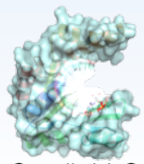
DataWknds.

NEURAL NETWORKS



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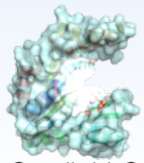
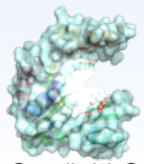
ADVANTAGES OF NEURAL NETWORK



ADVANTAGES OF NEURAL NETWORK

- Classification AND Regression
- Work with unstructured data (images, sound, text)
- Keep improving if we add more data (not bound)



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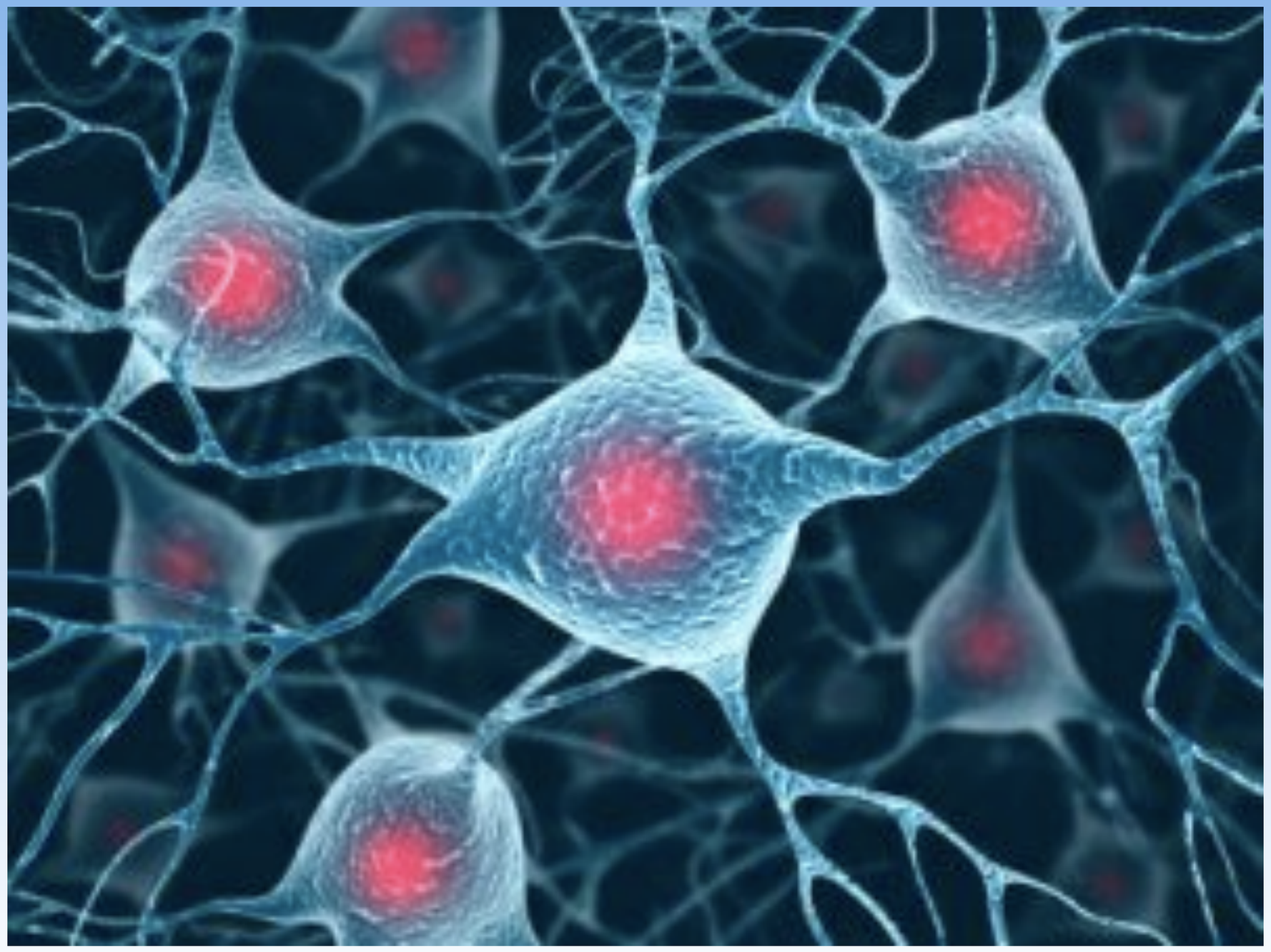
HOW



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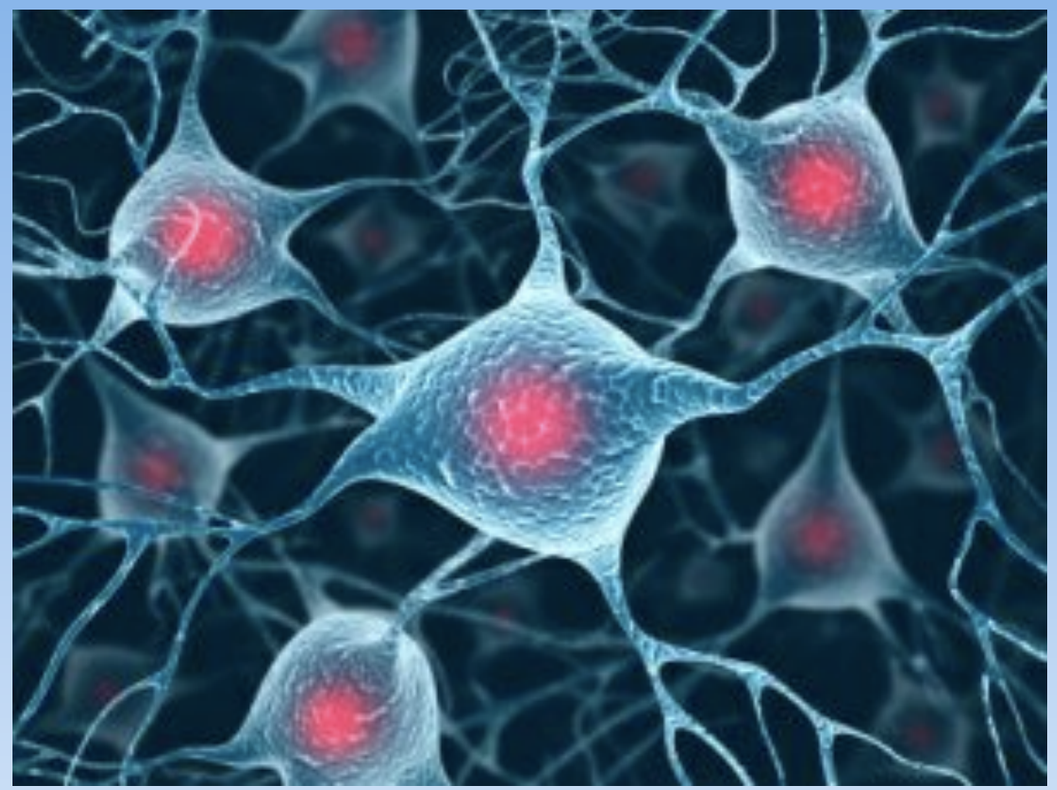
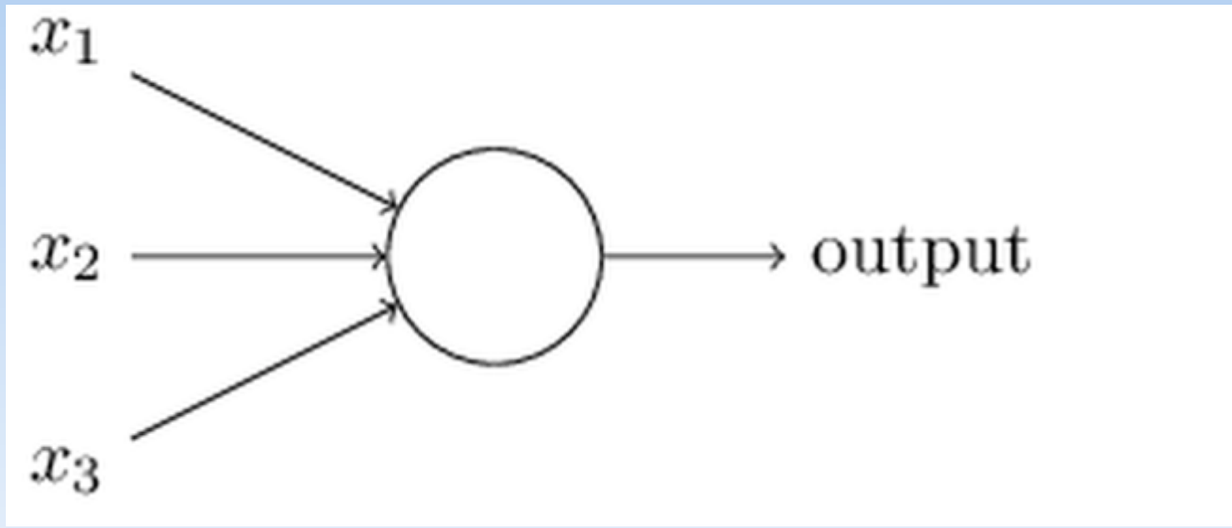
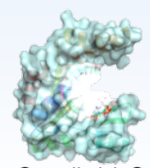
HOW







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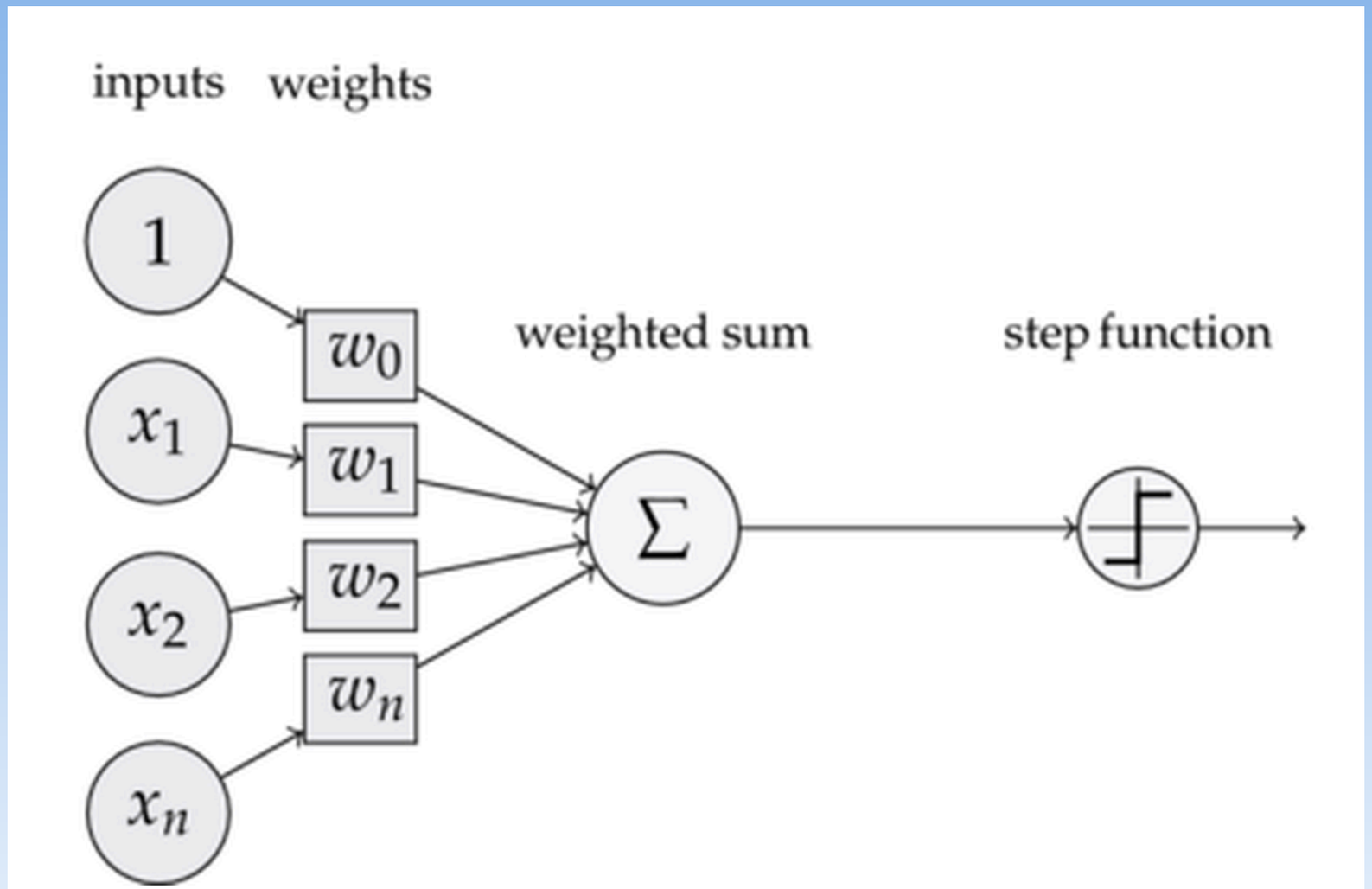
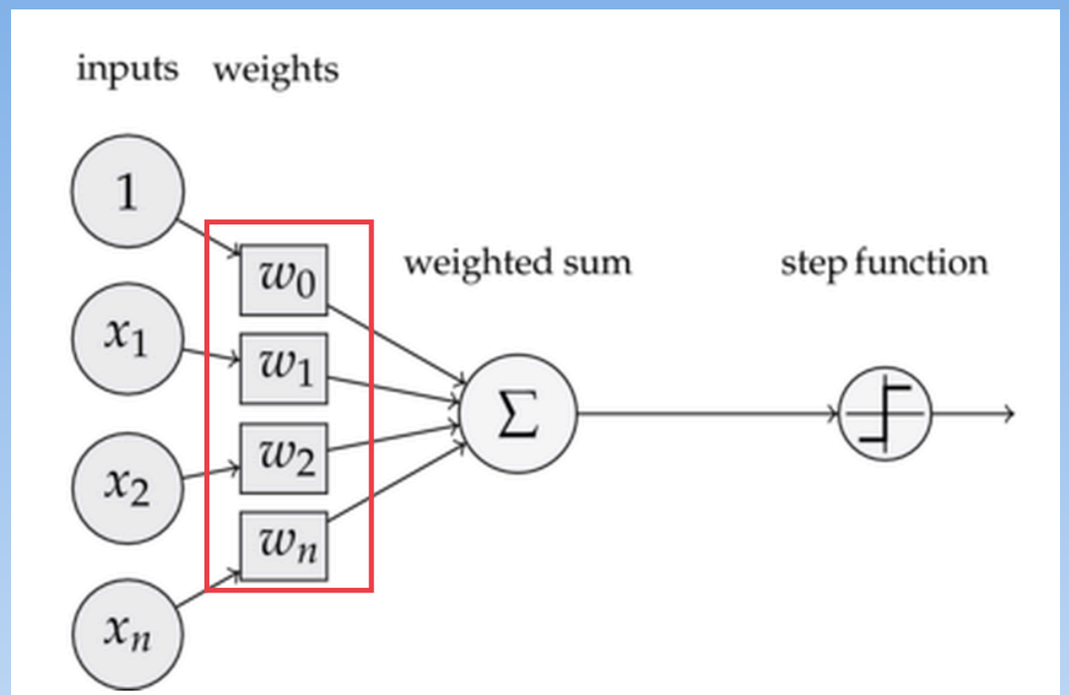
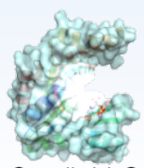
PERCEPTRON


inputs
weights
1
x_1
x_2
x_n
w_0
w_1
w_2
w_n
weighted sum
Σ
step function

WEIGHTS



$$z = \sum_{i=0}^{n} w_i * x_i$$



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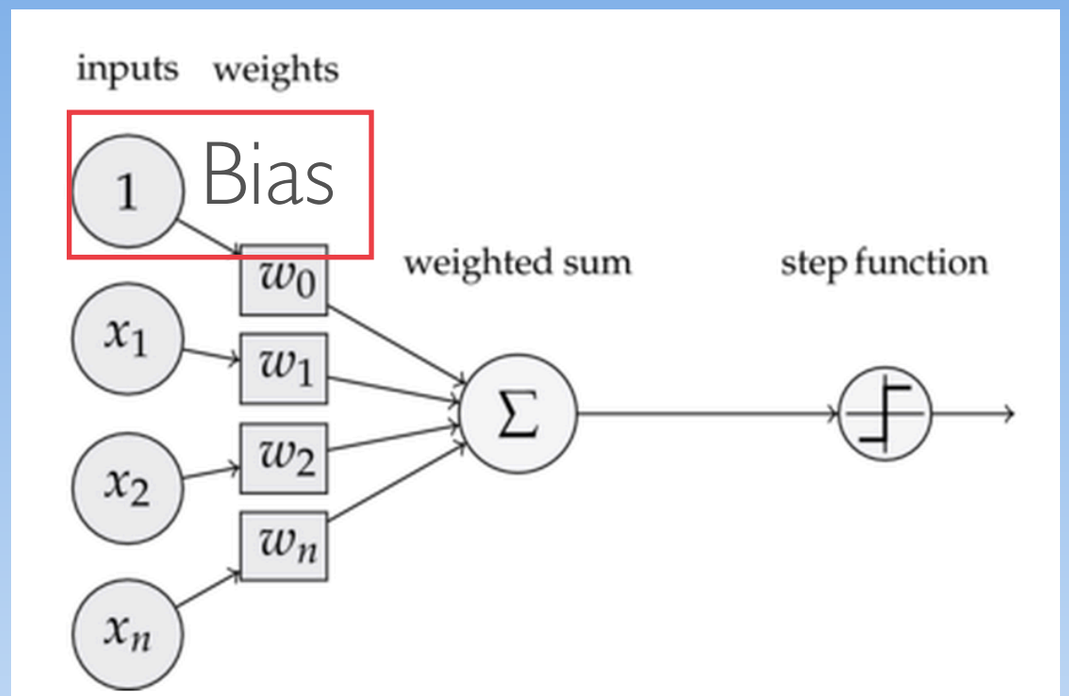
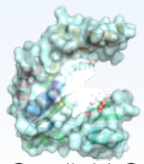
WEIGHTS



$$z = \sum_{i=0}^{n} w_i * x_i$$



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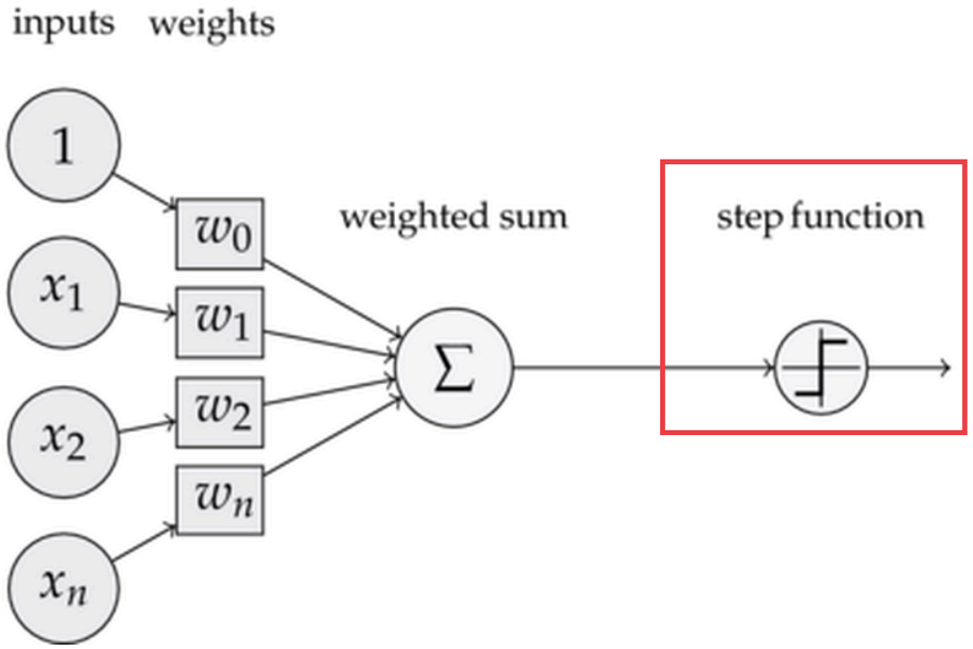
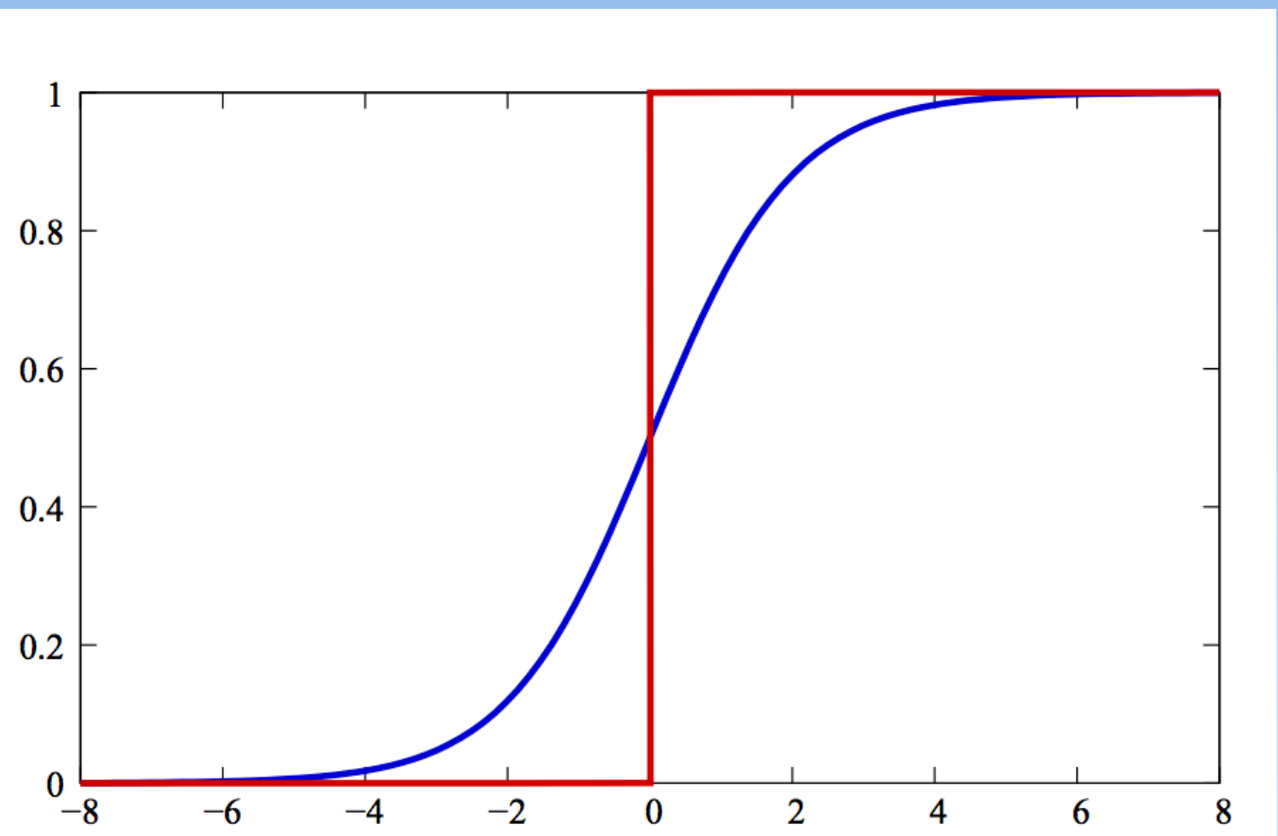
ACTIVATION FUNCTION

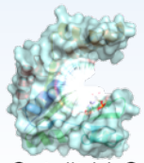




$$f_{log}(z) = \frac{1}{1 + e^{-z}}$$

f_{log} is called logistic function

If f(z) if above a threshold the neuron "fires"



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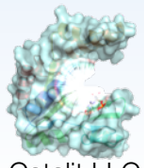
FORWARD PROPAGATION EXAMPLE

FORWARD PROPAGATION EXAMPLE

FORWARD PROPAGATION EXAMPLE

Should I go out surfing?



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FORWARD PROPAGATION

Sun	T	Surf
Yes	72	Yes
No	78	Yes
No	65	No
Yes	59	No

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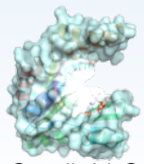
DEFINE THE NETWORK

- How many input units?
- How many output units?
- How many weights?
- How many biases?
- Which activation function?



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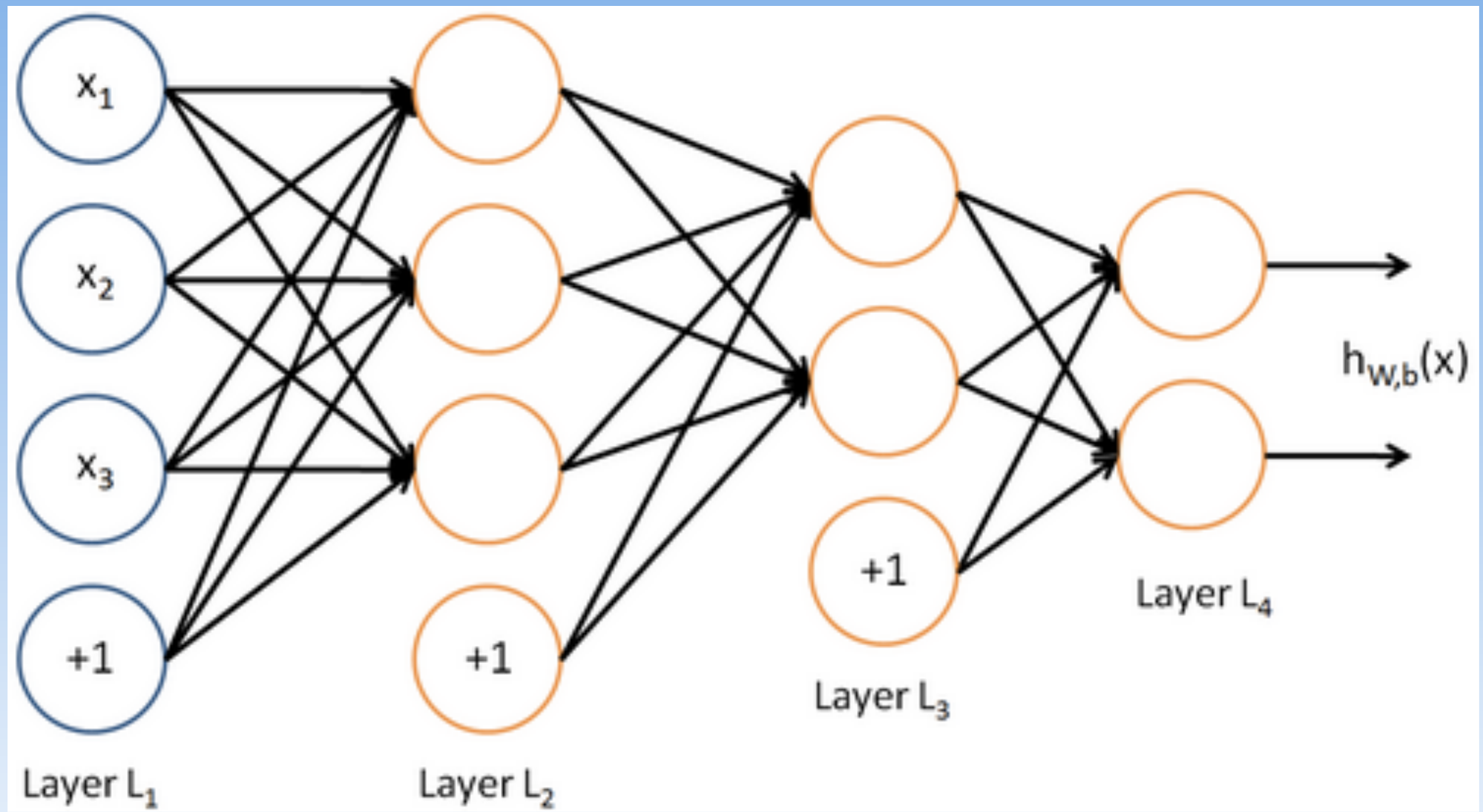
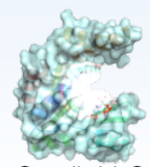
HIDDEN LAYERS (DEEP)



Fully connected neural network



ONE HOT ENCODING

Surf
Yes
Yes
No
No

Surf_Yes	Surf_No
1	0
1	0
0	1
0	1

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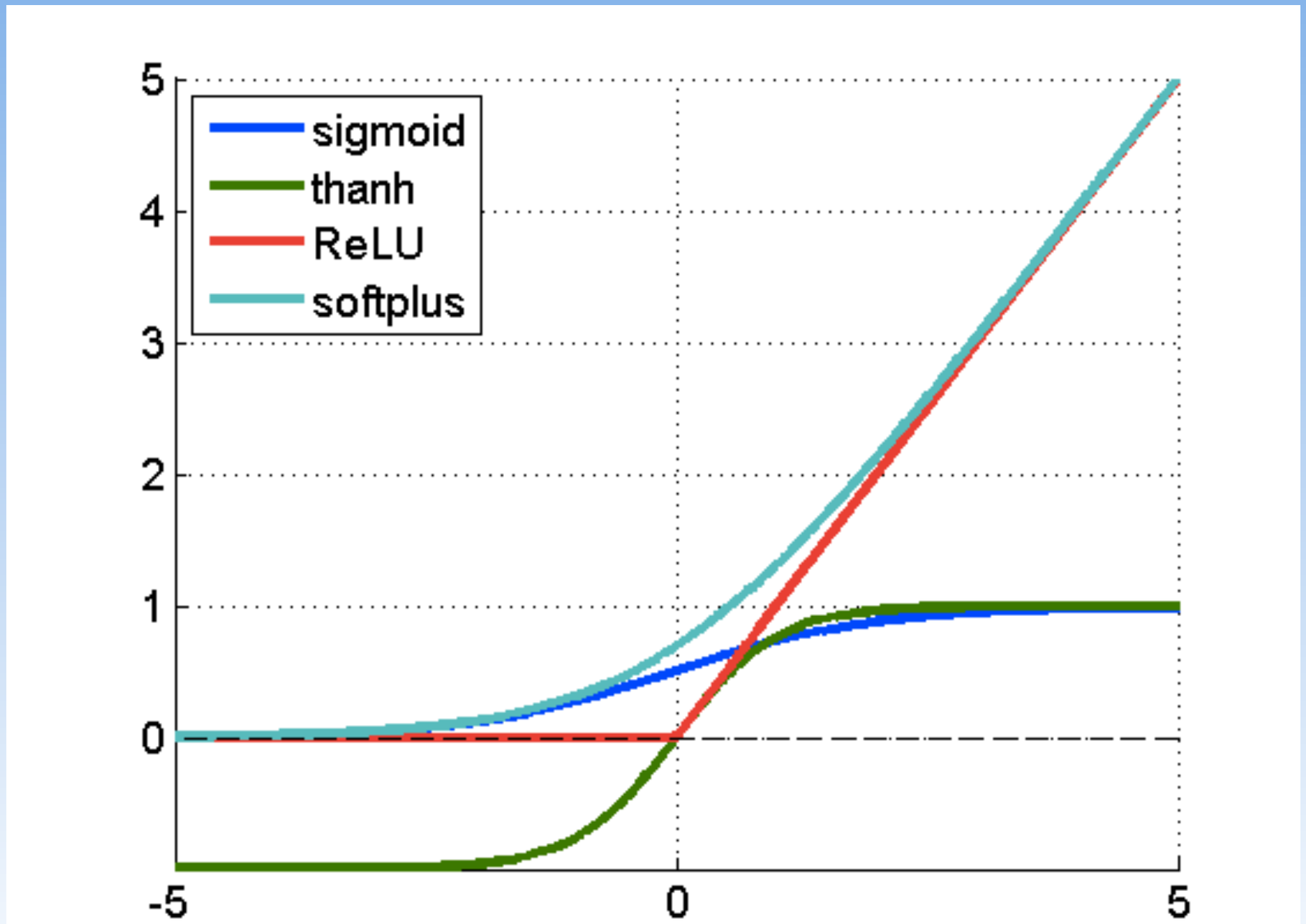
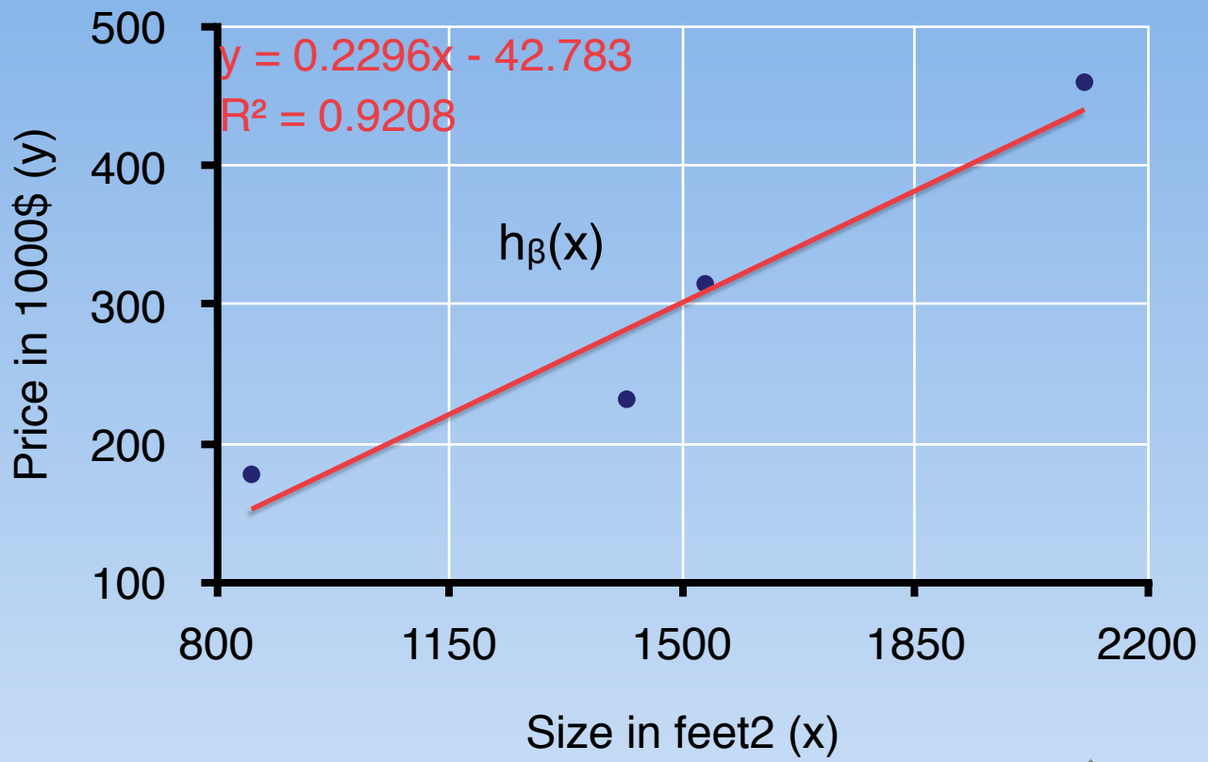
ACTIVATION FUNCTIONS

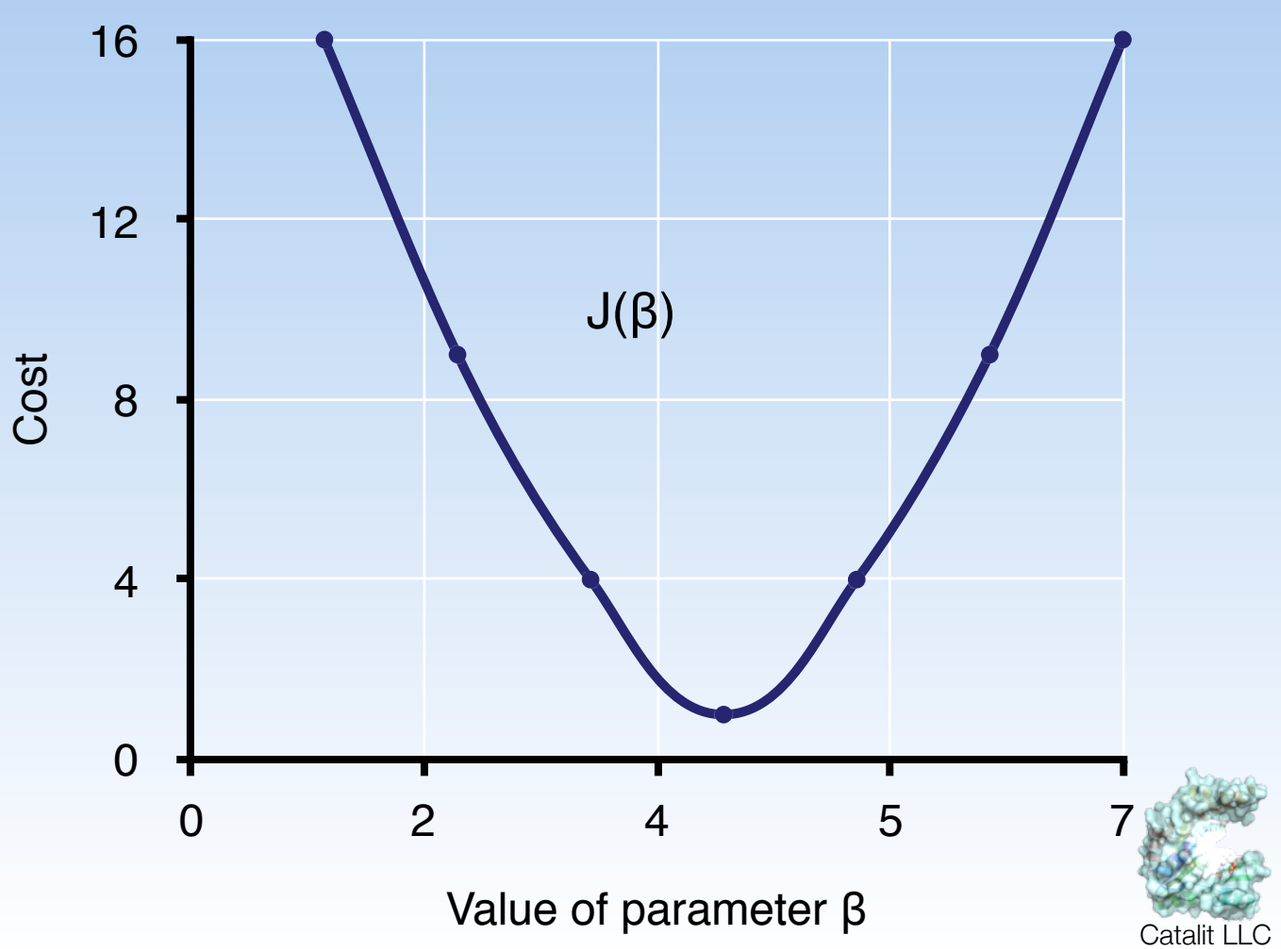


LOSS FUNCTION



Define Hypothesis
Define Loss Function

Minimize Loss



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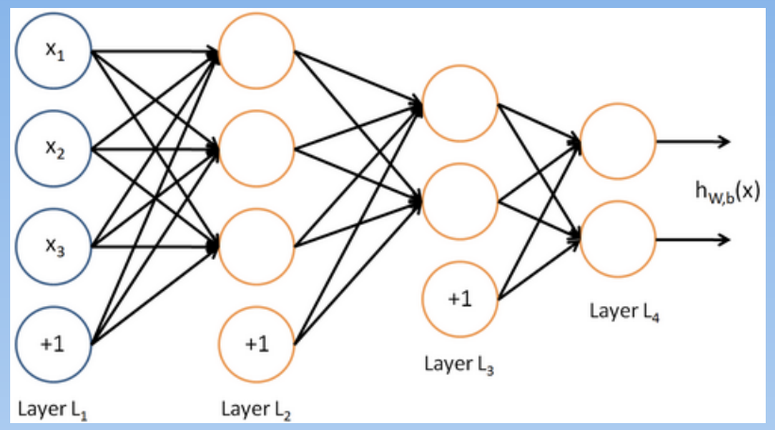
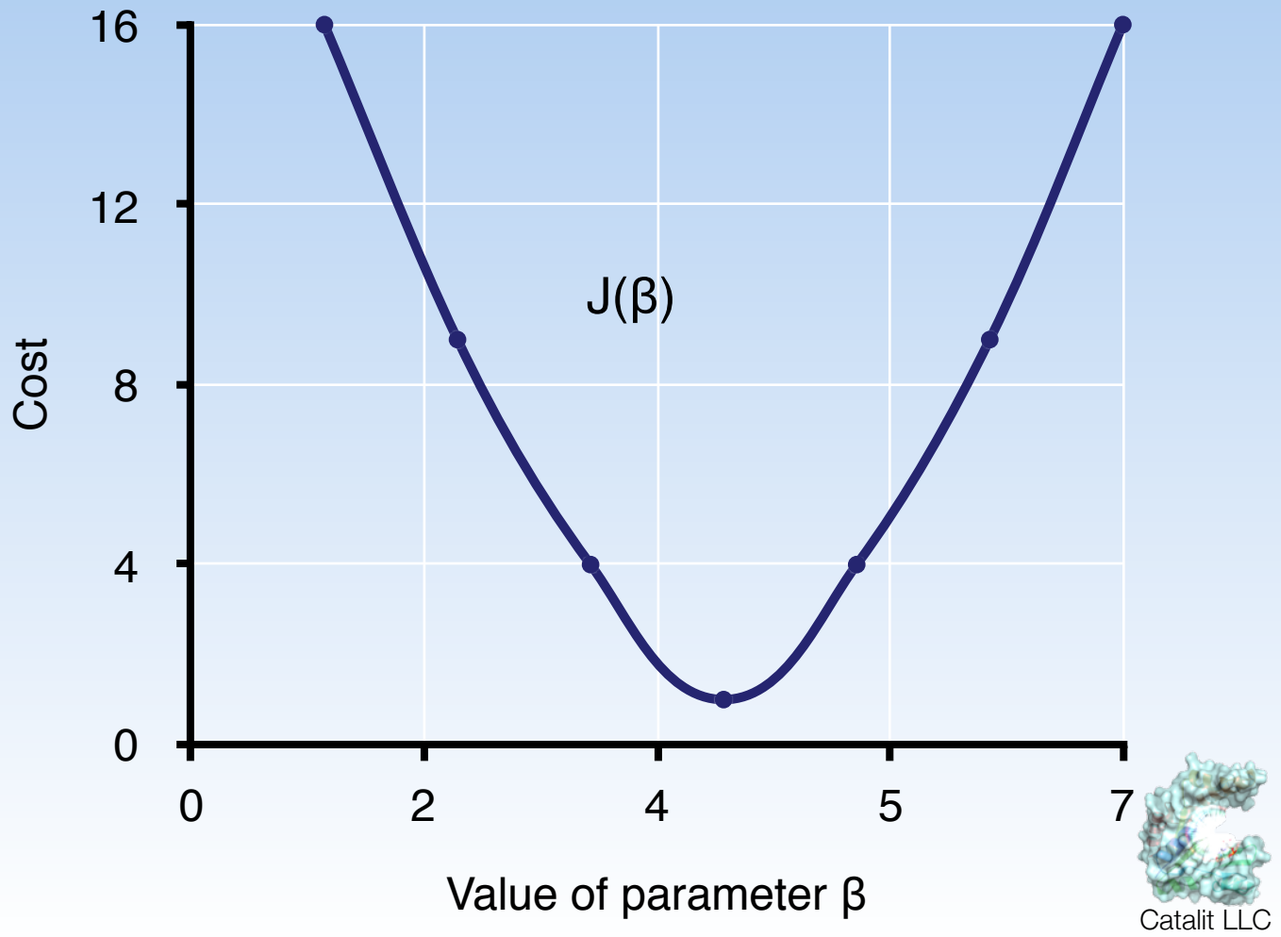
LOSS FUNCTION



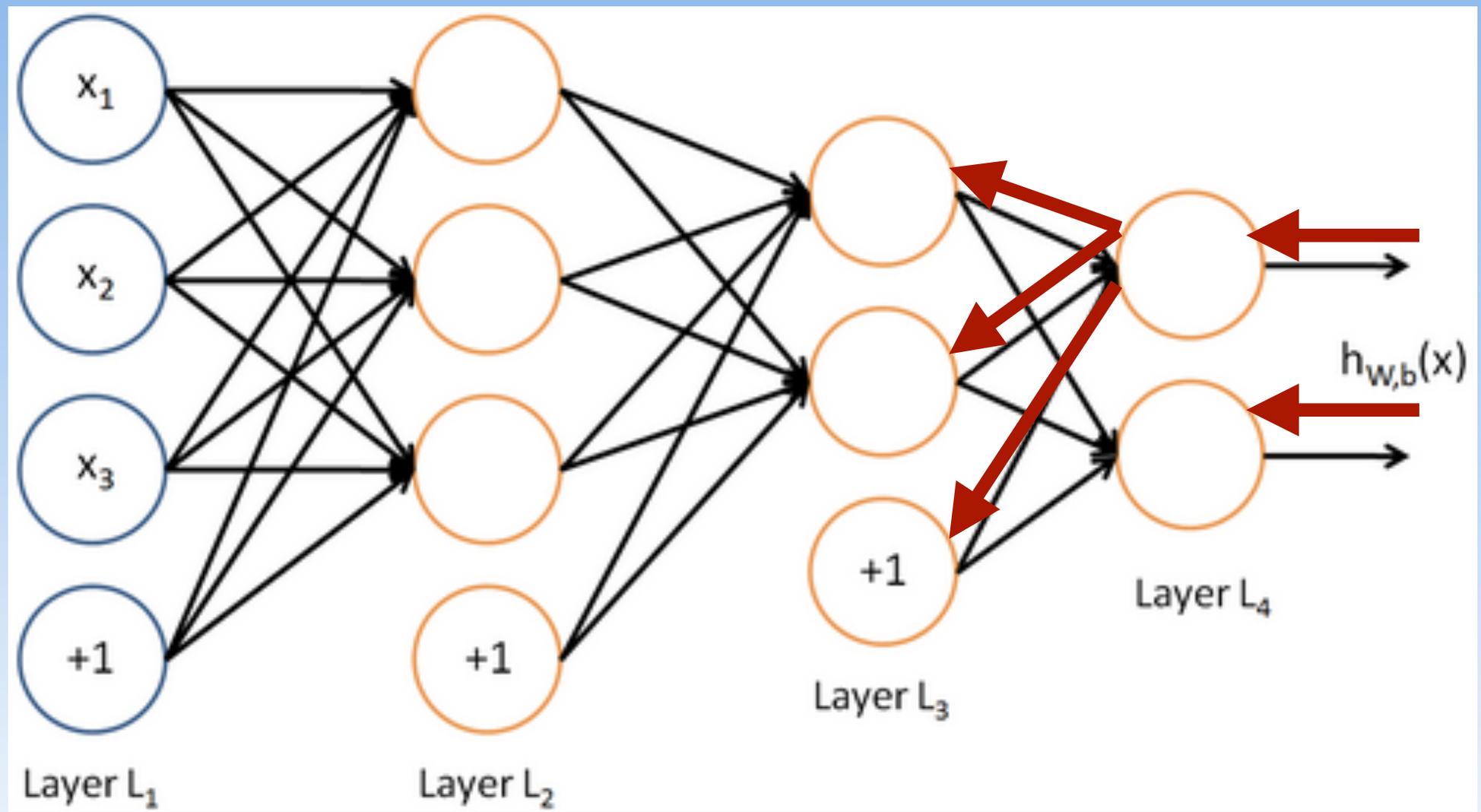
Define Hypothesis
Define Loss Function

Hypothesis is more complicated

Minimize Loss Function

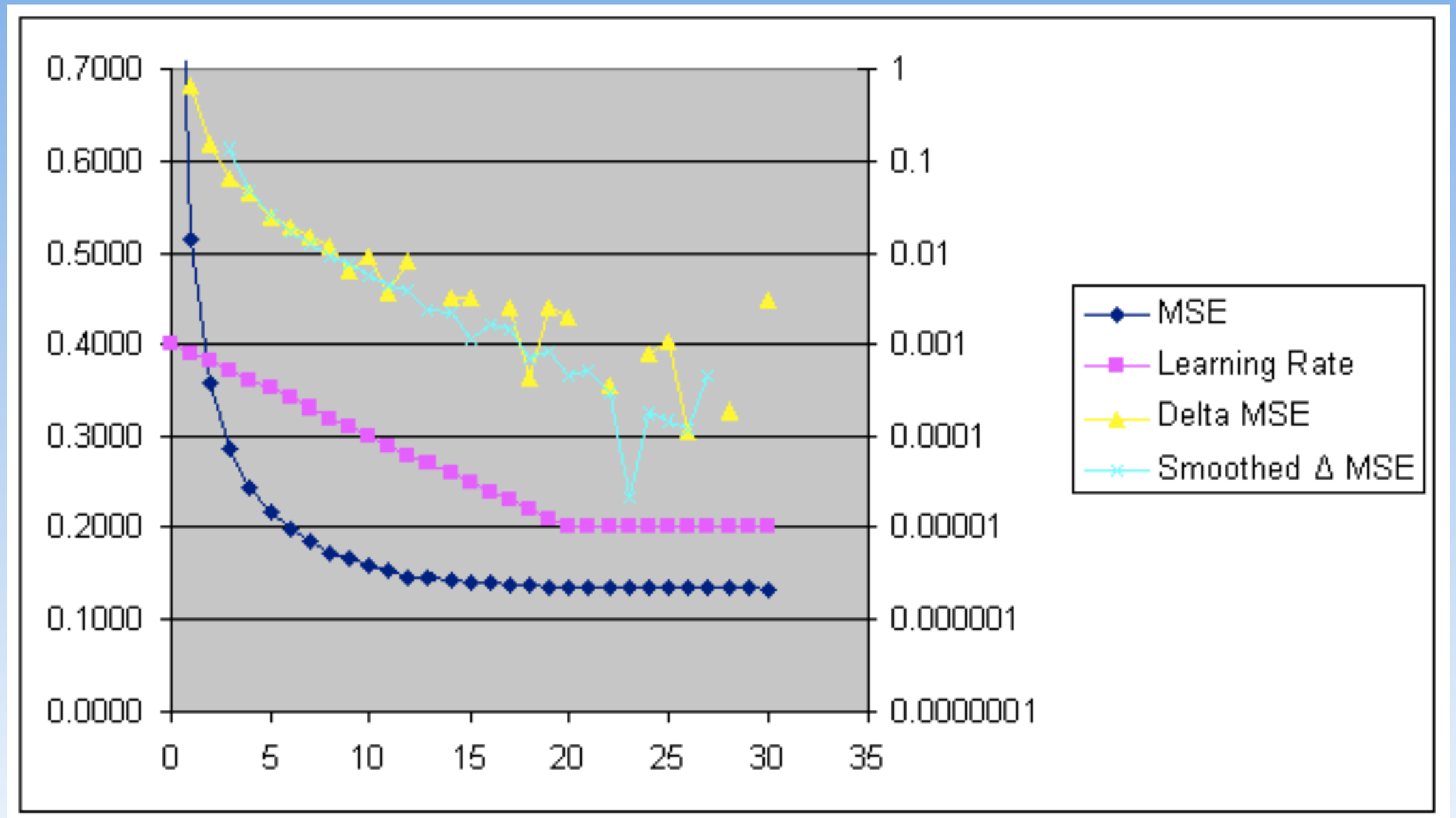


BACKPROPAGATION



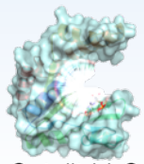
Compare expected output with actual output

EPOCHS


0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0000
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
0
5
10
15
20
25
30
35
MSE
Learning Rate
Delta MSE
Smoothed Δ MSE

MASTER FORMULA

model = data + structure + loss + optimizer



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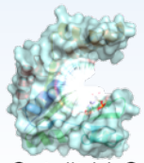
LAB



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