① $\sum_{256}$: $x_i w_i$

$x_i = \begin{cases} 0 = 0 \\ 1 = 1 \end{cases}$ $w_i = \begin{cases} 0 = -1 \\ 1 = 1 \end{cases}$

input = 16 x 16 = 256 → 128

$x_1 w_1 + x_2 w_2 = y_3 y_2 y_1$

$y_0 = \overline{\omega_1 \bar{x}_1 \bar{\omega}_2 + \bar{\omega}_1 \omega_2 \bar{x}_2}$

$y_1 = \overline{4\,OR}$

$y_2 = \overline{3\,OR}$

w_1x_1 / w_2x_2	00	01	11	10
00	000	000	001	111
01	000	000	001	111
11	001	001	010	000
10	111	111	000	110

NO too big

$x_1 w_1 = y_1 y_0$

$y_1 = x_1 \bar{w}_1$ decrement = $\bar{w}_1$ } if x_1

$y_0 = x_1 w_1$ increment = w_1

$\bar{y}_0 \bar{y}_1$ = nothing = $\bar{x}_1$

$x_1 w_1$	$y_1 y_0$
00	00
01	00
10	11
11	01

$y_1 = x_1 \bar{w}_1$

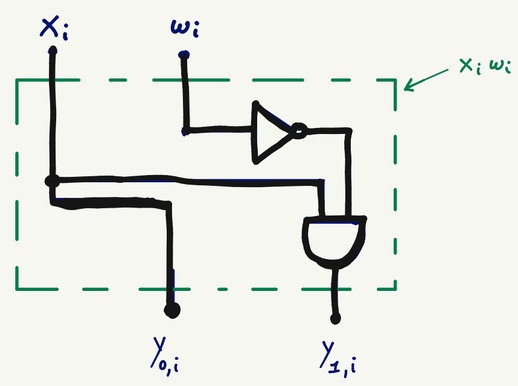
$y_0 = x_1$

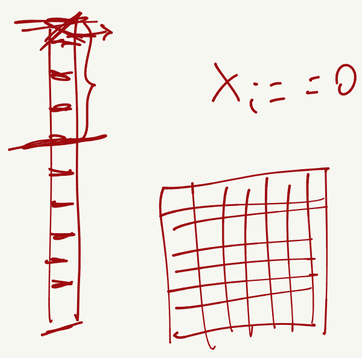
configurable (like 70% - 80%)

"11" → Sparsity ? 32 256

while loading, check 0?

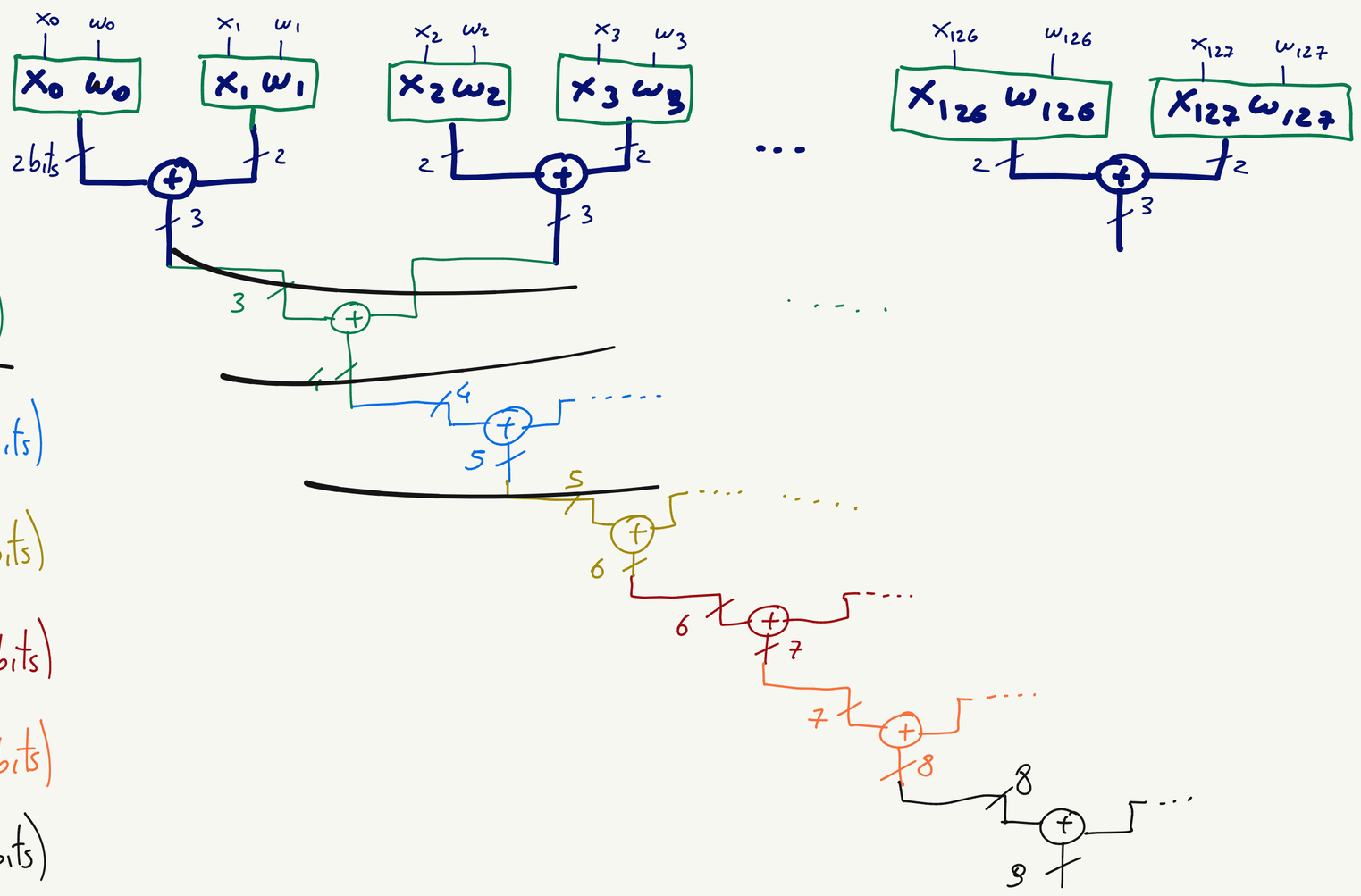
$x_i w_i$ (mult):





$x_i == 0$

$\sum_{128}$: $w_i x_i$



$\sum_{128}$: $w_i x_i$

64 adds (2 bits)

32 adds (in = 3 bits)

16 adds (in = 4 bits)

8 adds (in = 5 bits)

4 adds (in = 6 bits)

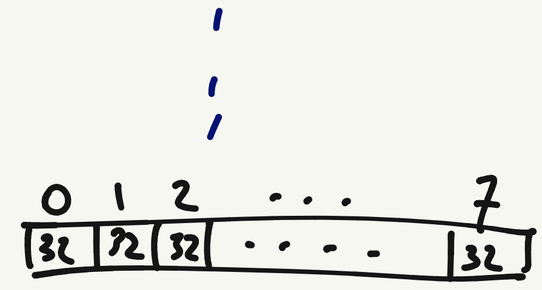
2 adds (in = 7 bits)

1 adds (in = 8 bits)

16 x 16 input = 256 = 32x8 SLOTS (if all 0, skip adder)

generic for the adder tree

① Adder with N bits ② Configurable adder tree



2 bits · 6 bits = 8 bits