



Neural Network

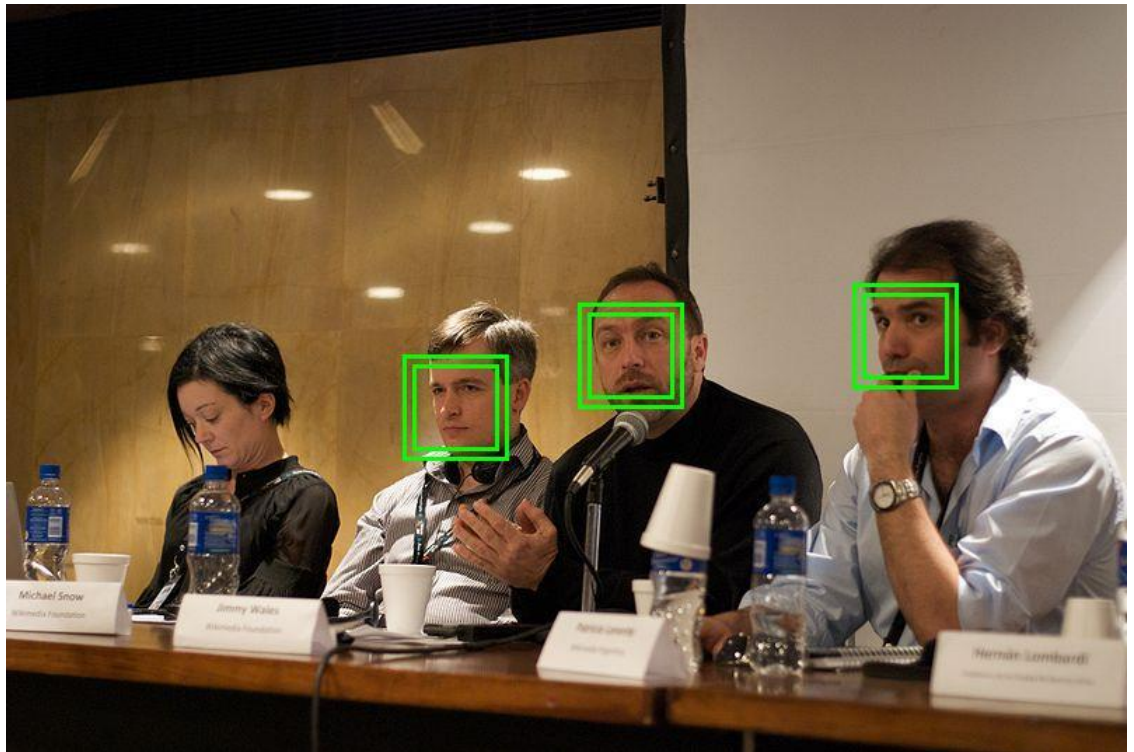
RECOGNITION

Face detection

Haar features + Support Vector Machine

Principal Component Analysis

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Recognizing handwritten text

Here's an example of my normal handwriting. Notice.

What does your handwriting look like?
If you are tagged - repeat this message
in your handwriting and tag 10 people.

Lorem ipsum dolor sit amet, consectetur adipiscing elit,
sed diam nonummy nibh euismod tincidunt ut laoreet ut
dolor magna aliquam erat, sed diam voluptua. Ut vero
ras et accusam et justo duo dolores et ea rebum. Hot
dita haed quibergun, no sea takimata sanctus est
Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet.

2. add that four the number to 100.
3. As that sum.

Les hermines m'ont en de planty
du la famille du hamigane.
Ce un des arbrisseaux dicidylidanes
a fleurs le plus sauent meures ou
violettes disposées en épis d'un la plupart

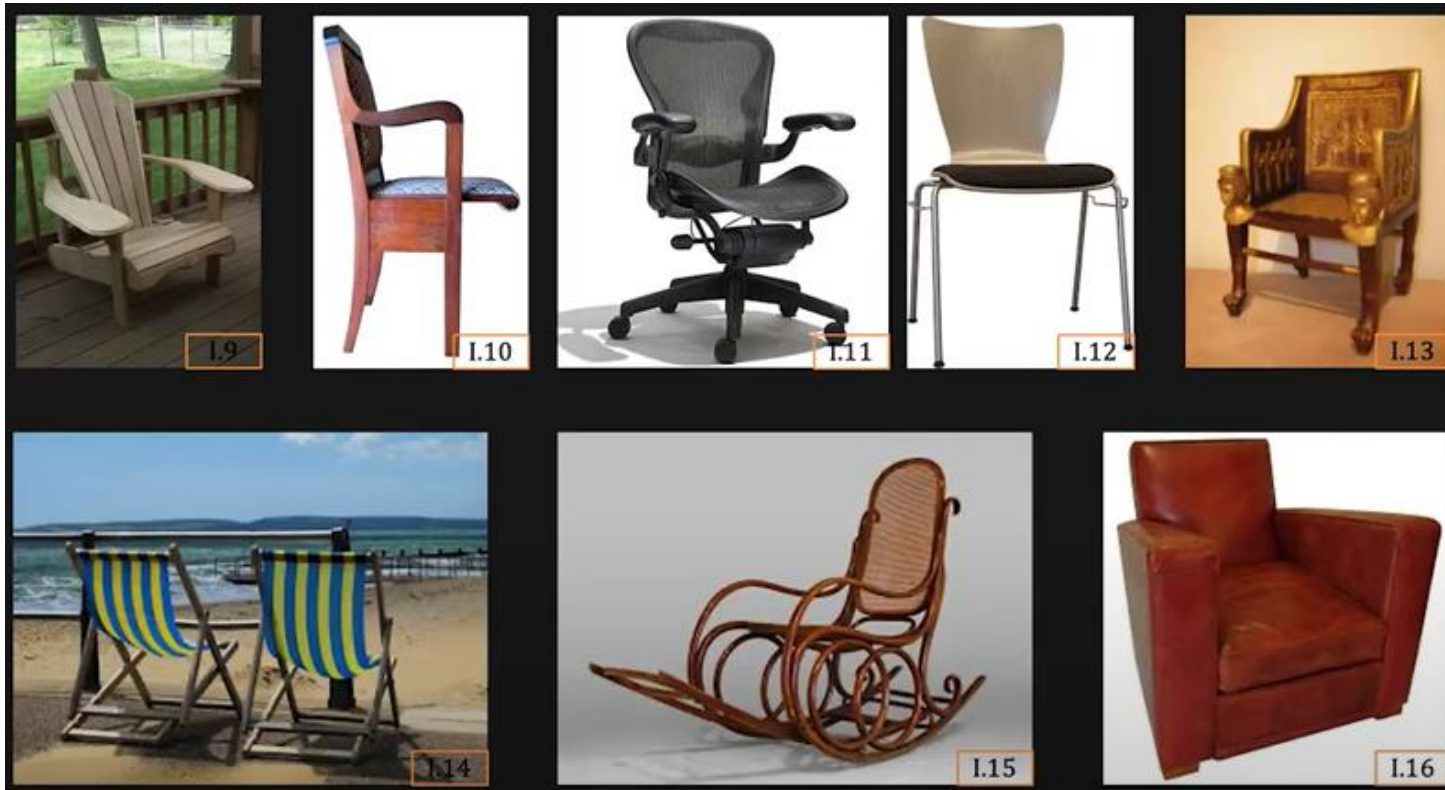
Where are the songs of Spring? Where are they?
Think not of them, thou hear'st the music too.

I am very grateful to you for the
kindness used me. I remember you with
last pleasure and all friends I found
on that factor. Will you remember
me to all, girls specially, would like
a sweet m. souvenir and give on the

A time there was, ere England's
griefs began,
When every root of ground main-
tained its man,

Fri. - 1 - off to continue early
this A.M. Past many English
along the road. Greeted with
"You can't catch the bloody
buggers". The - I we can't.
Sat. 2 - Up early this A.M. & had

Recognizing Chairs



Neural Networks

Perceptron (linear)

Perceptron Network (linear)

Activation function

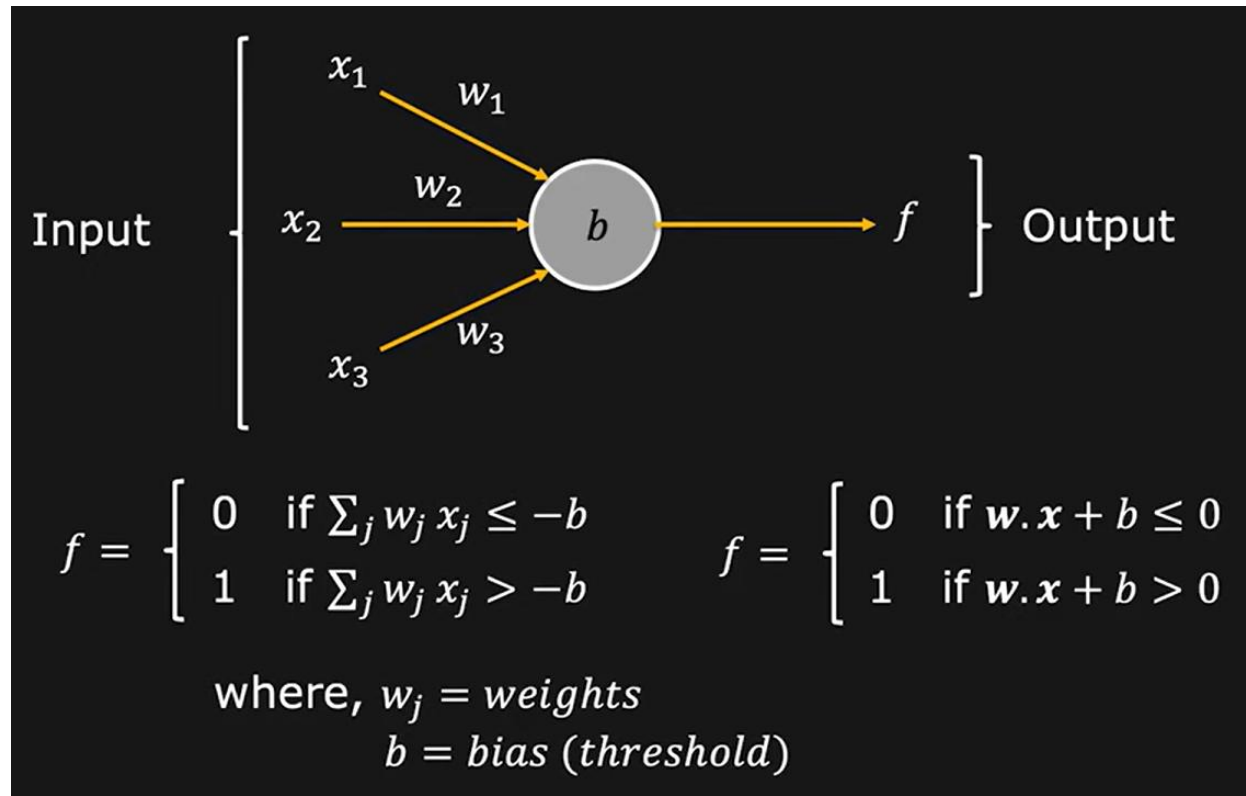
Sigmoid neuron

Neural Network

Gradient Decent

Backpropagation Algorithm

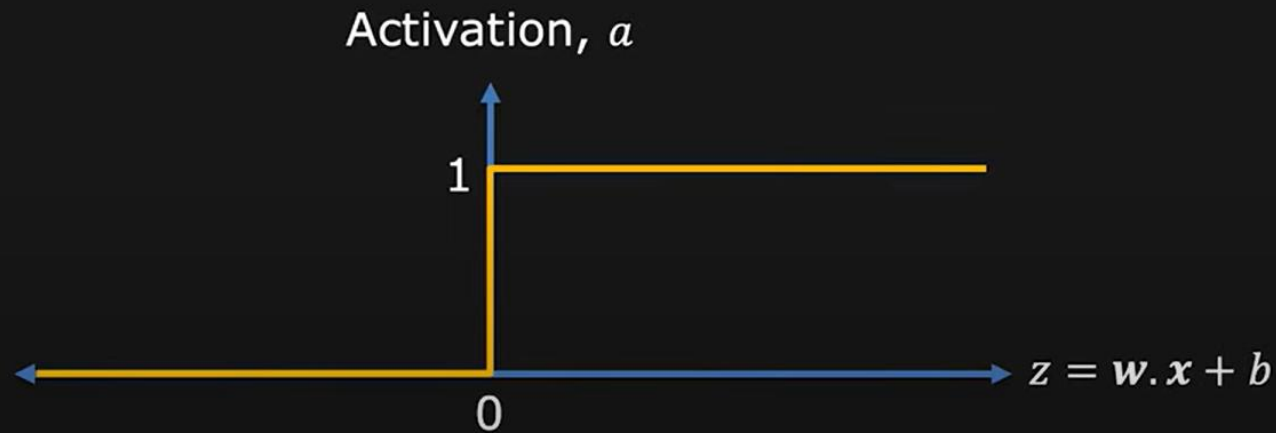
Perceptron



Activation function of Perceptron

Let: $z = \mathbf{w} \cdot \mathbf{x} + b$

$$\text{Activation: } a = f(z) = \begin{cases} 0 & \text{if } z \leq 0 \\ 1 & \text{if } z > 0 \end{cases}$$



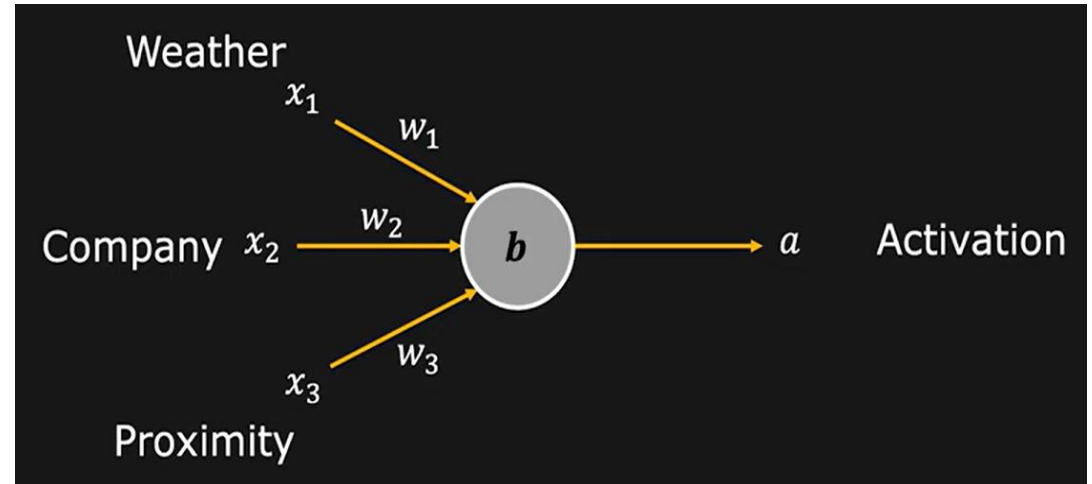
Perceptron: Example

Will you go to movie?

x_1 : Is the weather good?

x_2 : Do you have company?

x_3 : Is the theatre nearby?



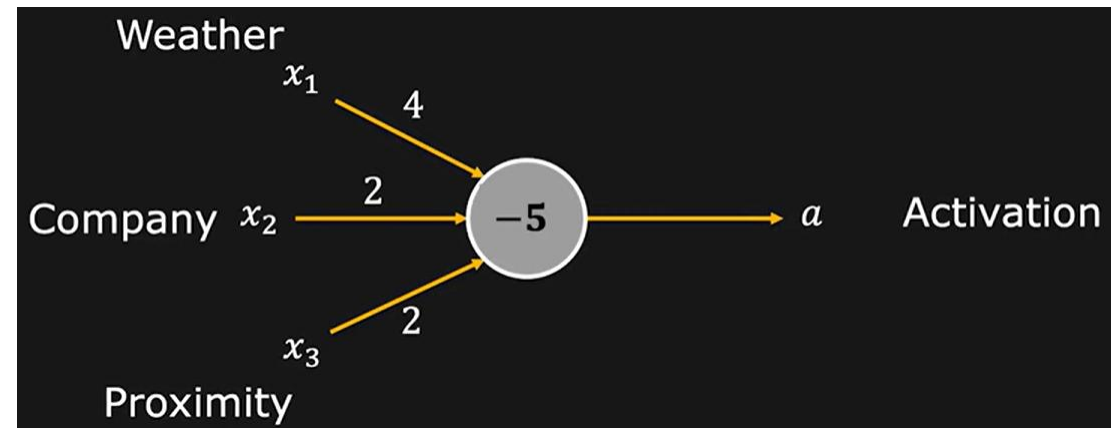
Perceptron: Example

Will you go to movie?

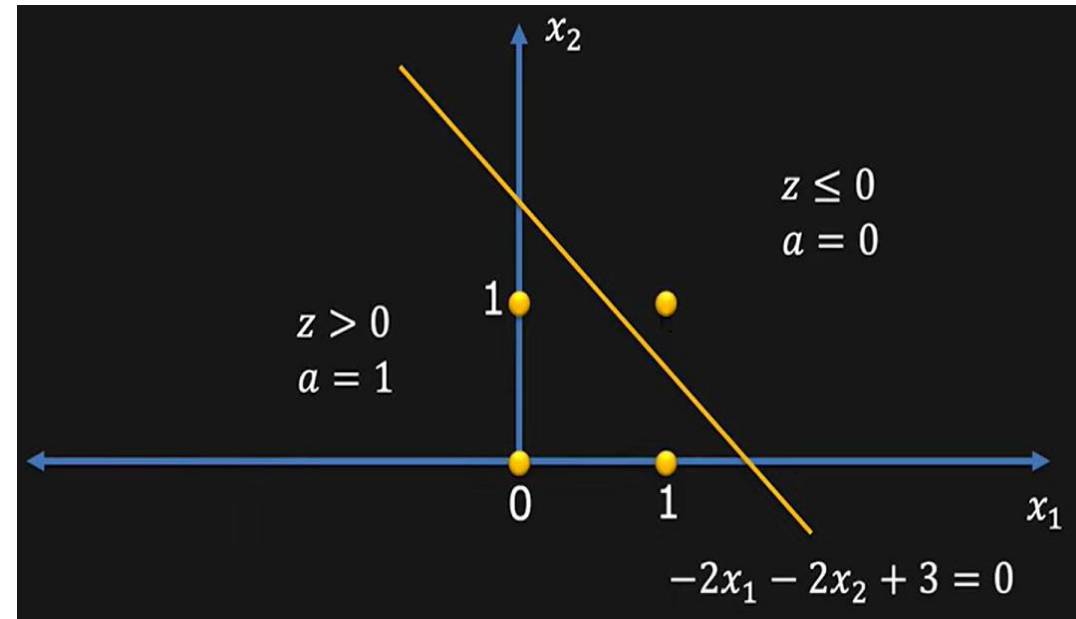
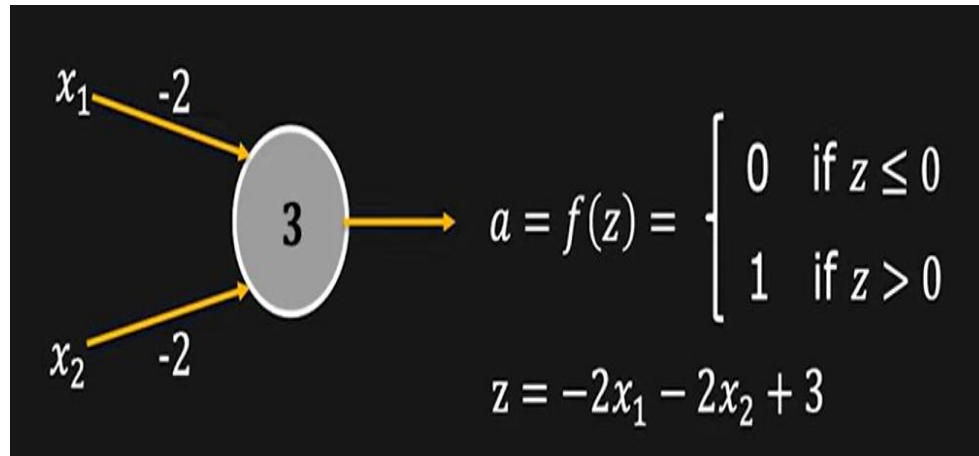
x_1 : Is the weather good?

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Perceptron as linear classifier

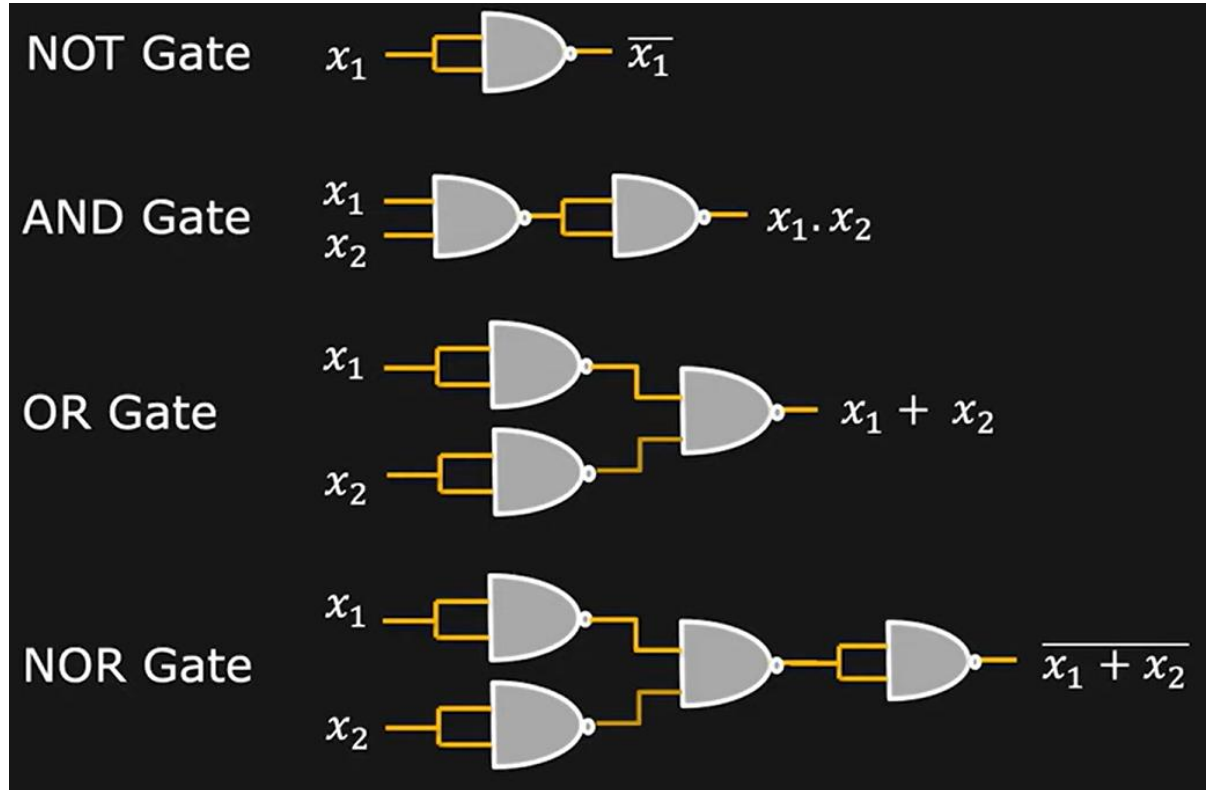


Perceptron as NAND gate

x_1	x_2	a
0	0	1
0	1	1
1	0	1
1	1	0

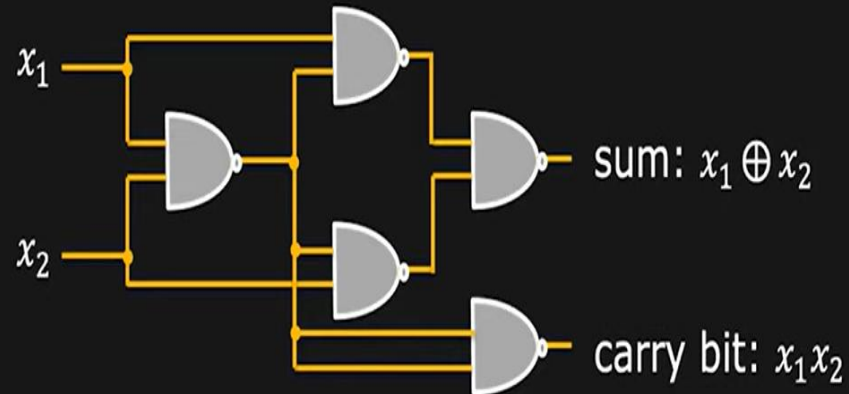


NAND: Universal Logic Gate

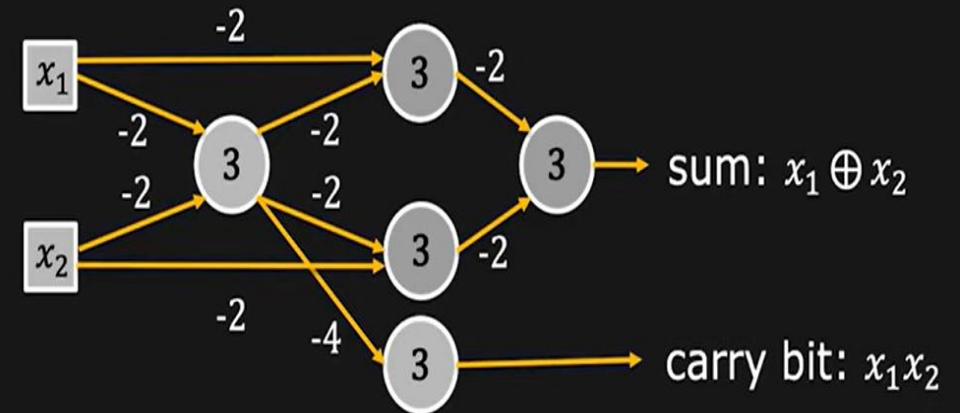


Perceptron: 1-bit binary adder

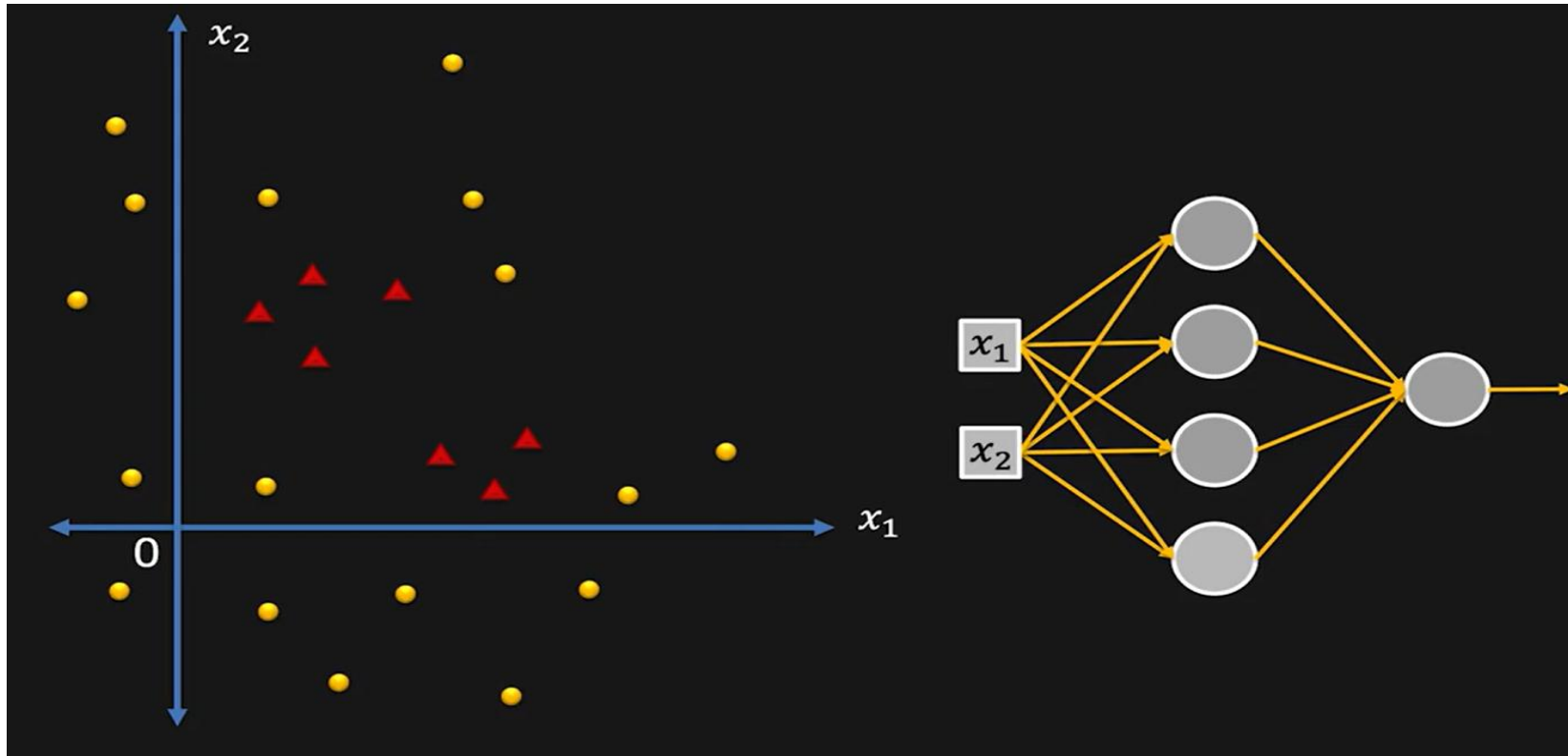
Digital Logic Circuit



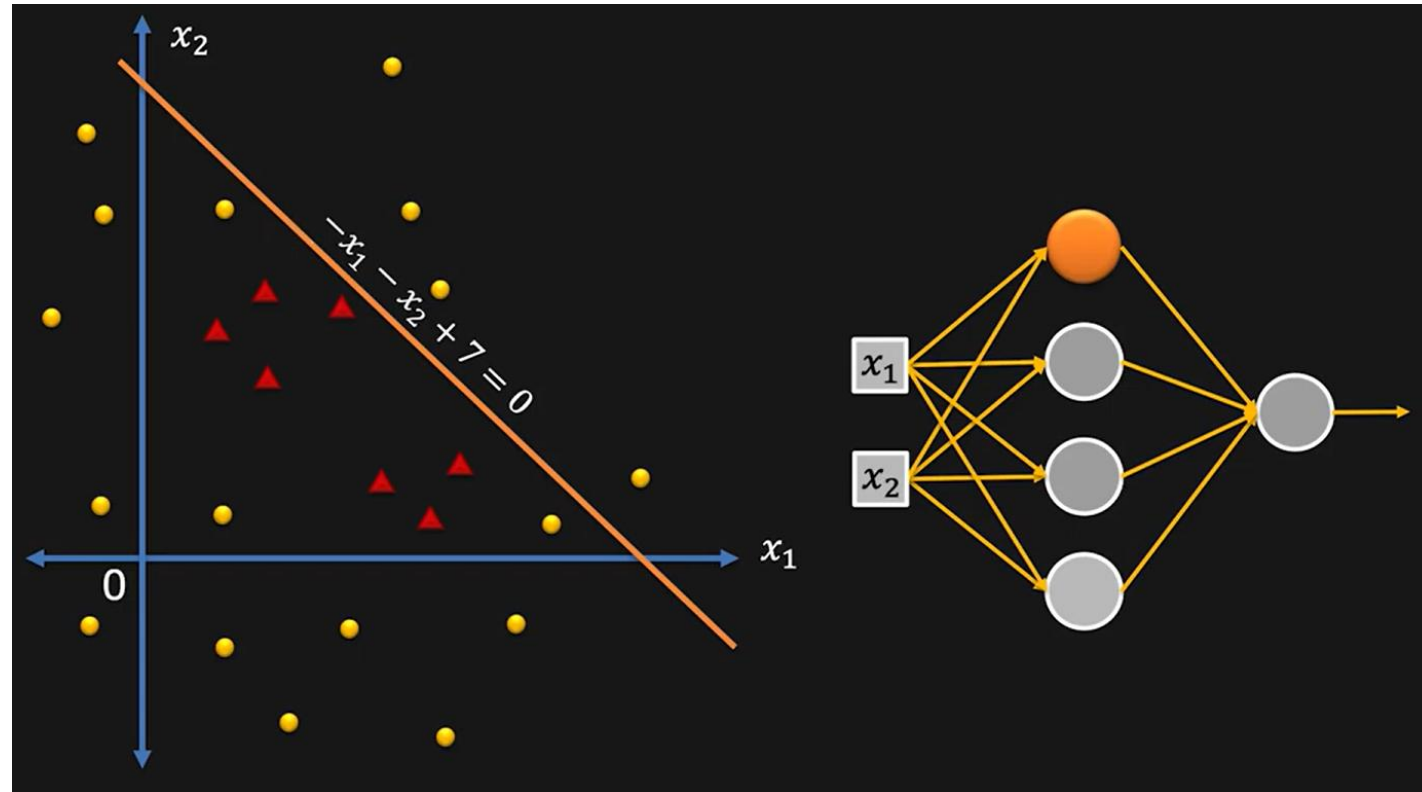
Equivalent Perceptron Network



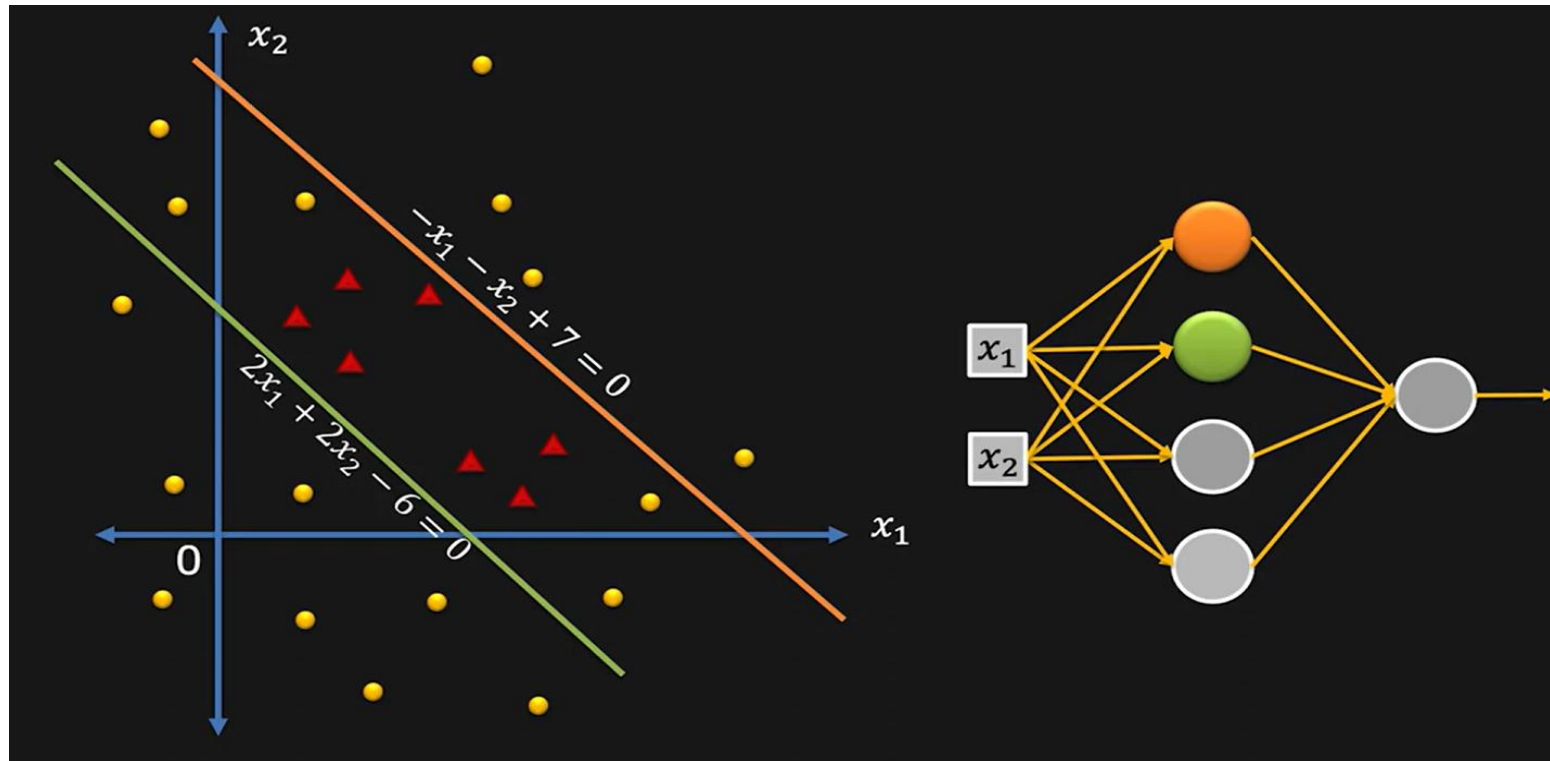
Linear Classifier for Complex Regions



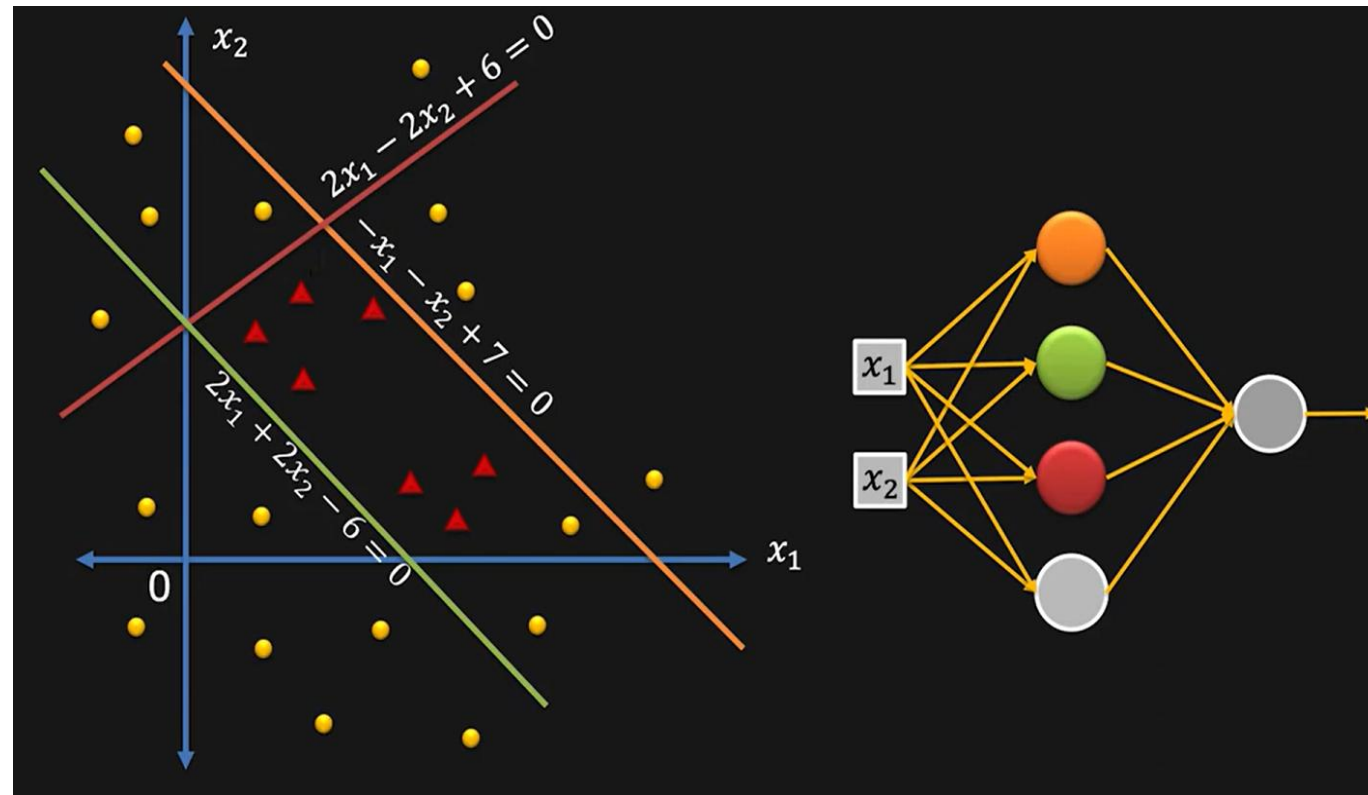
Linear Classifier for Complex Regions



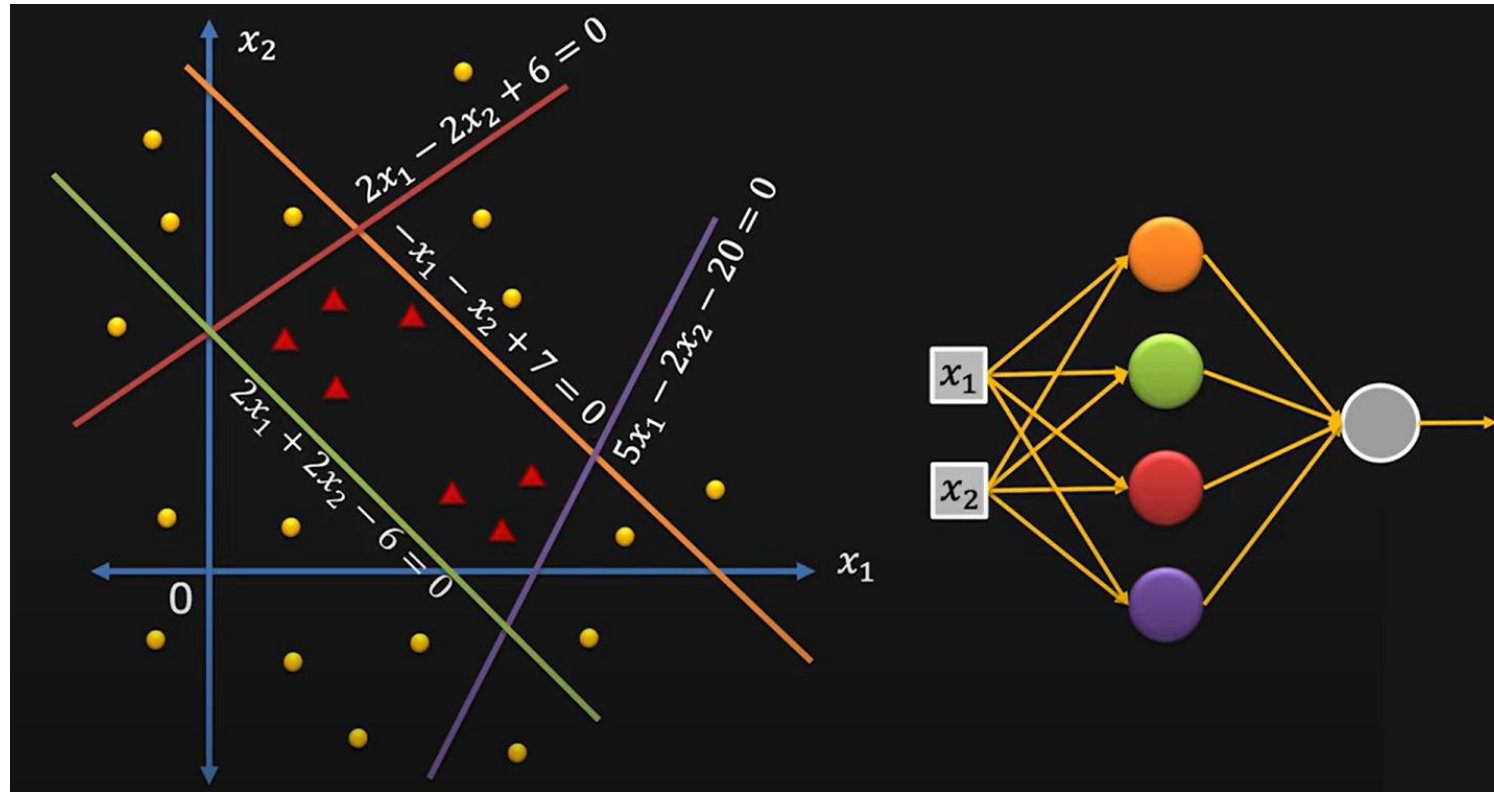
Linear Classifier for Complex Regions



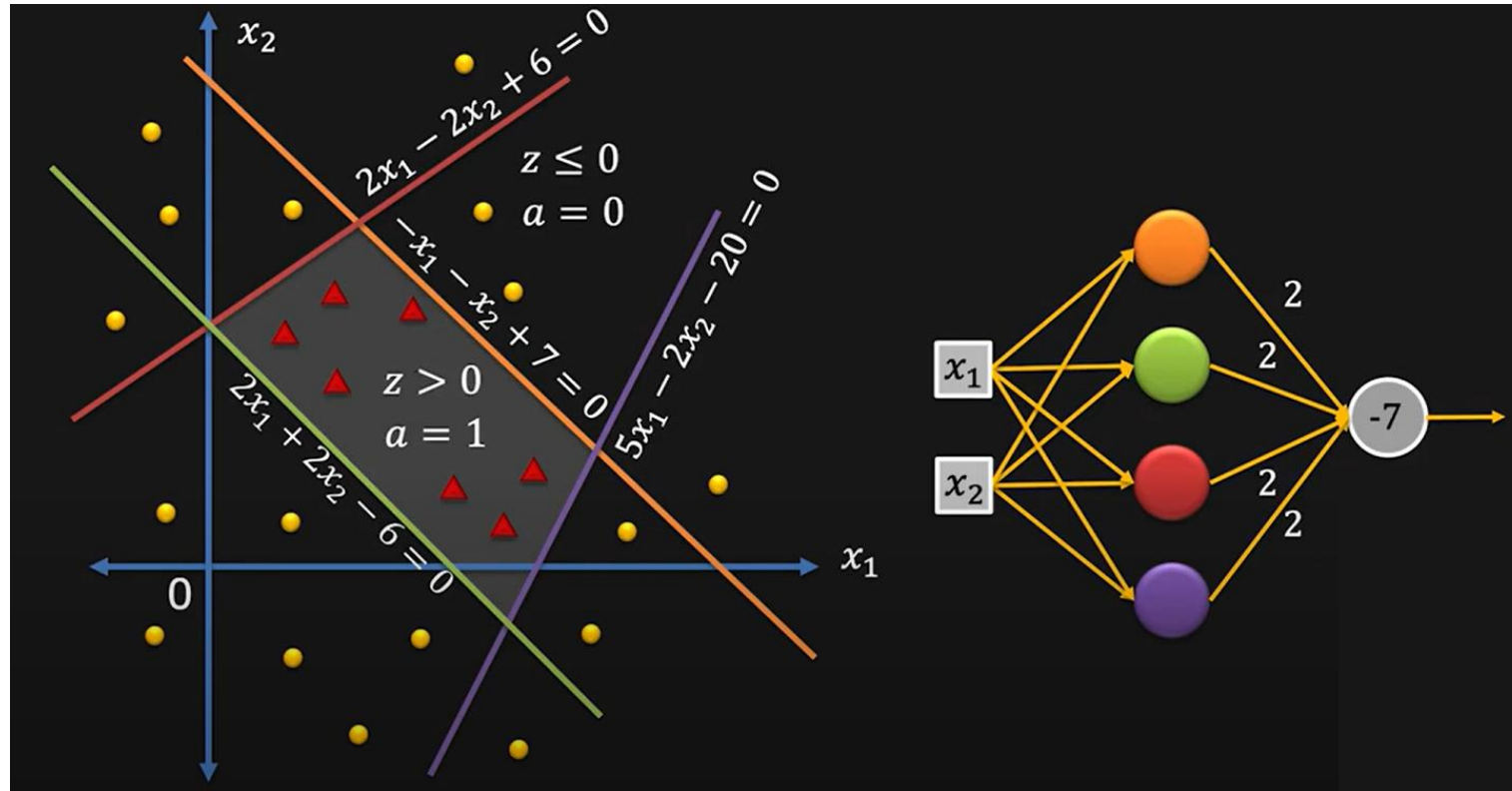
Linear Classifier for Complex Regions



Linear Classifier for Complex Regions



Linear Classifier for Complex Regions



Multi-layer Perceptron Network

