Sunday, September 10, 2023 9:18 PM

Deep Learning? Have a starter!

Class 1. Intro to ANN, Perceptron, Network Archite

artificial Neural

Biological Neur

Axion → Dendrit

ctures.

Networks

eons

e Synapse

Artifical Neuro

1. Input laye
2. Hidden "
3. Output "

nS

TZ

Applications

1. Pattern
2. Fraud
3. Stock
4. Echo pattern
5. Medical

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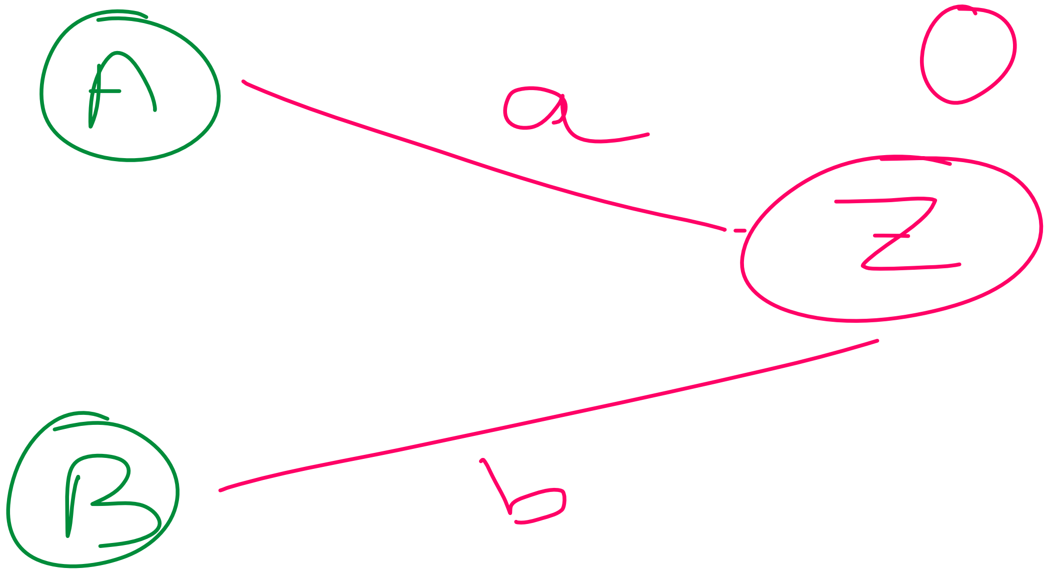
Neuron

net, I = a

O =



$$\frac{A + bB}{f(I)}$$

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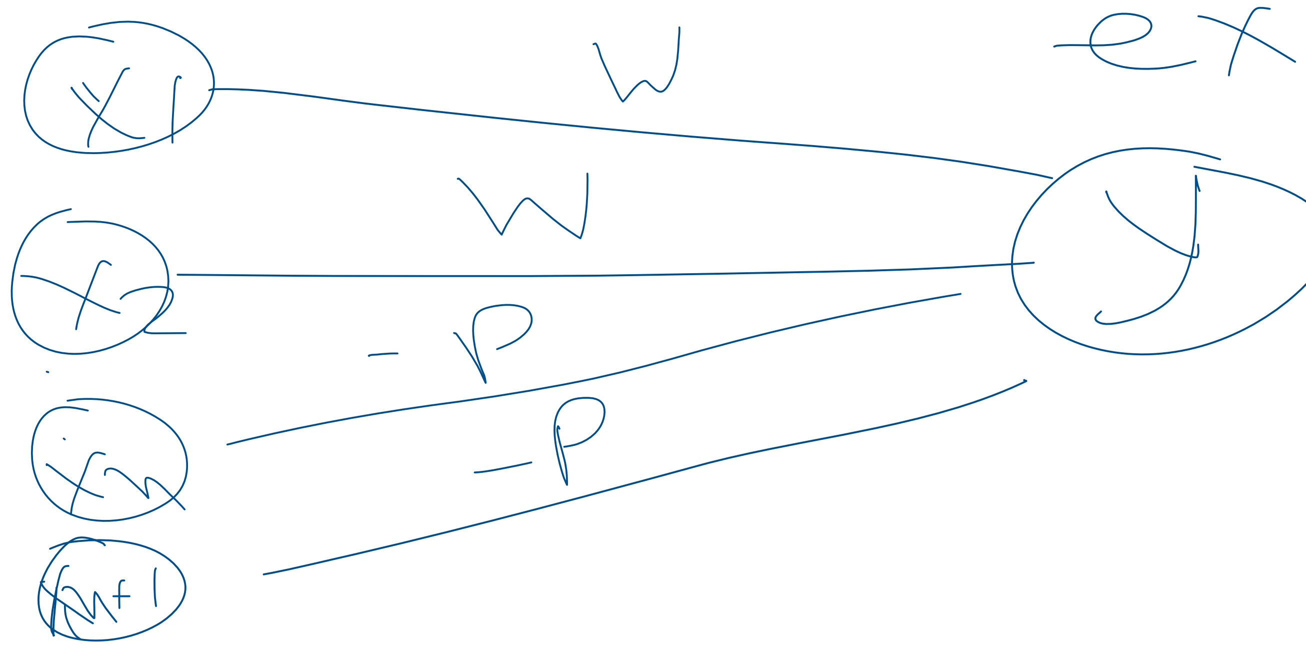
Warren McCulloc

↓

Linear Threshold



ch

Gate

hibitory

Activation func:

$f(y_{in}) = 1$ if $>$

0 el

$f_{in} \geq t$

se

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Single-layer N (Perce

- Input multi-di

- input $\boxed{x}$

eptions)

N

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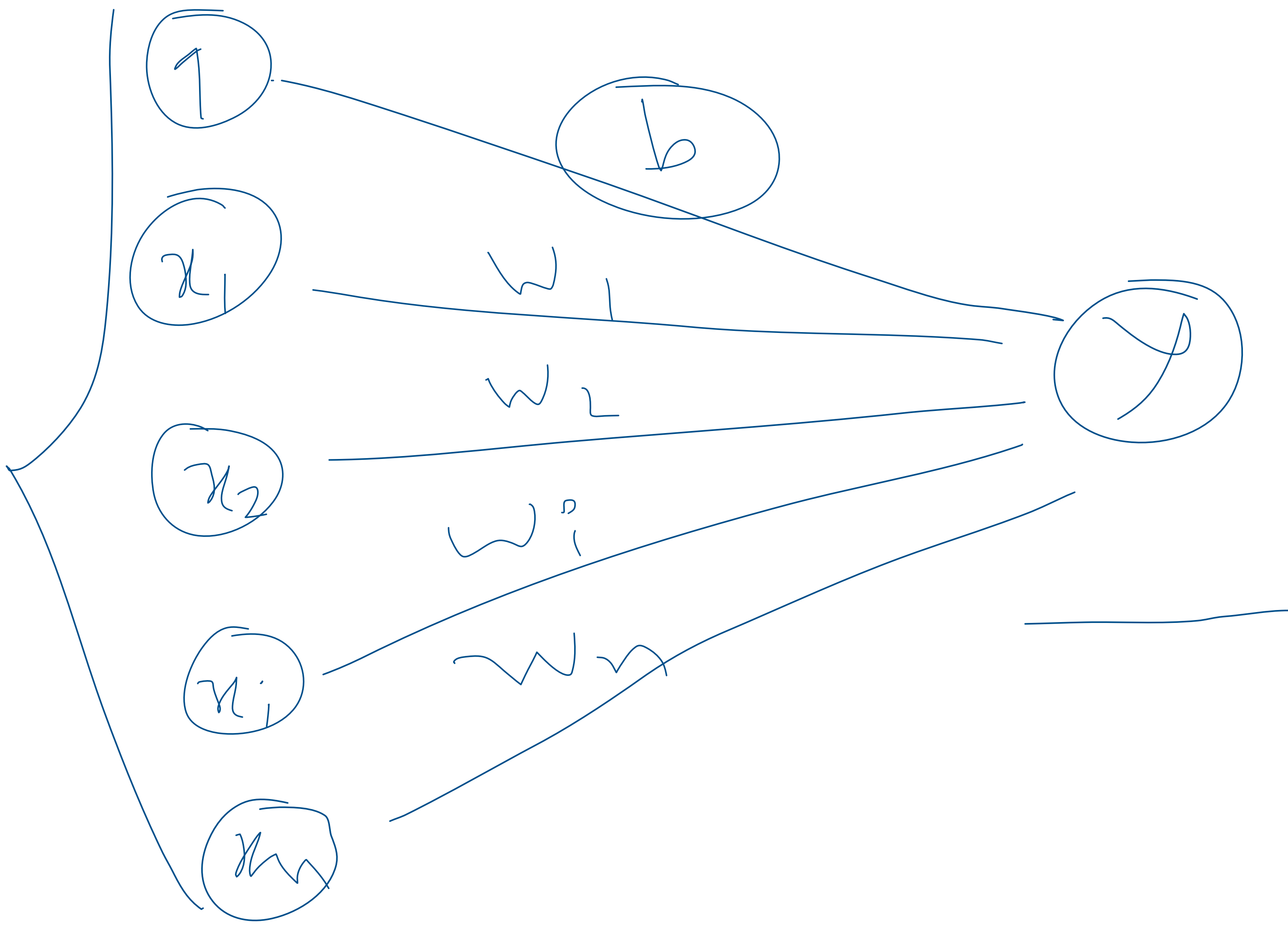
ersonal (victim)


1
x_1
x_2
x_i
x_n
b
w_1
w_2
w_i
w_n
y

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$\overset{ə}{i}$ - h o

single

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Algorithm

1. Initialize w, b, α.

2. Stopping condition

3. For each training pai
   Set activation of

   $X_i = S_j$ for

4. Compute outpu

5. Update w, b

n, 3 - 5

input unit

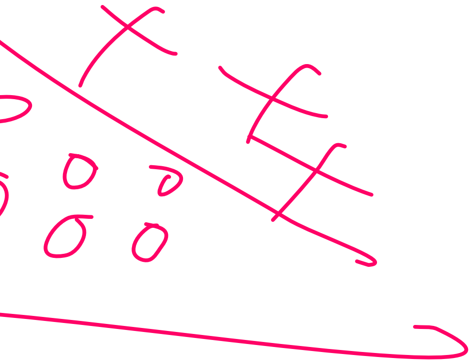
1 to n

t response

Limitations

1. 2 values
2. Linearly se
3. XOR

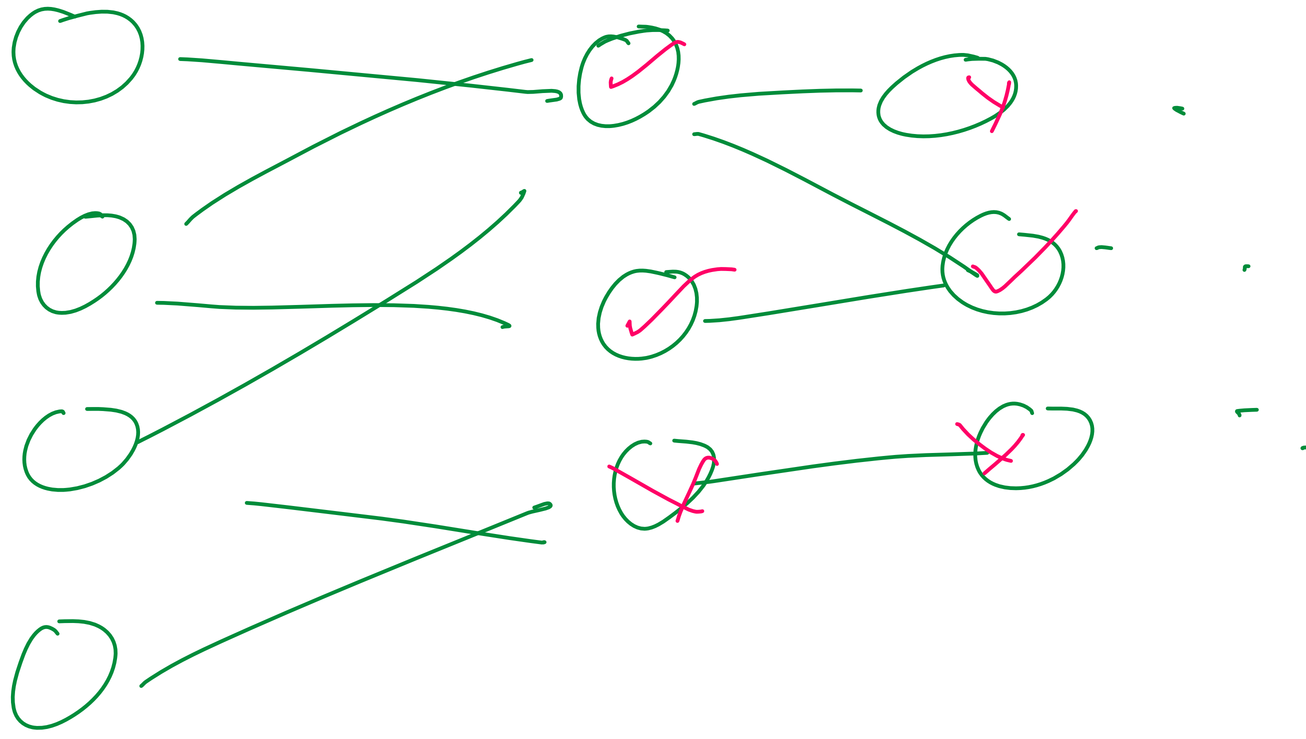
A
0
0
1

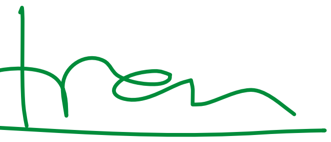


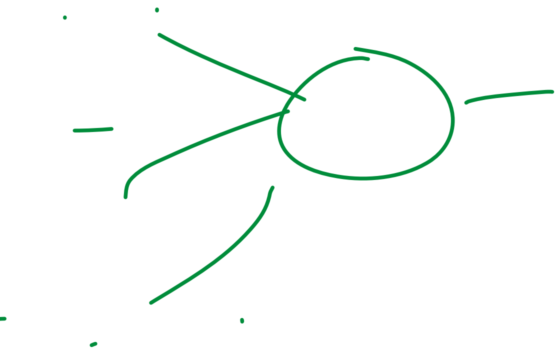
eparable

	B	X
0	0	0
0	1	1
1	0	1
1	1	0

Multi-layer perceep







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Activation Func-

① Linear Function

$$y = x$$

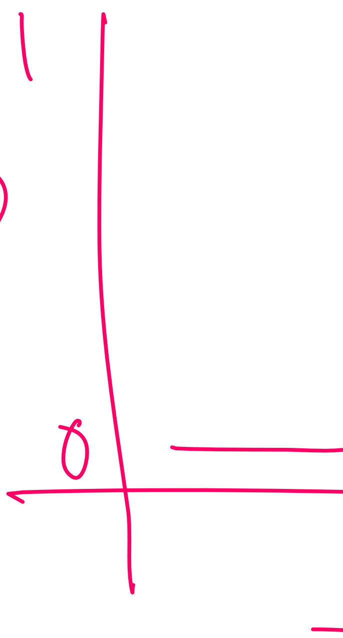
Range: $-\infty \longrightarrow +$

tion

$\to \infty$

② Sigmoid

$$A = \frac{1}{1+e^{-x}}$$



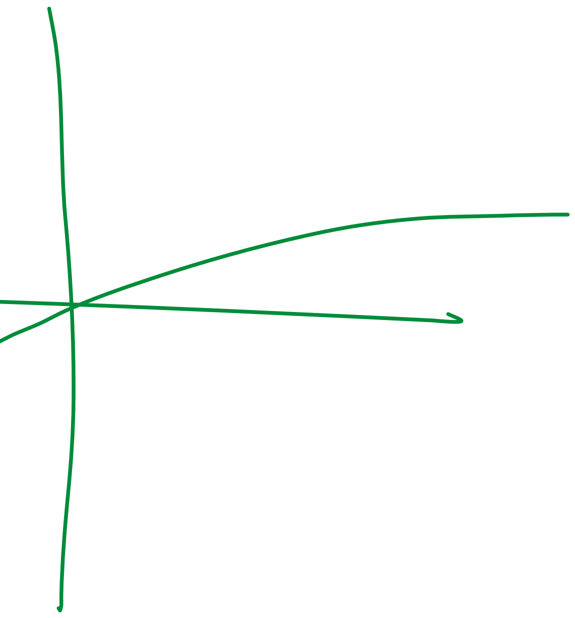
Range : $\check{0} \rightarrow \check{1}$

Binary clas

③ Tanh

$$\tanh(x) = \frac{2}{1+e^{-2x}} - 1$$

Range: $-1 \rightarrow +1$



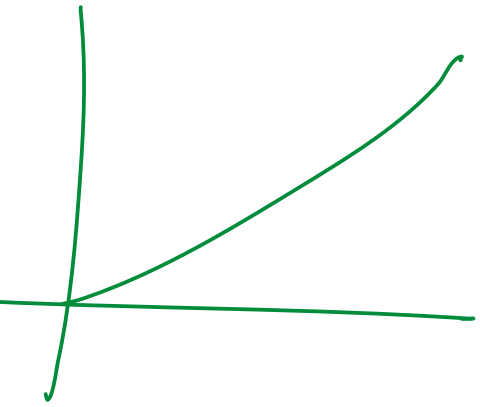
④ ReLU

Rectified Linear U

Range : $0 \rightarrow \infty$

$$A(x) = \max(0, x)$$

Unit



⑤ Softmax → Output

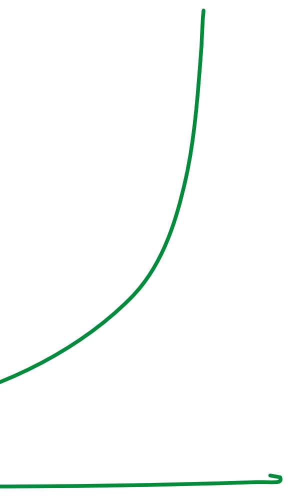
Multi-class

:

:

0

$+$



Architectures

1. Feedforward N
2. Recurrent N
3. Convolutional NN
4. Autoencoders
5. Generative Adve

[illegible]

[illegible]

[illegible]

rial N (GaN)

Model

- Interconnect
- Activation Fu
- Learning R

ions

ne

ules

5 Neuron Connecti

① Single-layer

② Multi-layer

③ Single node with

④ Single layer rec

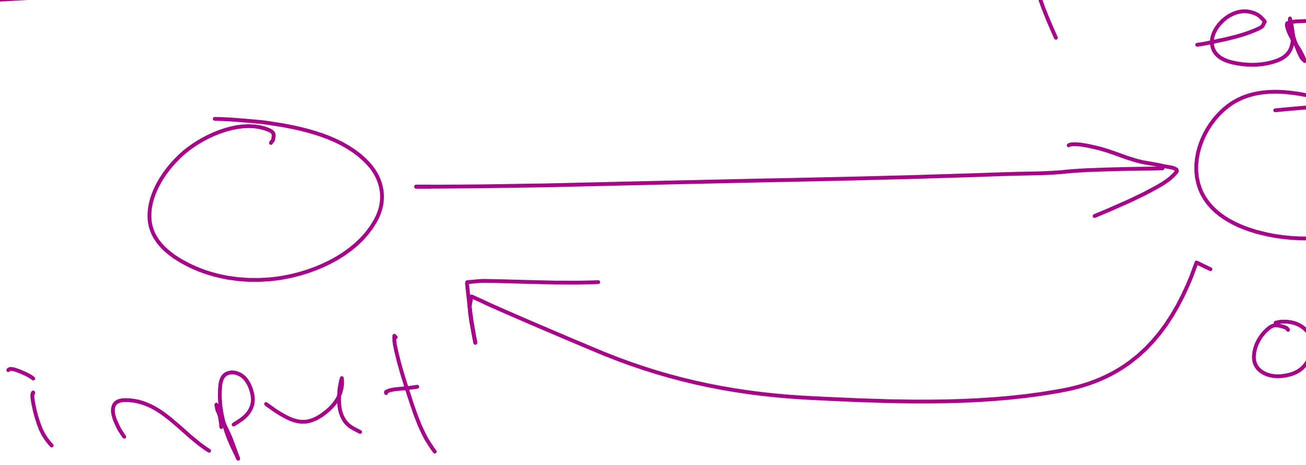
⑤ Multilayer ,,

m Archi

h our Feedback

ument

Back Propagation



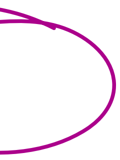
Training

① Feed

② Calc
& B.

③ upd

rror



utput

- forward

of error

eck

ate weight

Algo

① Input x ⟶

② weight, w → mod

③ Calc. output of
(input → hidd

④ Calc. error (

path

deled

neurons

(in → output)

v. t. o.)

Backpropagation erro

Actual − Desired
output output

(5) Go back to hid

(6) Update weigh

e^{π}

den lazen

f