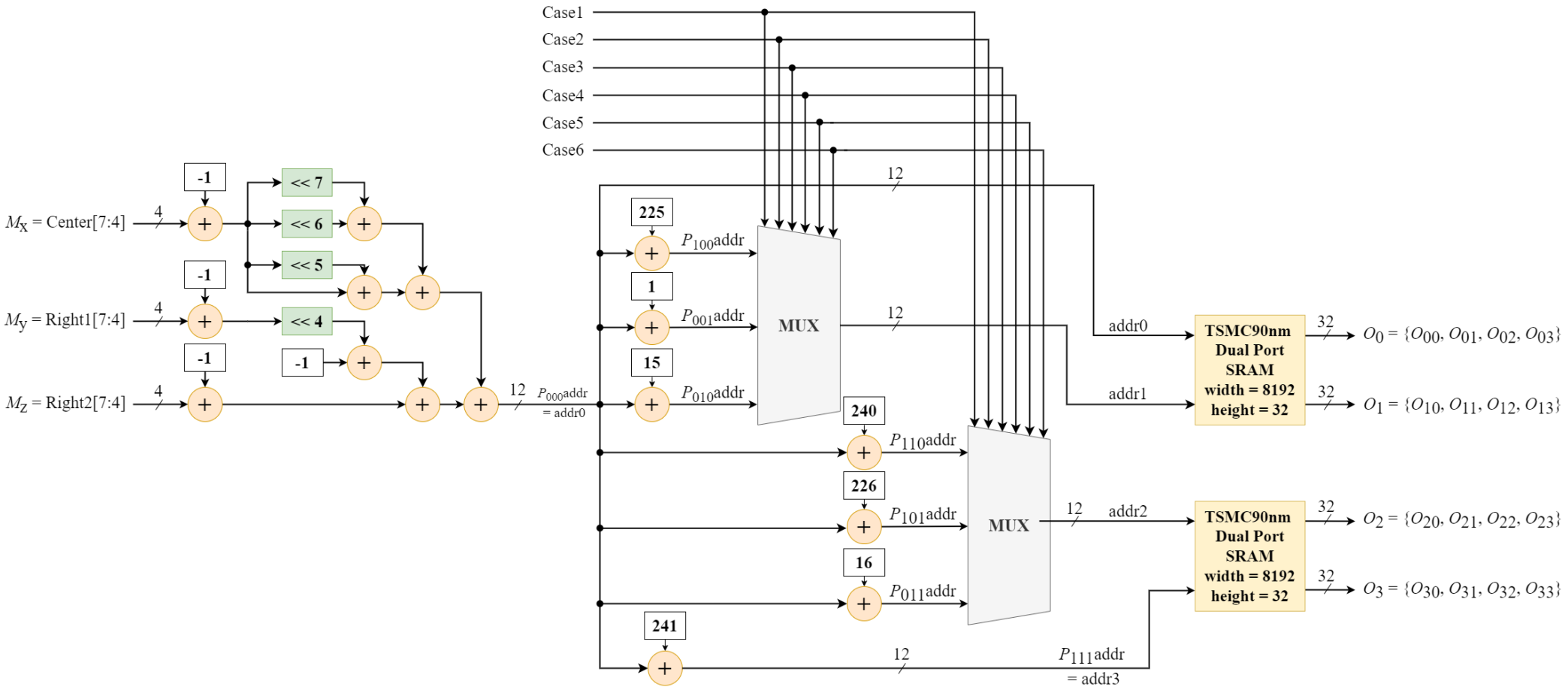
硬體整體架構圖


Input
LR image
(Y)
8
LR
P
8
Line buffer
Line buffer
Line buffer
Line buffer
32
Line_buffer_out
{Line_buffer_out, LR}
40
Line_buffer_out [15:8]
Buffer
40
Buffer
40
Buffer
40
Buffer
16
8 Center
8 Right1
8 Right2
Right
Direction calculator
8 out0 R
8 out1 R
8 out2 R
8 out3 R
addr0
addr1
addr2
addr3
13
32
LUT
LUT
24
8 Center
8 Down1
8 Down2
Down
Direction calculator
8 out0 D
8 out1 D
8 out2 D
8 out3 D
LUT
LUT
24
8 Center
8 Up1
8 Up2
Up
Direction calculator
8 out0 U
8 out1 U
8 out2 U
8 out3 U
LUT
LUT
24
8 Center
8 Left1
8 Left2
Left
Direction calculator
8 out0 L
8 out1 L
8 out2 L
8 out3 L
LUT
LUT
Rotational
Ensemble
calculator
8 out0
8 out1
8 out2
8 out3
32
Output
HR image
(Y)
Up2
Up1
Left2
Left1
Center
Right1
Right2
Down1
Down2
out0
out1
out2
out3

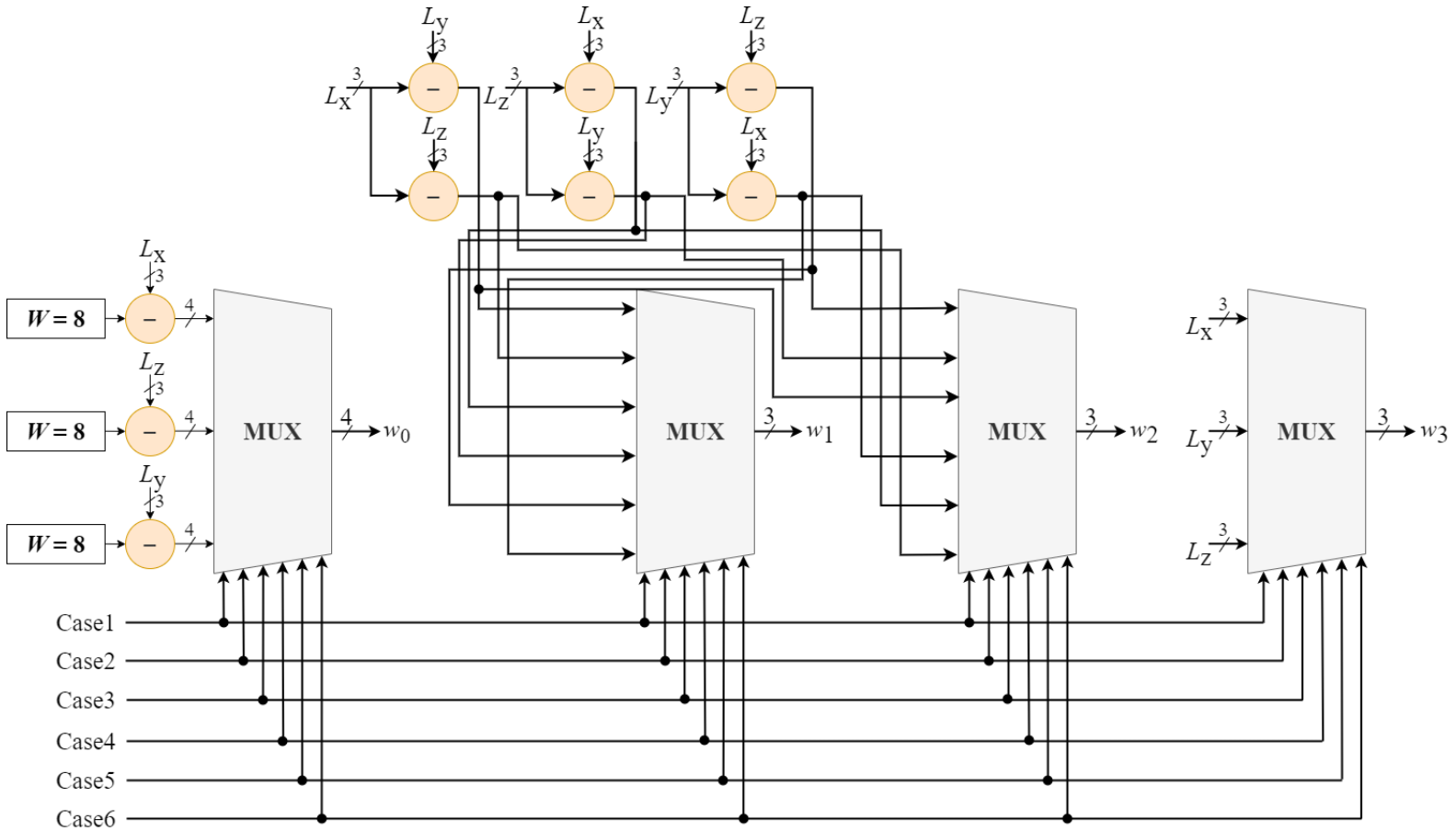
Direction_Calculator_Y_8: 用來作四面體插補



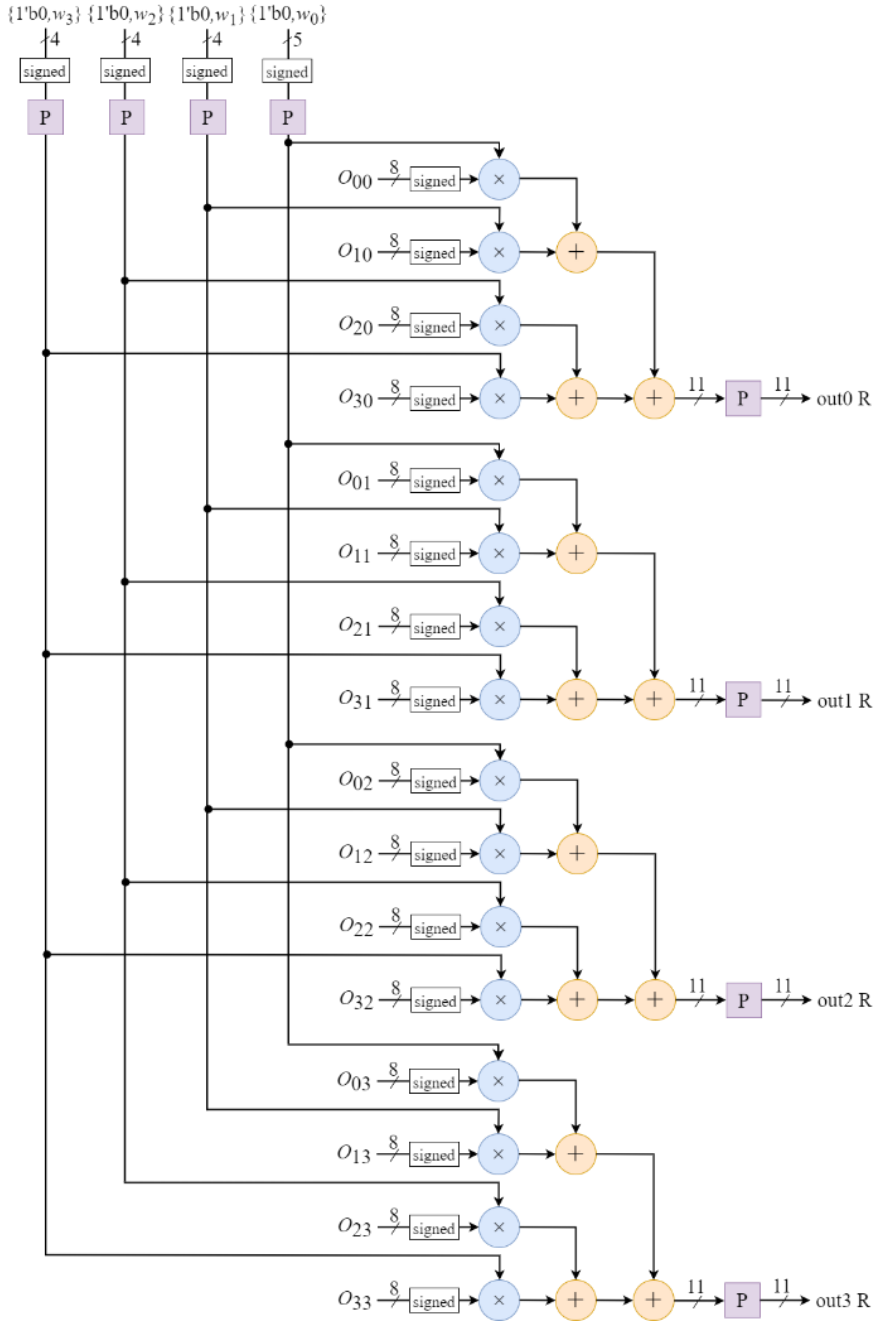
Direction_Calculator_Y_8



Direction_Calculator_Y_8



Direction_Calculator_Y_8



Rotational_Ensemble_calculator_Y_8_C.v