

Deep Learning

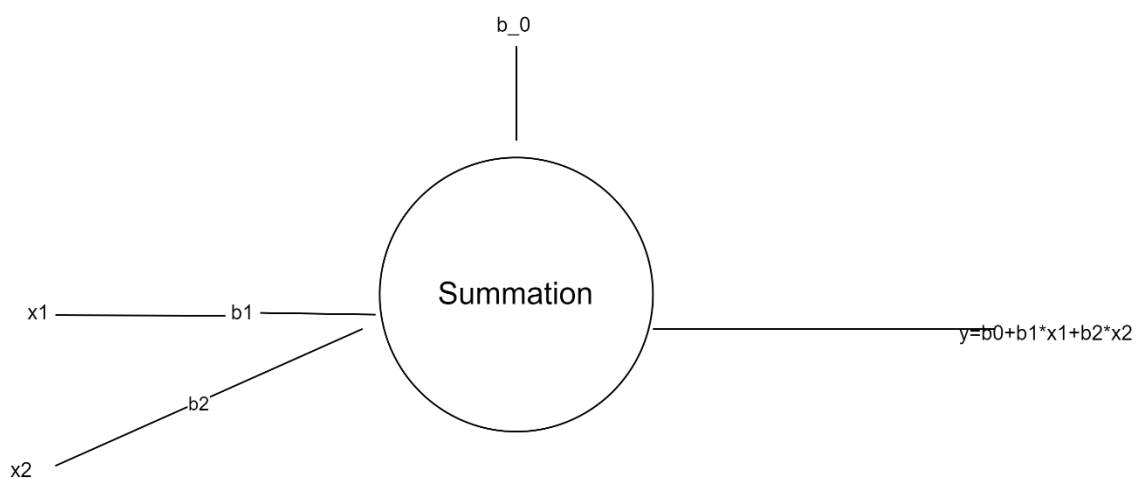
- 1) ANN: Artificial Neural network (DNN)
All the kind of ML problems we can achieve using DNN
- 2) CNN: Convolution Neural network
All the kind of Image problems
Object detection
Video annotation
- 3) RNN: Recurrent Neural Network
Related To NLP problems

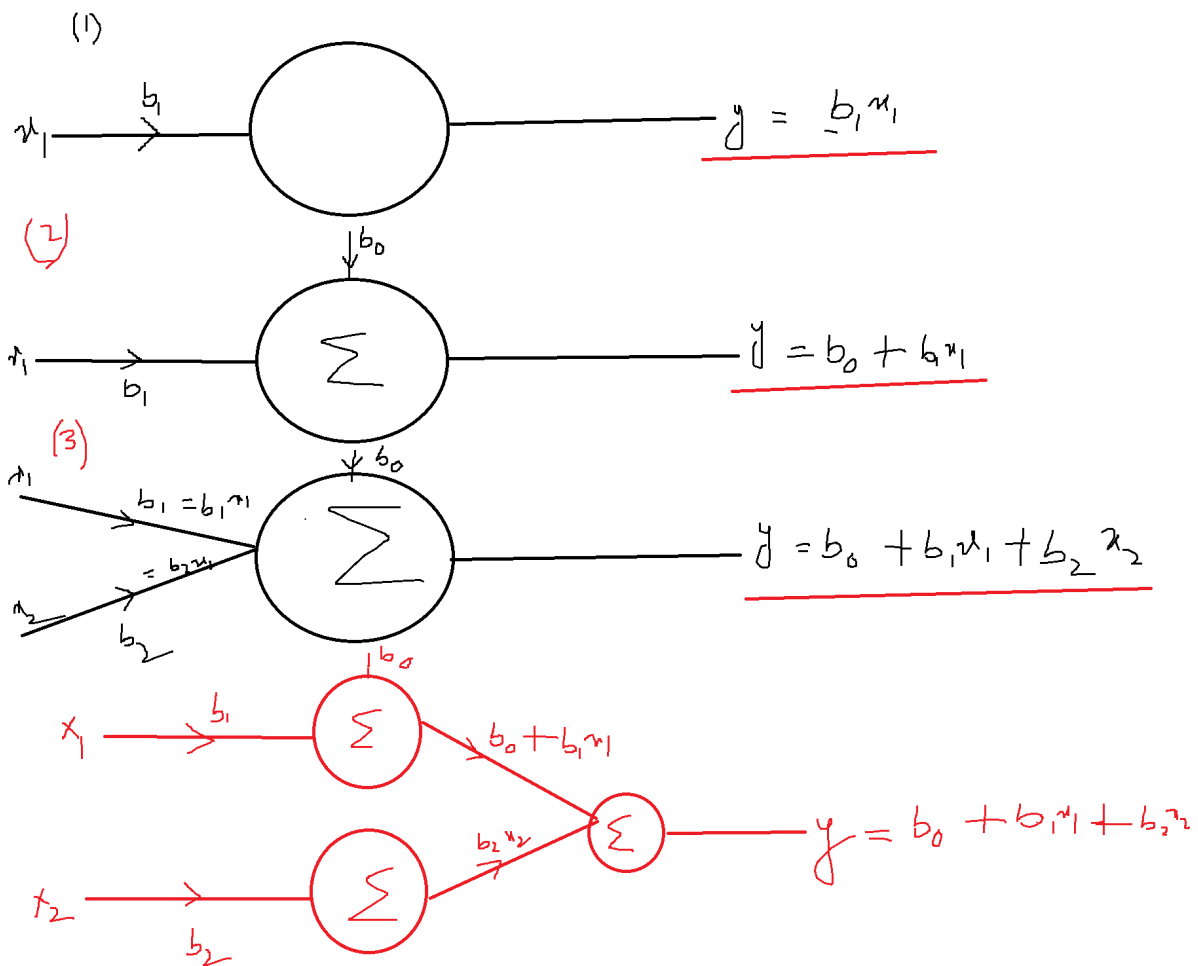
If you want to understand about Neural networks
You need to understand about Neuron
What's happening inside the Neuron

Linear regression help

$$Y = b_0 + b_1 * x_1 + b_2 * x_2 + b_3 * x_3 + \dots + b_n * x_n$$

$$Y = b_1 * x_1$$





If you observe in the above neurons, we are just passing the inputs

It is kind of Linear combination of inputs

$B_1 * x_1 + b_2 * x_2 + b_3 * x_3 =$

Our model will not identify the patterns

Imagine our brain : So many neurons will available

Each neuron connect with other neurons in such a way, even a complex problem also

Our brain try to get the solution

We need to enhance the neuron, with Non linear property

There two types maths:

1) Linear maths

Passing the output

2) Non linear maths

It is able to understand the pattern

Imagine Logistic Regression Problem

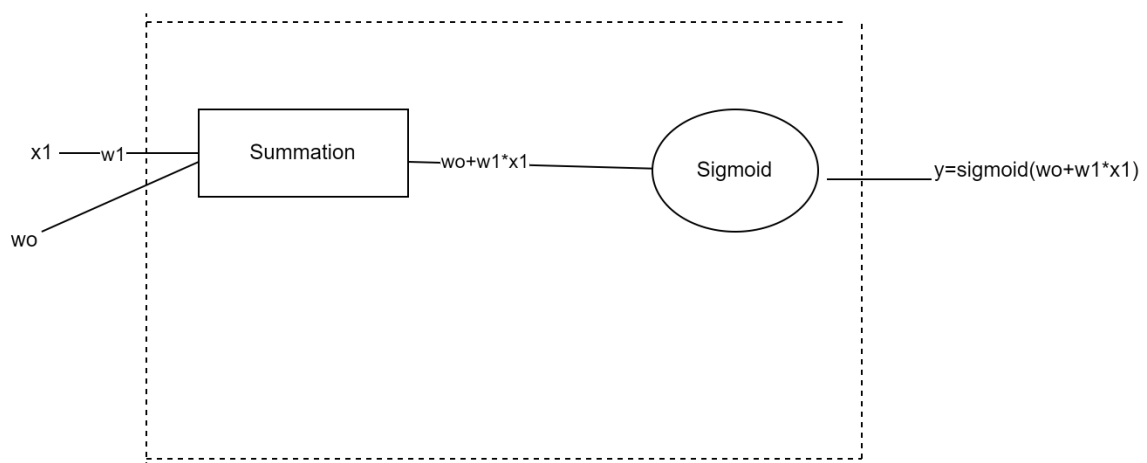
Step-1: We have input let assume we have input : x_1

Step-2: We have one weight for x_1 : w_1

Step-3: We have bias : w_0

Step-4: Linear combination: $w_0 + w_1 * x_1$

Step-5: $\text{Sigmoid}(\text{LR}) === \text{Sigmoid}(w_0 + w_1 * x_1)$



Neuron= Summation+ Sigmoid

Sigmoid is a function: Non linear function

This is useful to Logistic regression problems

Binary classification problem

There are many Non linear function and Linear functions available

After computation will pass the output to the Non linear function, These Non linear function called

Activation Function

So sigmoid is one of the activation function

We have some activation function available for the specific use case problems

- Sigmoid
- Softmax
- Tanh
- ReLU

Every activation function has different equation, provides a different use case

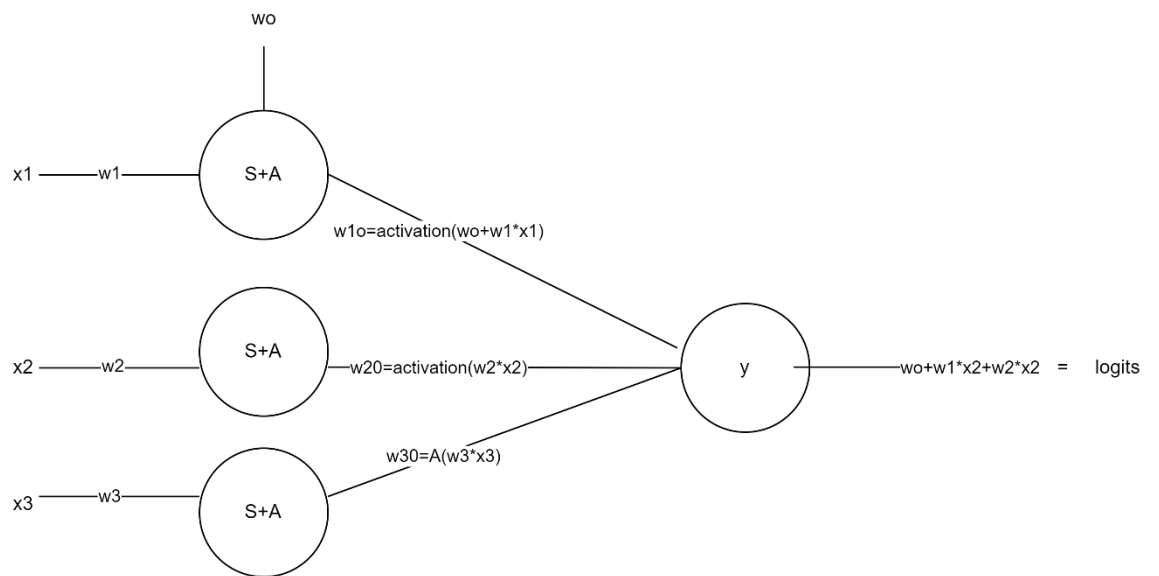
From the overall thing all Deep learning problems

Is what happens inside the Neuron

Inside the neuron there two operation

- Summation
- Activation

Neuron-operation= Summation + Activation

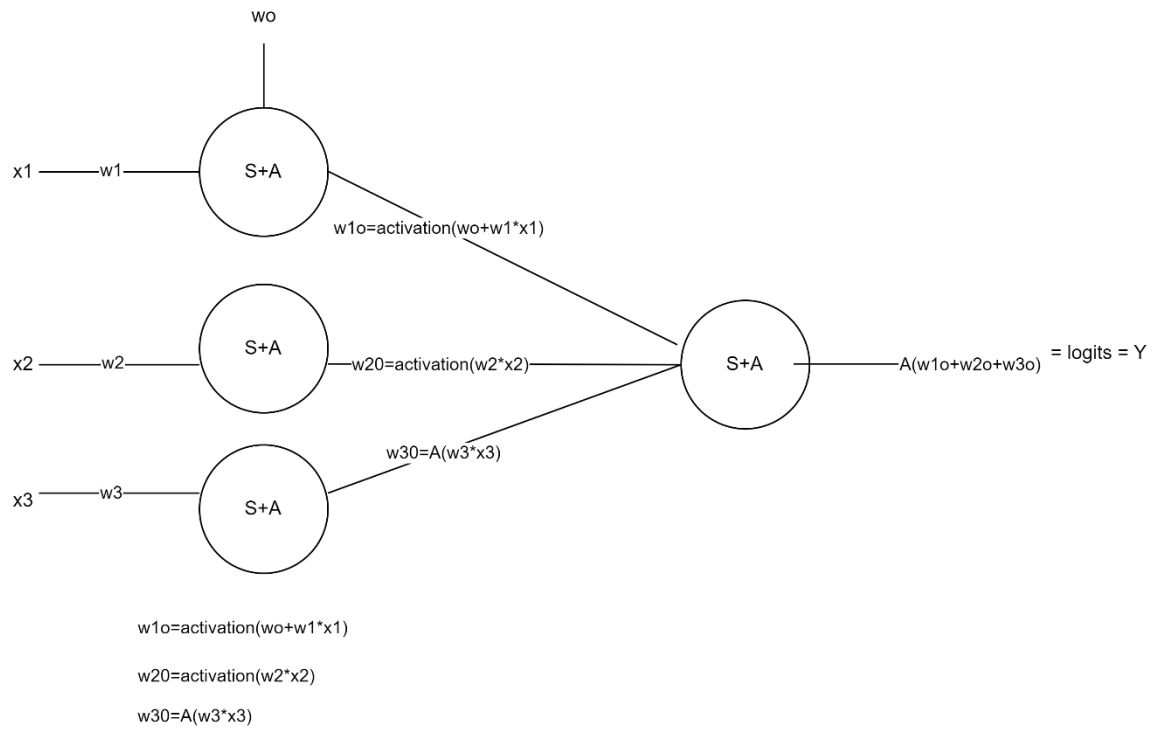


$$w_{1o} = \text{activation}(w_o + w_1 \cdot x_1)$$

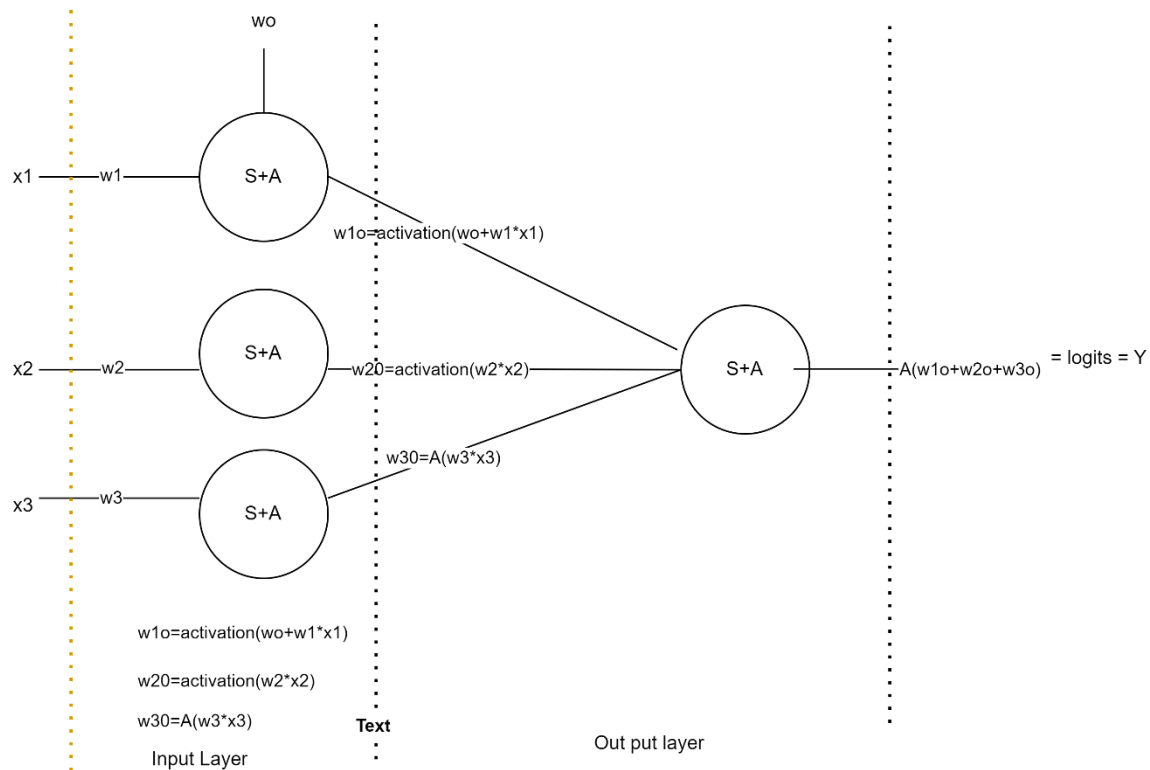
$$w_{2o} = \text{activation}(w_2 \cdot x_2)$$

$$w_{3o} = A(w_3 \cdot x_3)$$

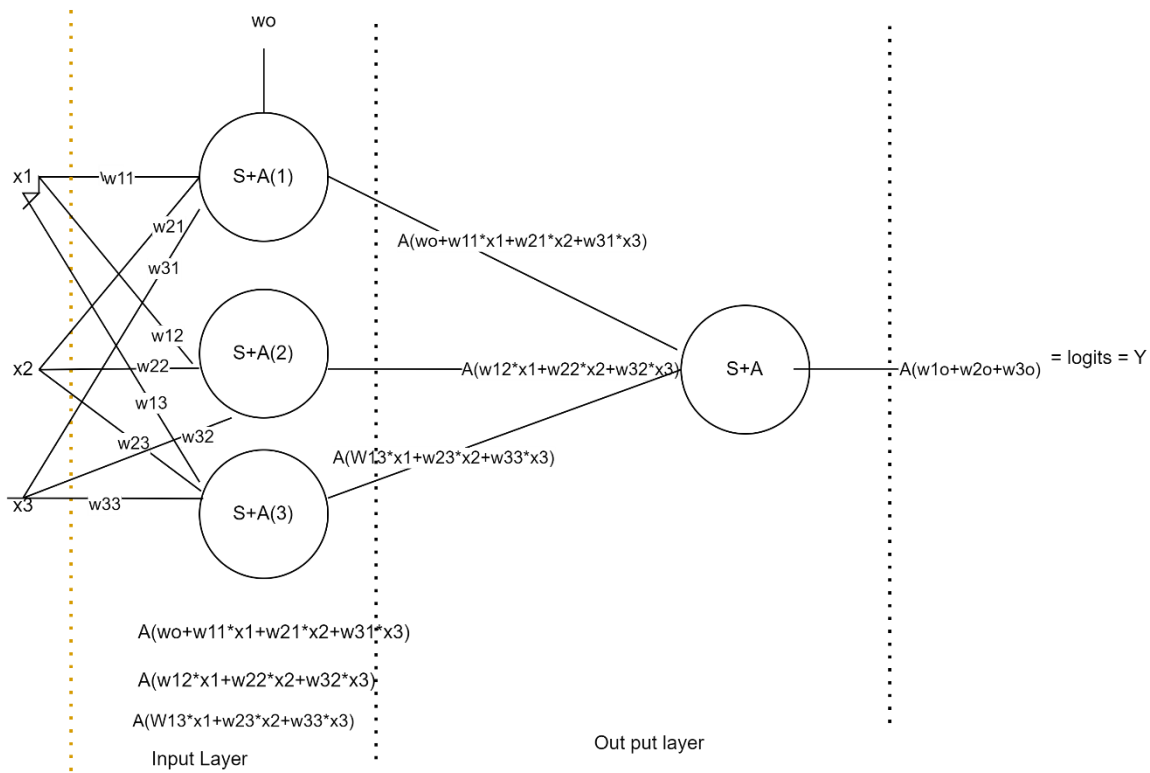
$$y = \text{activation}(w_{1o} + w_{2o} + w_{3o}) = 0 \text{ to } 1$$



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$$y = \text{activation}(w_0 + w_1x_1 + w_2x_2 + w_3x_3) = 0 \text{ to } 1$$

Final Conclusion

For the first layer

Number of coefficients , number of parameters to train is

$$3*3+1= 9+1=10$$