

Introduction to Deep Learning

UTKARSH GAIKWAD

CLASS STARTING SHARP AT 10:10 AM



What is Deep Learning?

As a Human I can
learn from Past
Experiences



Eg.
Learning to ride bicycle

Initially you will fall lot
of times

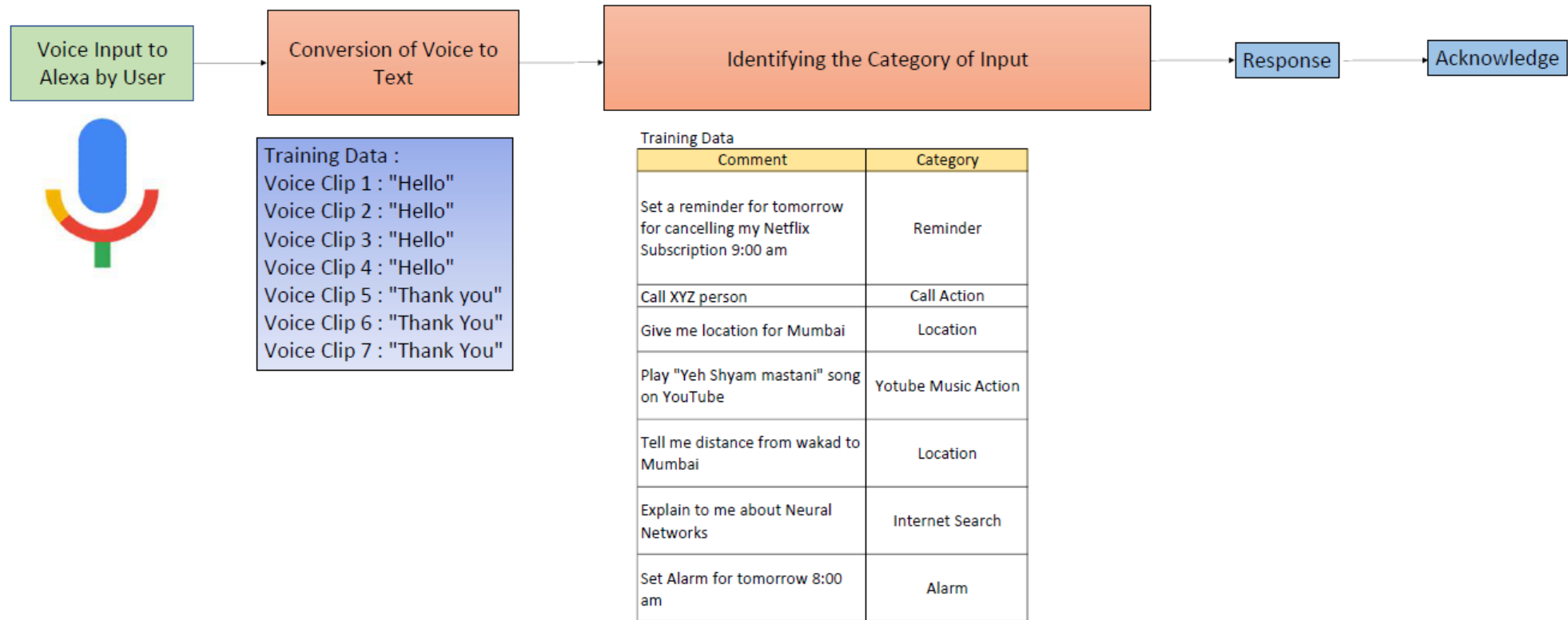
As you practice riding
bicycle more and more
You don't even have to
think

I can Mimic the
human brain with
help of Artificial
Neural networks

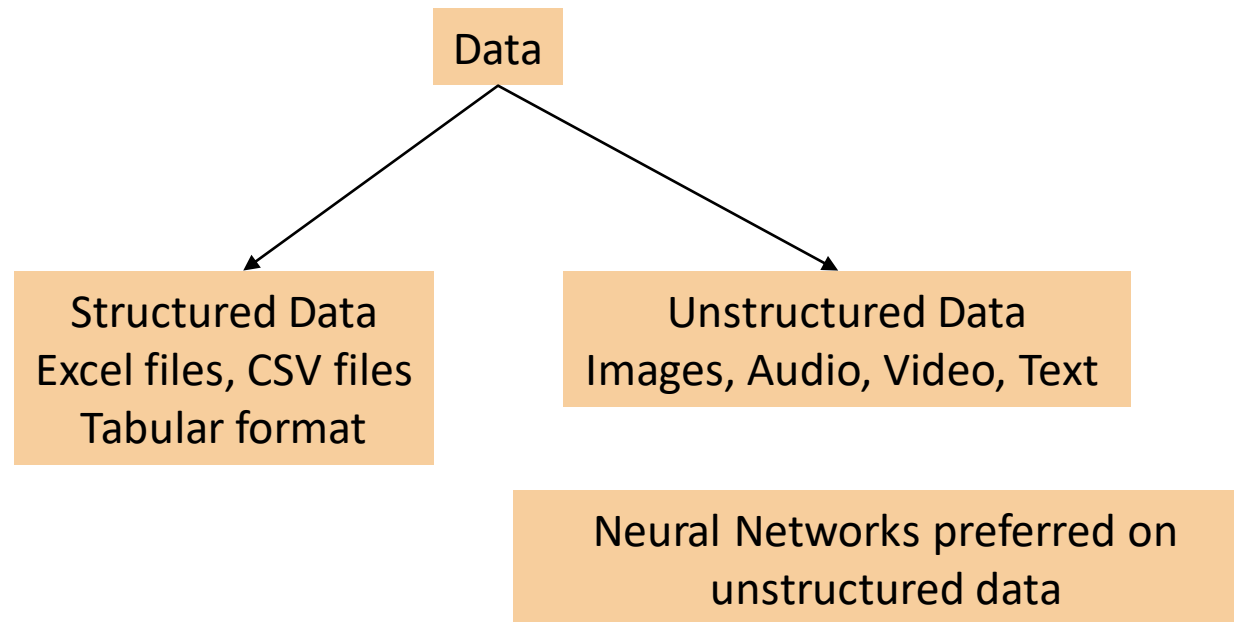
Machine



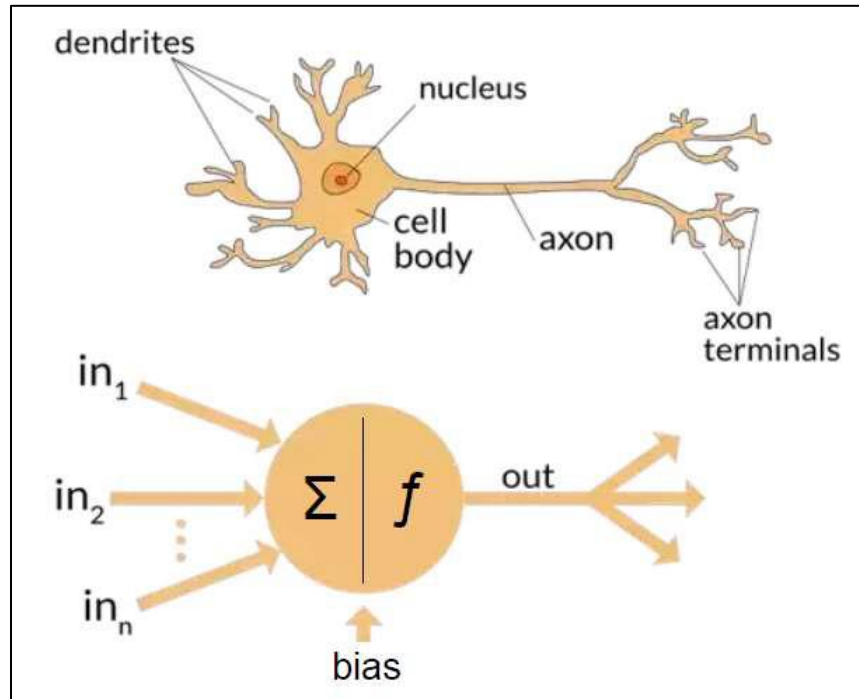
Deep Learning Application



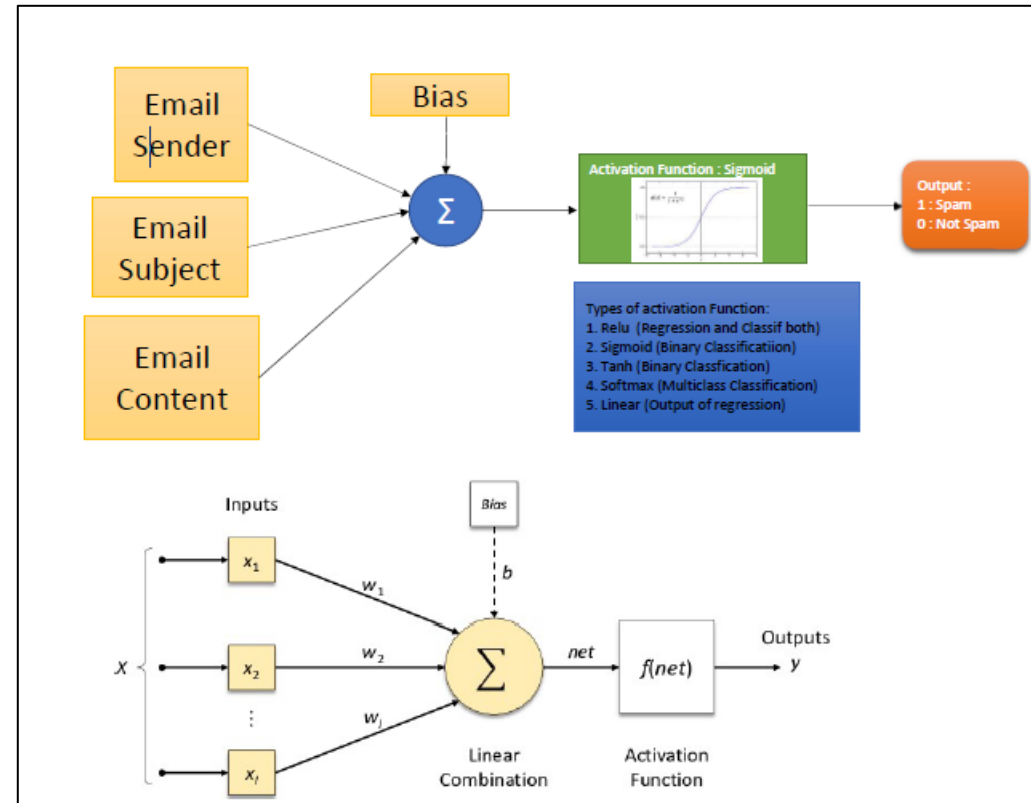
Types of Data



What is Artificial Neuron?

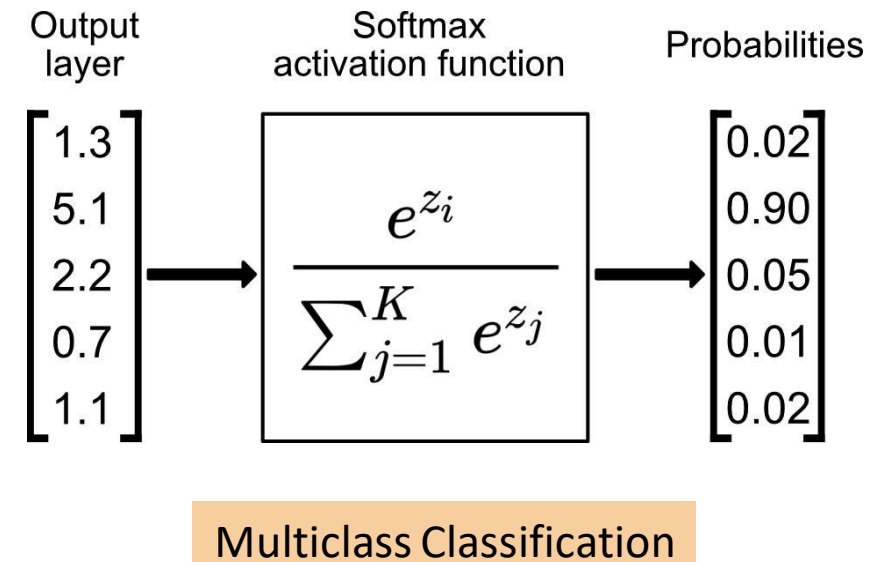
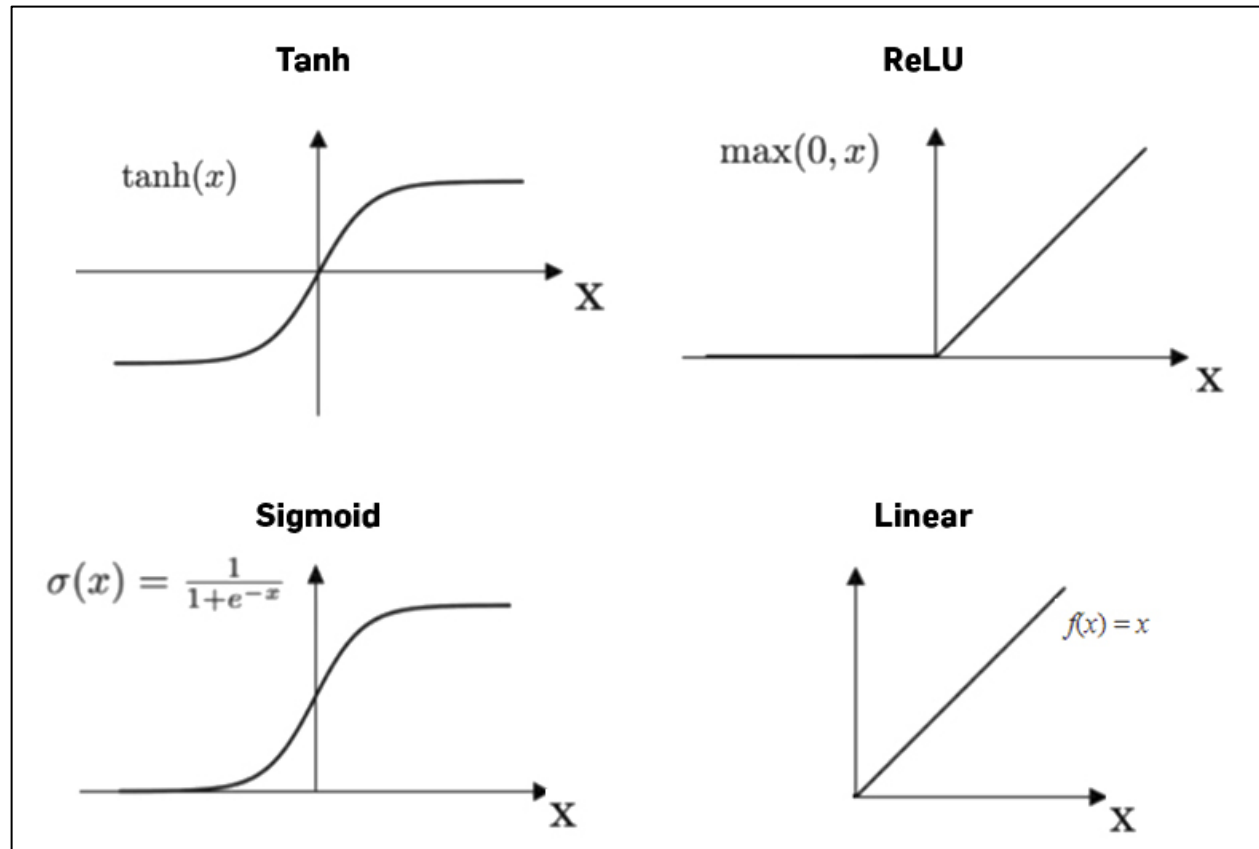


A Single Neuron/
Perceptron

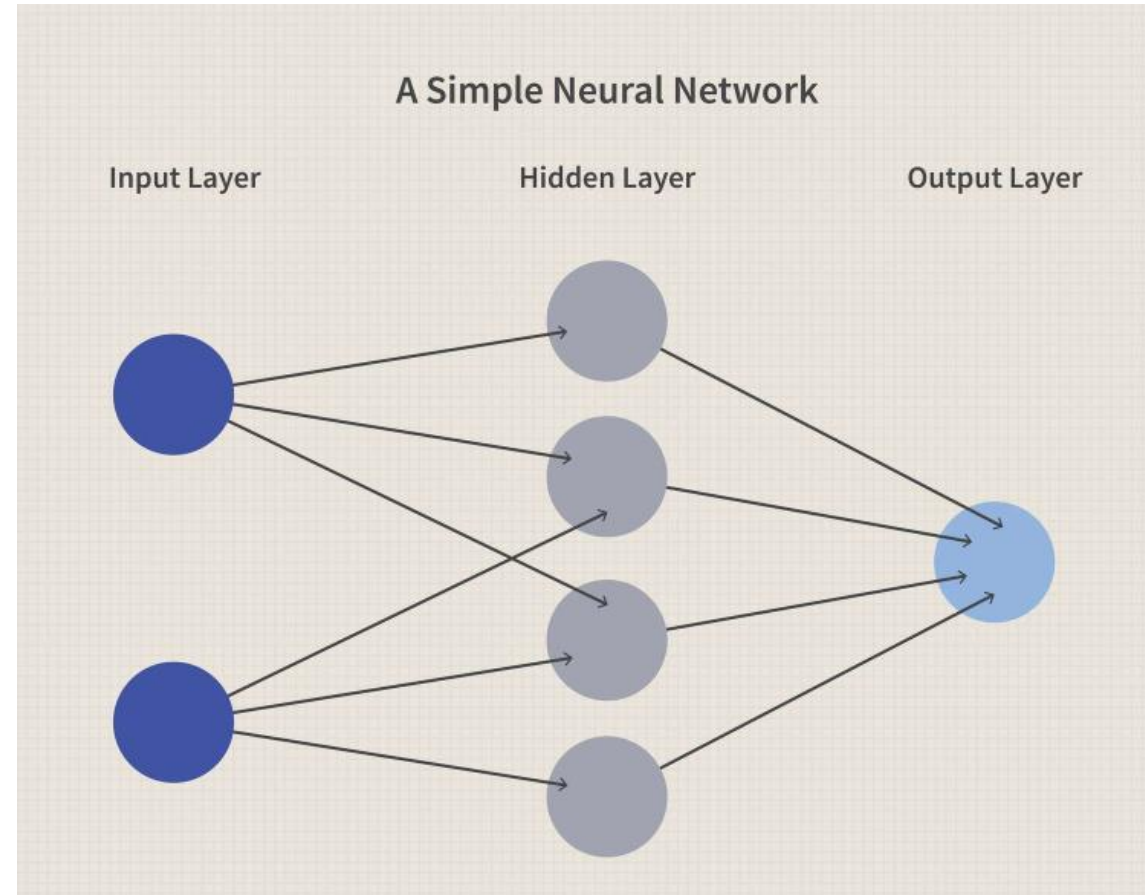


$$y = w_0 + w_1 * x_1 + w_2 * x_2 + w_3 * x_3$$

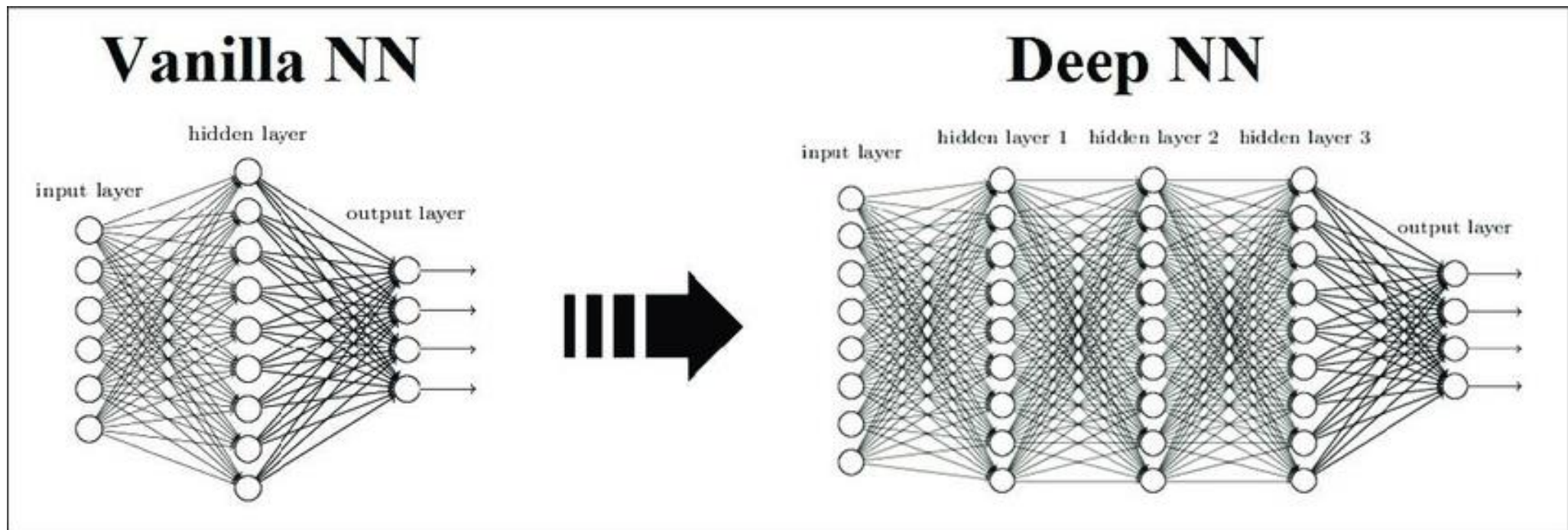
What is activation function?



What is a Neural Network

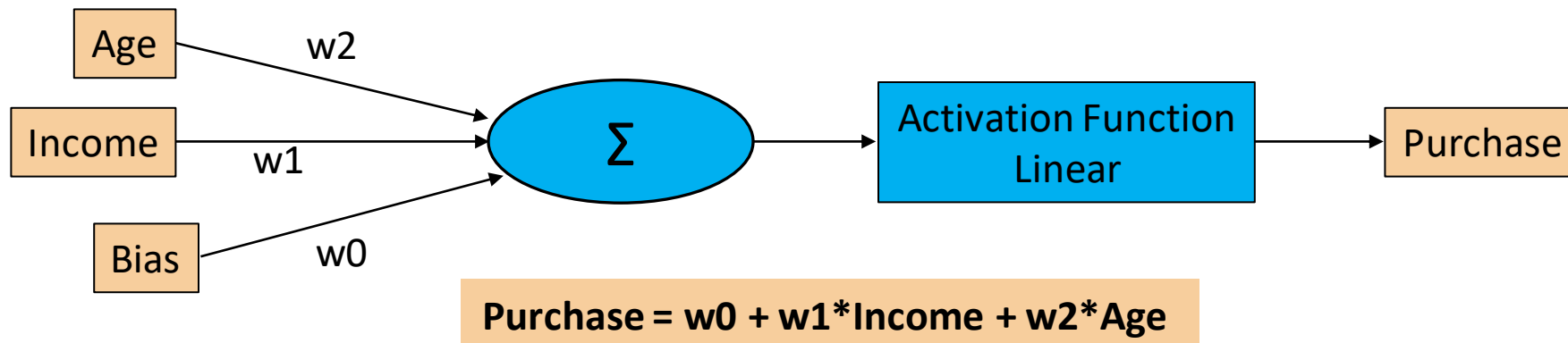


Types of Neural Networks

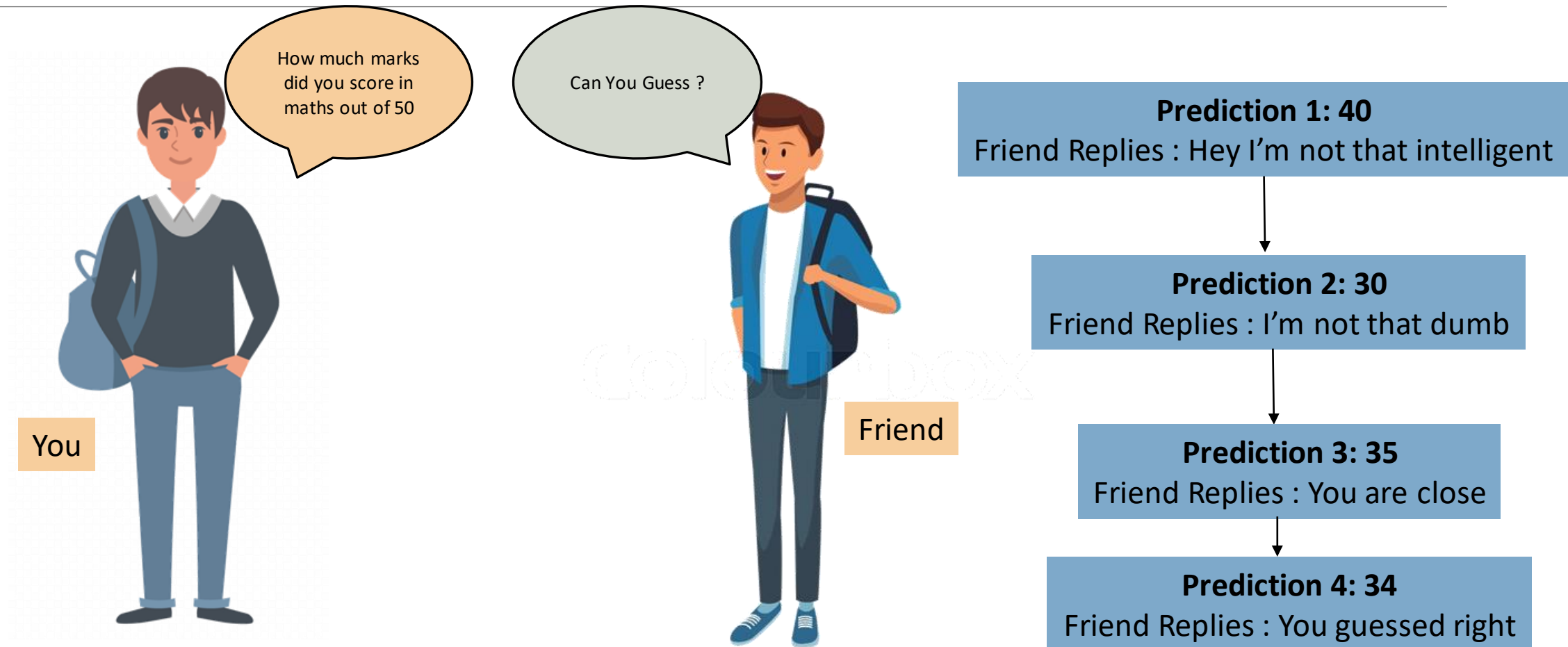


Example simple neuron

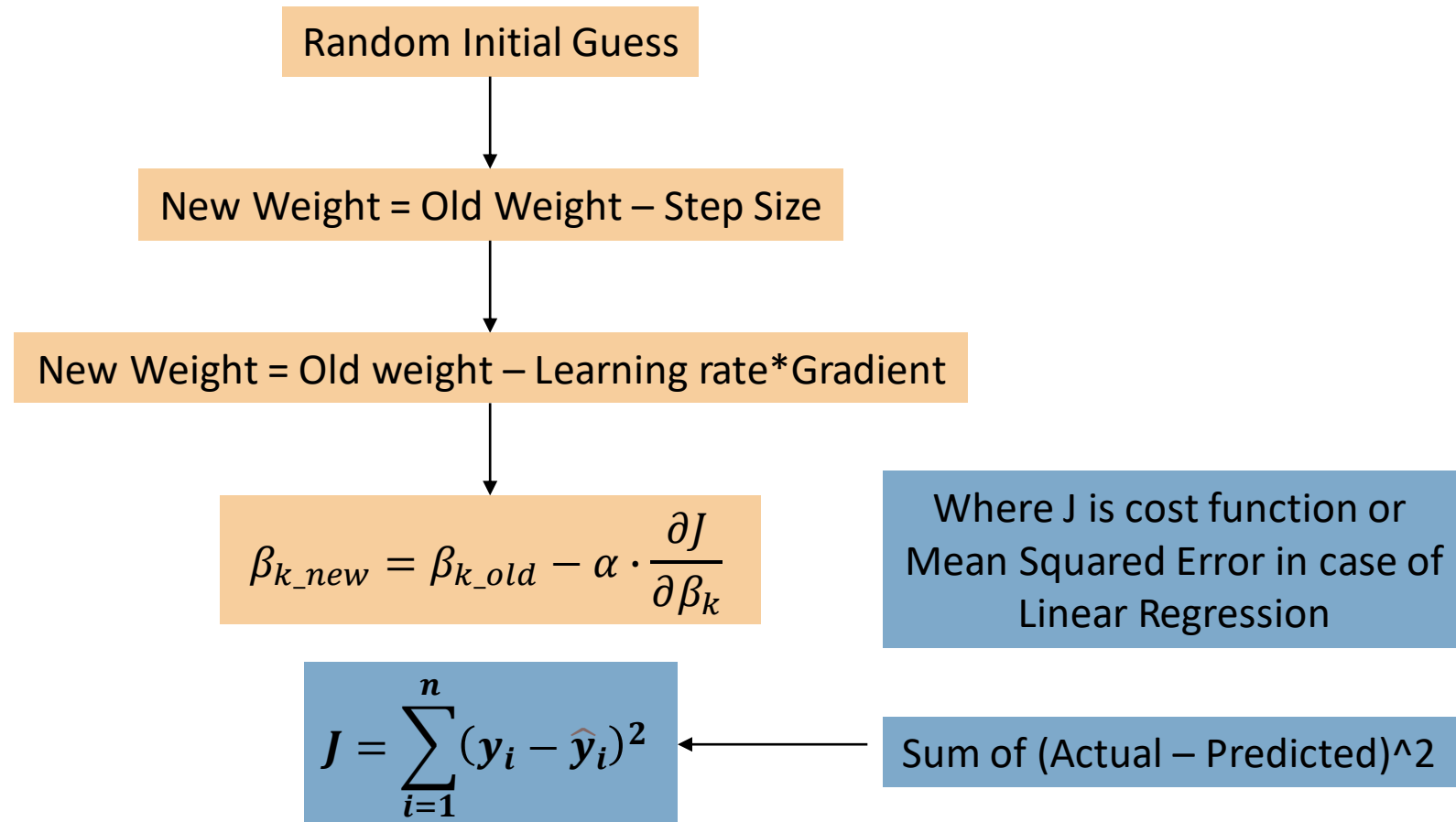
Age	Income	Purchase
25	50,000	1,000
30	60,000	2,000
35	70,000	3,000
40	125,000	4,000
45	150,000	5,000



How are coefficients obtained in a Neuron? Gradient Descent Algorithm



Gradient descent algorithm



Step 1: Scaling Independent features

Age	Income	Purchase
25	50,000	1,000
30	60,000	2,000
35	70,000	3,000
40	1,25,000	4,000
45	1,50,000	5,000

Standard
Scaler

Age Scaled	Income Scaled	Purchase
-1.4142	-1.0434	1,000
-0.7071	-0.7889	2,000
0.0000	-0.5344	3,000
0.7071	0.8653	4,000
1.4142	1.5015	5,000

Mean	35	91000	
Stdev	7.07	39293.8	

Step 2 : Initial Random guess and Forward Propagation

W0	2000
W1	1300
W2	0.1

$$\text{Purchase} = w_0 + w_1 * \text{Income} + w_2 * \text{Age}$$

Age Scaled	Income Scaled	Purchase	Pred	Error	Error^2
-1.4142	-1.0434	1,000	643.41	356.59	1,27,156.93
-0.7071	-0.7889	2,000	974.32	1,025.68	10,52,016.81
0.0000	-0.5344	3,000	1305.23	1,694.77	28,72,234.19
0.7071	0.8653	4,000	3124.93	875.07	7,65,745.59
1.4142	1.5015	5,000	3952.11	1,047.89	10,98,083.87

MSE	11,83,047.48
RMSE	1087.679861

Step 3: Updating weights

Backward Propagation

w2	w1				-2*Error	-2*Error*Income	-2*Error*Age
Age Scaled	Income Scaled	Purchase	Pred	Error	Gradient W0	Gradient W1	Gradient W2
-1.4142	-1.0434	1,000	539.07	460.93	-921.87	961.90	1303.72
-0.7071	-0.7889	2,000	895.43	1,104.57	-2209.14	1742.86	1562.10
0.0000	-0.5344	3,000	1251.79	1,748.21	-3496.42	1868.61	0.00
0.7071	0.8653	4,000	3211.46	788.54	-1577.08	-1364.61	-1115.17
1.4142	1.5015	5,000	4102.26	897.74	-1795.49	-2695.94	-2539.20

Grad	-10000.0000	512.8089	-788.5534
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W0	2000	Learning Rate	0.1
W1	1300	W0_new	3000
W2	0.1	W1_new	1248.7191
		W2_new	78.955345

New Weight = Old weight – Learning rate*Gradient

Step 4: Check MSE , RMSE Again

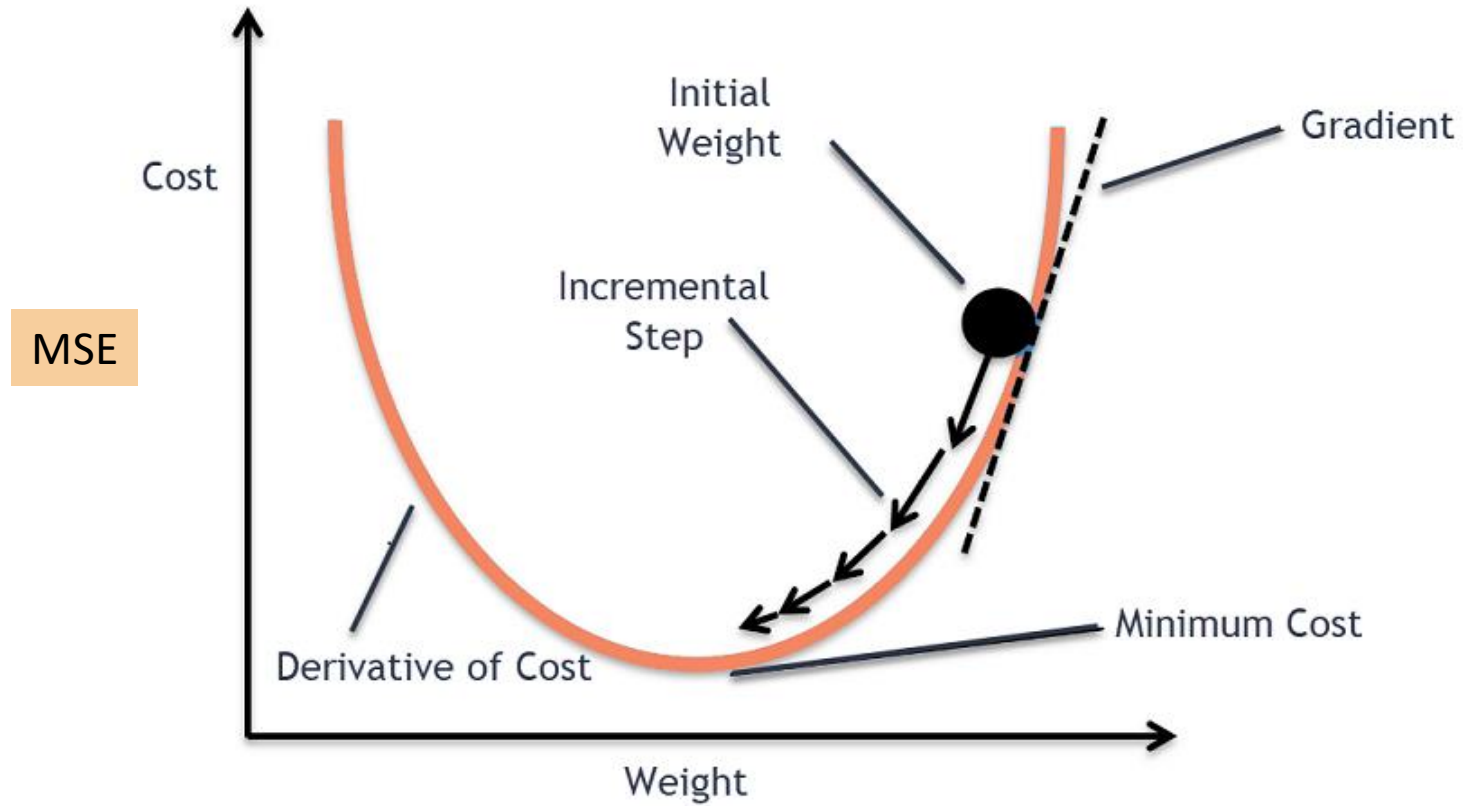
Forward propagation

Learning Rate	0.1
W0_new	3000
W1_new	1248.7191
W2_new	78.955345

Age Scaled	Income Scaled	Purchase	Pred	Error	Error^2
-1.4142	-1.0434	1,000	1585.40	-585.40	3,42,691.56
-0.7071	-0.7889	2,000	1959.02	40.98	1,679.43
0.0000	-0.5344	3,000	2332.64	667.36	4,45,369.85
0.7071	0.8653	4,000	4136.32	-136.32	18,582.61
1.4142	1.5015	5,000	4986.62	13.38	178.90
					MSE 1,61,700.47
					RMSE 402.1199697

Repeat backward propagation

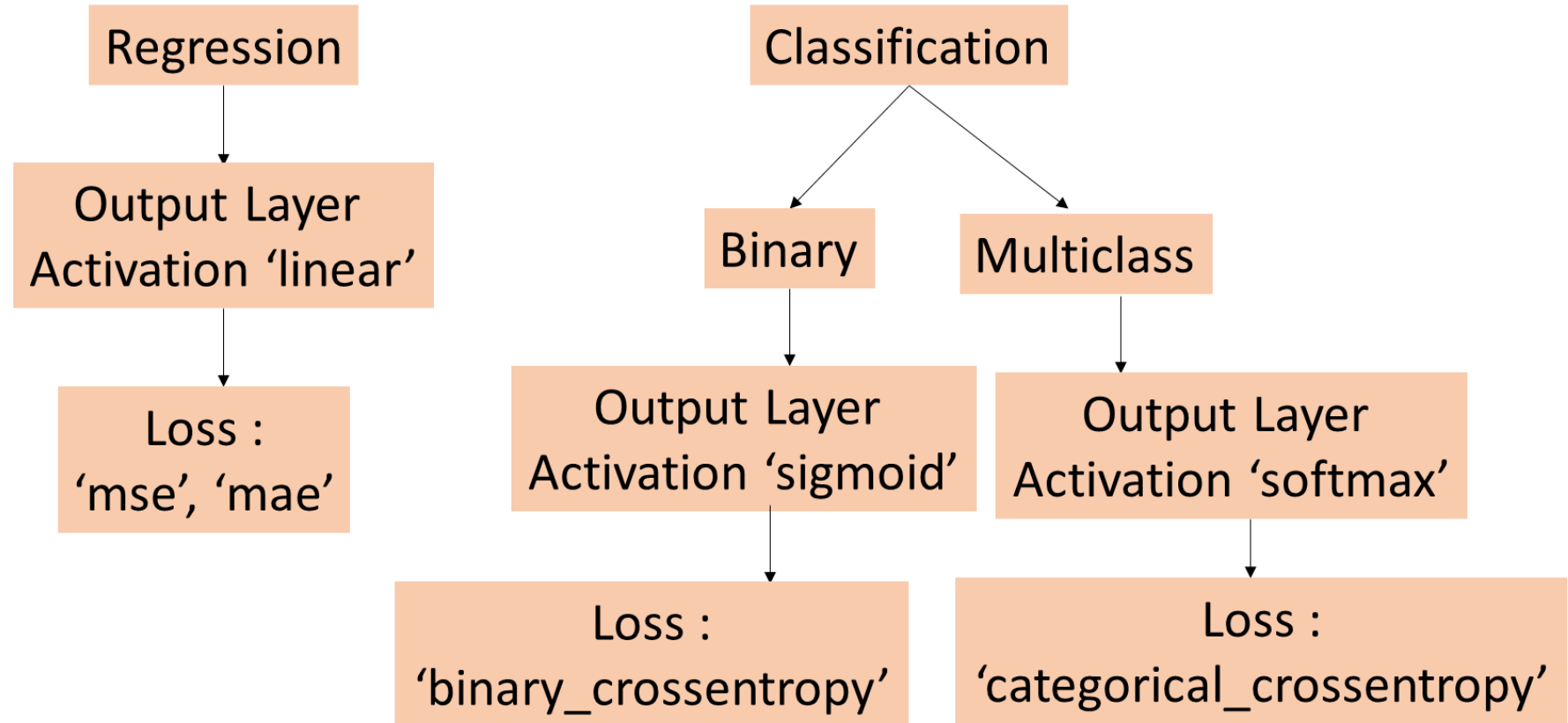
Gradient Descent Algorithm Summary



Different Cost functions

1. Regression : Mean Squared Error, Mean Absolute Error
2. Binary Classification : Binary Cross Entropy
3. Multiclass Classification : Categorical Cross Entropy

Summary of Activation Function with Loss function



Libraries Required for Deep Learning

- `pip install --upgrade tensorflow --user`
- `pip install keras --user`
- `pip install nltk`
- `pip install opencv-python`

Thank you

PING ME ON SKYPE FOR ANY QUERIES

UTKARSH GAIKWAD

