$$\frac{22101622}{2}$$

$$f = A.\bar{B} + B.C$$

A	B	C	$\cancel{A}\bar{B}$	$A\bar{B}$	BC	f
0	0	0	1	0	0	0
0	0	1	1	0	0	0
0	1	0	0	0	0	0
0	1	1	0	0	1	1
1	0	0	1	1	0	1
1	0	1	1	1	0	1
1	1	0	0	0	0	0
1	1	1	0	0	1	1

for $f = 0$, class 0: $(0,0,0)$, $(0,0,1)$, $(0,1,0)$, $(1,1,0)$

class 1: $f = 1$: $(0,1,1)$, $(1,0,0)$, $(1,0,1)$, $(1,1,1)$

for this to be linearly seperable,

$w_1 A + w_2 B + w_3 C + b > 0$; for all points where $f = 1$

$w_1 A + w_2 B + w_3 C + b < 0$; $f = 0$

$f = 0$		$f = 1$	
$(0,0,0) \rightarrow$	$b < 0$	$(0,1,1) \rightarrow$	$w_2 + w_3 + b > 0$
$(0,0,1) \rightarrow$	$w_3 + b < 0$	$(1,0,0) \rightarrow$	$w_1 + b > 0$
$(0,1,0) \rightarrow$	$w_2 + b < 0$	$(1,0,1) \rightarrow$	$w_1 + w_3 + b > 0$
$(1,1,0) \rightarrow$	$w_1 + w_2 + b < 0$	$(1,1,1) \rightarrow$	$w_1 + w_2 + w_3 + b > 0$

Contradiction:

$(1,0,0) \rightarrow w_1 + b > 0 \Rightarrow w_1 > -b$

$(0,1,1) \rightarrow w_2 + w_3 + b > 0 \Rightarrow w_2 + w_3 > -b$

again,

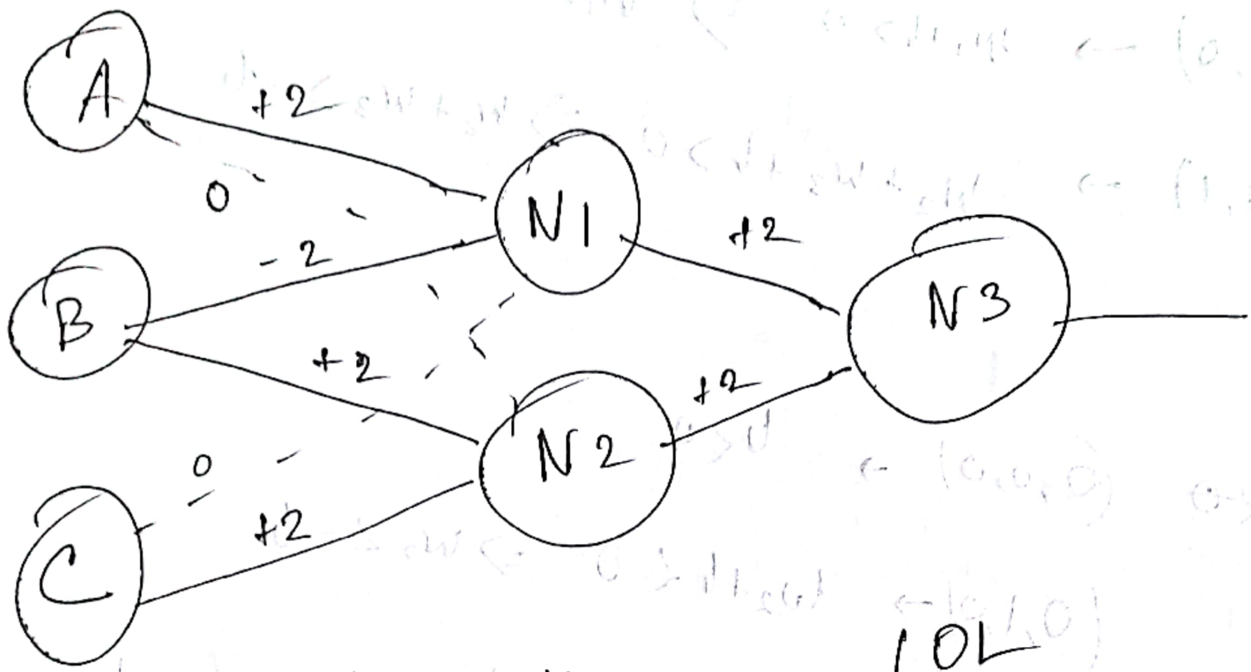
~~$b<0$~~ $(0,0,0) \rightarrow b < 0$

$(0,1,0) \rightarrow w_2 + b < 0 \Rightarrow w_2 < -b$

So, there are contradictions, thus, the function is not linearly seperable.

not solvable by using a single perceptron.

Solution:



IL

↓

I/O

HL

↓

N2: let function be $f(2B+2C-\underset{b}{\overset{2}{1.5}})$

N1: $f(2A-2B-\underset{b}{0.5})$

if $f(x) \geq 0$, $f(x)=1$

$f(x) \leq 0$, $f(x)=0$

OL

N3: $f(2N1+2N_2-0.5)$

$f(x)=1$; $f(x) > 0$

$f(x)=0$; $f(x) \leq 0$

A	B	C	N1	N2	N3
0	0	0	-0.5 ; 0	-2 ; 0 ~~1.5 ; 0~~	-0.5 ; 0
0	0	1	-0.5 ; 0	0 ; 0	-0.5 ; 0
0	1	0	-2.5 ; 0	0 ; 0	-0.5 ; 0
0	1	1	-2.5 ; 0	2 ; 1	1.5 ; 1
1	0	0	1.5 ; 1	-2 ; 0	1.5 ; 1
1	0	1	1.5 ; 1	0 ; 0	1.5 ; 1
1	1	0	-0.5 ; 0	0 ; 0	-0.5 ; 0
1	1	1	-0.5 ; 0	2 ; 1	1.5 ; 1

$N3 = f(A\bar{B} + BC)$

~~2 -2 0.5~~

so, the following network solves it, not a single neuron as ~~it~~ it is not linearly ~~seperabill~~ seperable.