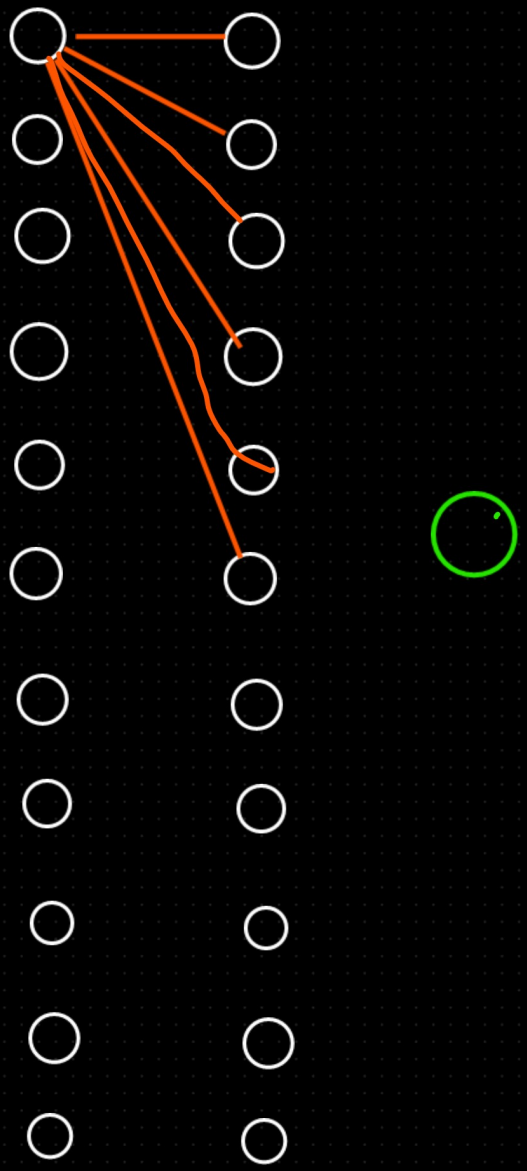
1. ANN Practical
2. Loss fn
3. BP
4. Vanishing gradient -
5. Exploding gradient -
6. Actr fn / Loss / optimizer
7. One more Practical
8. Normalization, Regularization
9. tensorflow → Regression
10. Pytorch - Regression



$11 \times 11 = 121 + 11 = 132$

$11 \times 1 + 1$

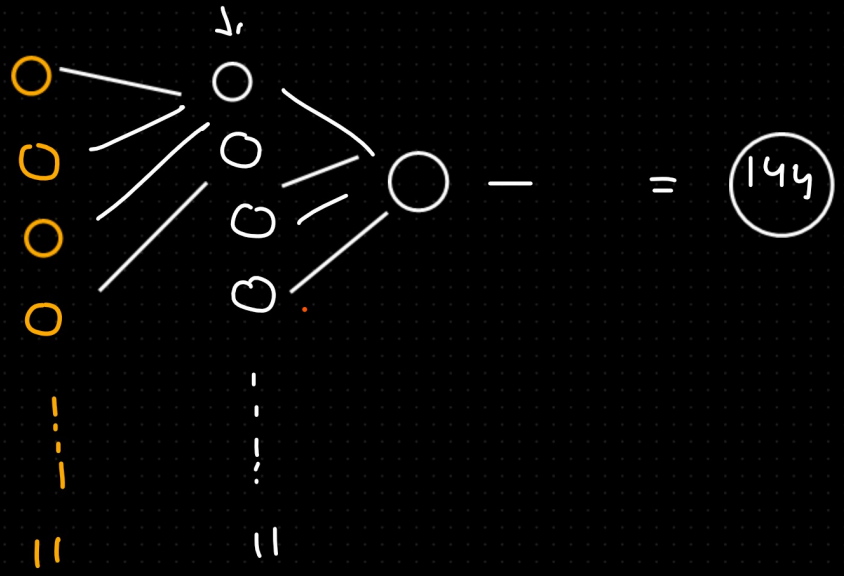
$11 + 1 = 12$

132

12

144

```
model=Sequential()
model.add(Dense(11,activation="sigmoid",input_dim=11))#input layer
model.add(Dense(1,activation="sigmoid"))#output layer
```



$11 \times 11 = 121 + 11$

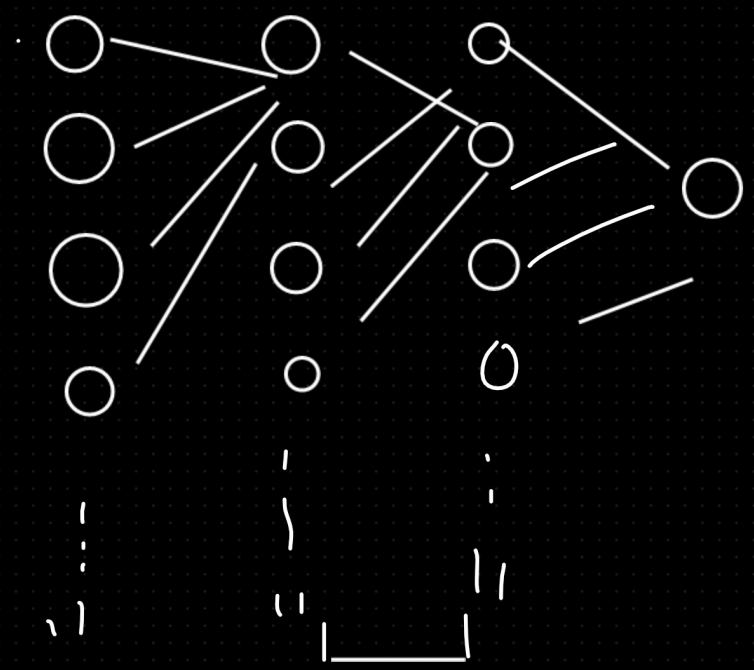
$= 132$

$11 \times 1 + 1$

$11 + 1 = 12$

$= 144$

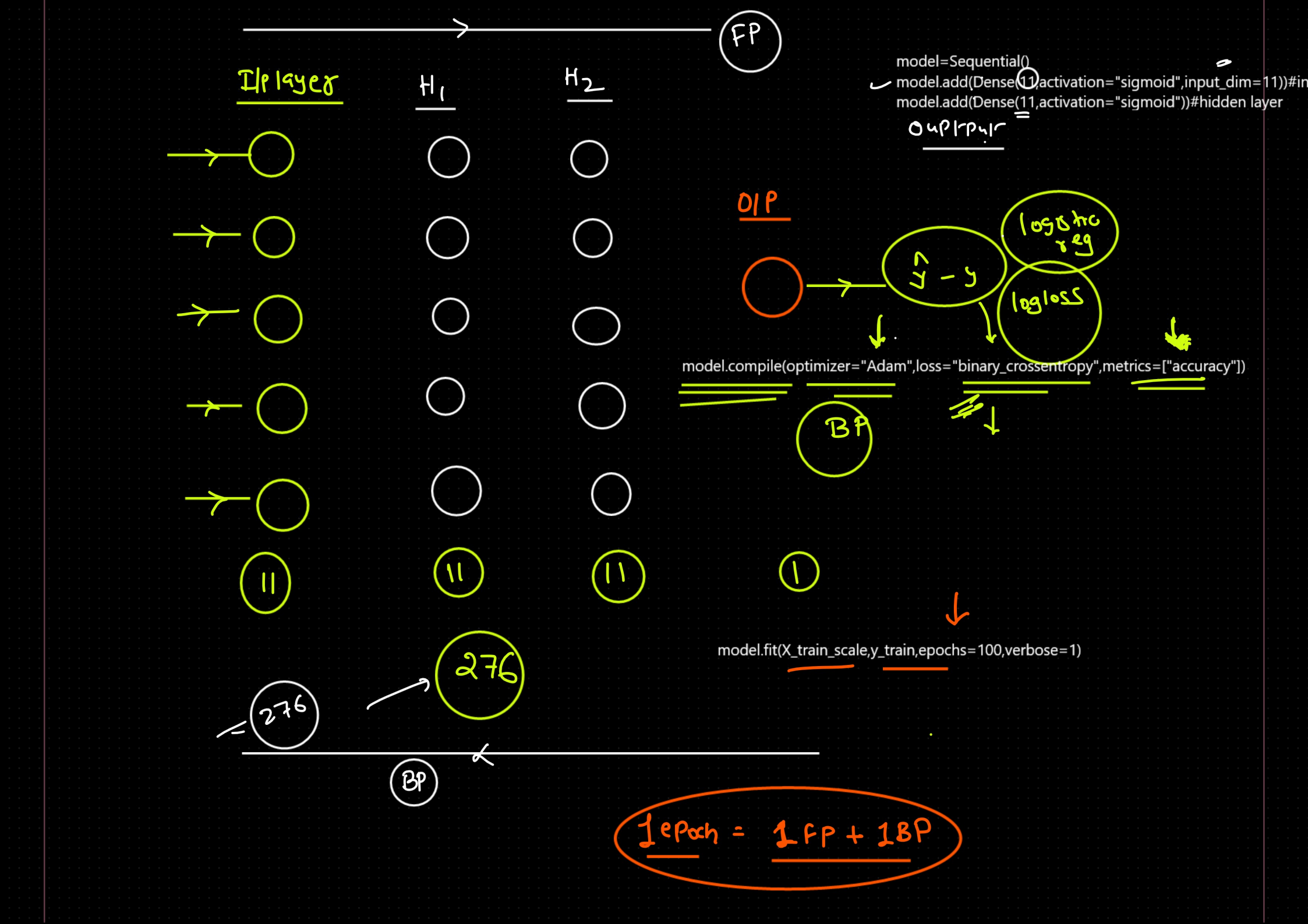
```
model=Sequential()
model.add(Dense(11,activation="sigmoid",input_dim=11))#input layer
model.add(Dense(11,activation="sigmoid"))#hidden layer
model.add(Dense(1,activation="sigmoid"))#output layer
```

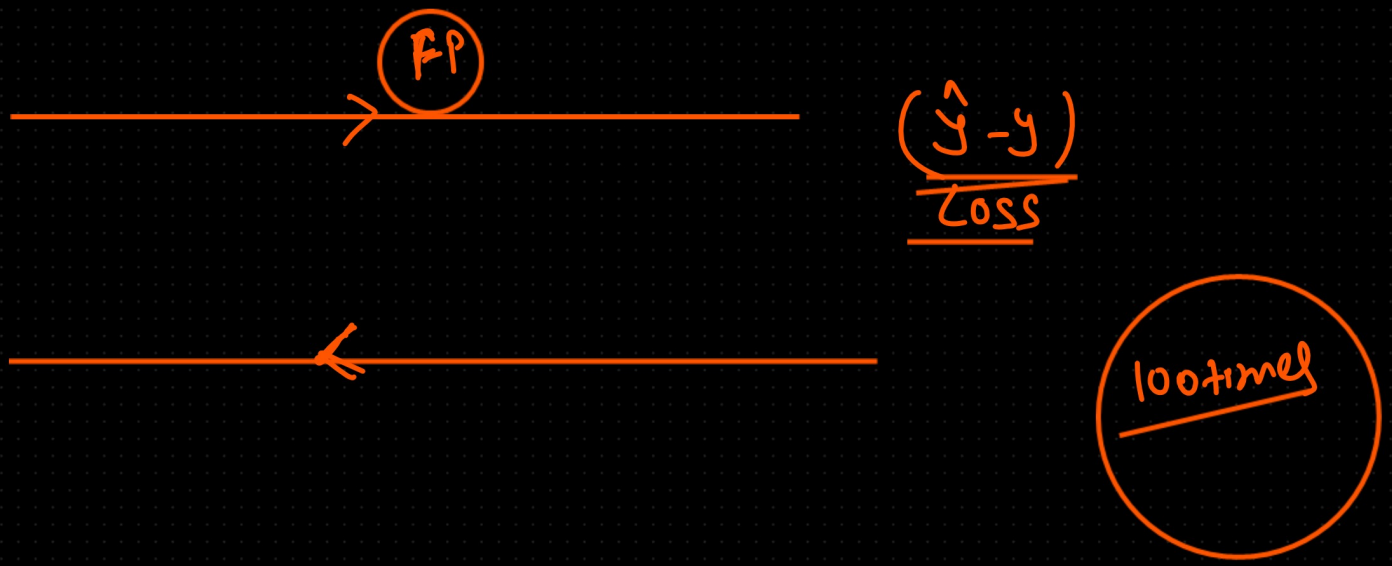


132
132
12
276

11×11+11

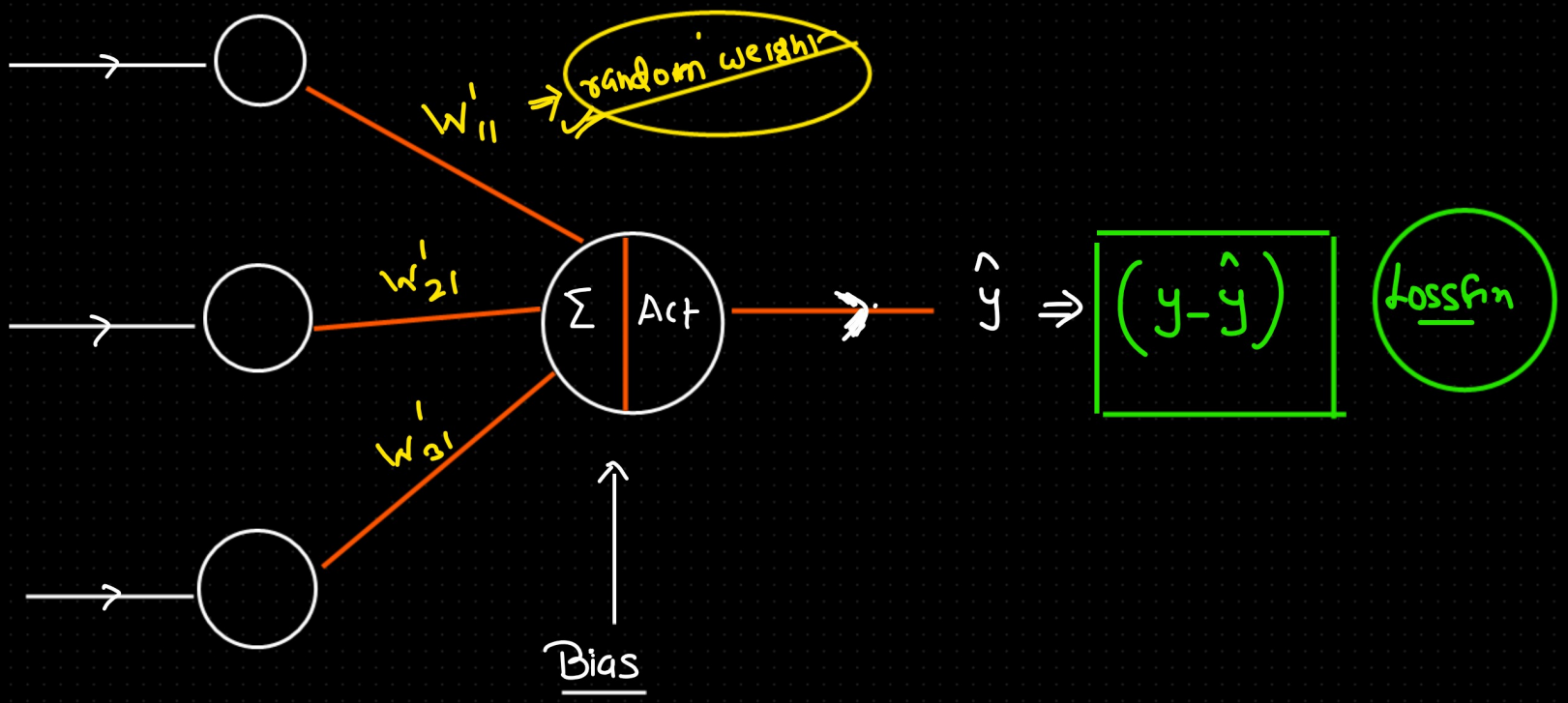
121+11 = 132 132 12


FP
Ip layer
H_1
H_2
model=Sequential()
model.add(Dense(11,activation="sigmoid",input_dim=11))#in
model.add(Dense(11,activation="sigmoid"))#hidden layer
Oupirput
OIP
$\hat{y} - y$
logistic reg
logloss
model.compile(optimizer="Adam",loss="binary_crossentropy",metrics=["accuracy"])
BP
11
11
11
1
model.fit(X_train_scale,y_train,epochs=100,verbose=1)
276
276
BP
1epoch = 1FP + 1BP



- loss function
- Backpropogation

Forward Propogation = Calculating the Value (output)



Backward Propogation

Update the Parameter ⇒ (weight, Bias)

Linear regression

$\hat{y} = mx + c$

- m = Weight
- c = Constant

} ⇒ I need to update it how you will get to know?

Loss

Minimum loss

Loss v/s cost

Height	Weight	BMI	BMI_Pred	
170	65	22	21	1
185	68	23	20.5	2.5
175	71	21	21.5	0.5

(Actual - Pred) = Loss

$$\frac{1}{n}\sum_{i=1}^{n}(\text{Actual} - \text{Pred})$$ → Cost

Loss = one observation

Cost = entire data

ANN

Regression

1. MSE ✓
2. MAE ✓

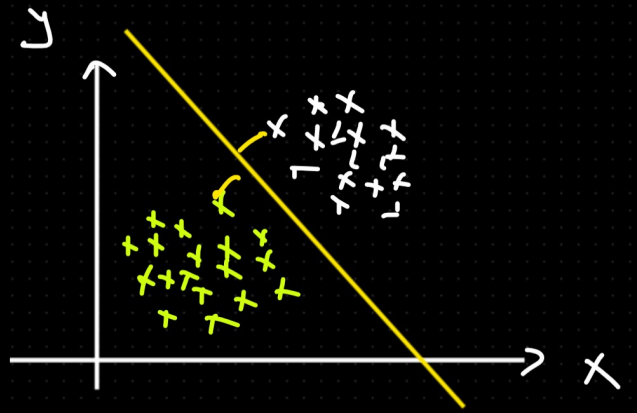
classification

1. Binary cross entropy or logloss
2. { Categorical cross entropy
   Sparse categorical cross entropy }

MSE ⇒ Mean Squared error

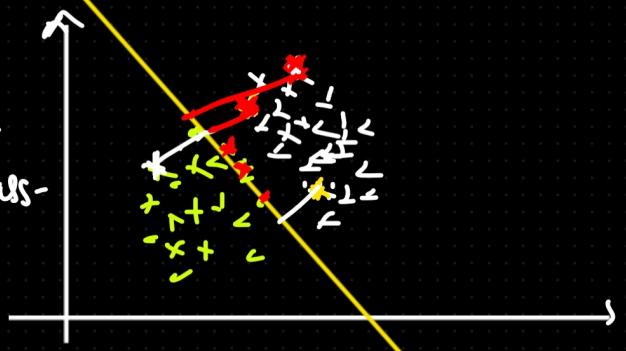
$$= \frac{1}{n}\sum_{i=1}^{n}(y-\hat{y})^2$$

Square



BMI	Height	weight	Pred_weight	
22	170	68	67	= 1
20	160	70	66	= 4
23	175	75	80	= -5
				0

How many point are wrong class-ified = 3



How much loss is this : ? No.

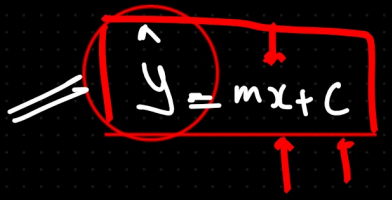
But Quantity = ?

Loss

68 66 = 2
70 72 = -2
75 76 = -1

-1

Distance = Based on Distance
how much loss



y

Square ⇒ $1^2 + 4^2 + (-5)^2 = 1 + 16 + 25$

= 42

Mod (MAE)

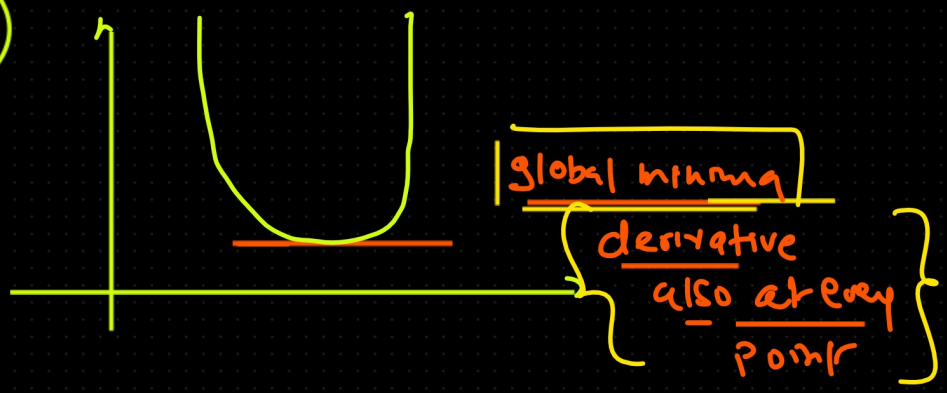
-ve = +ve

|-ve| = +ve

1 ⇒ 1
4 ⇒ 16
25 = 625 ⇒

10 ⇔ 100

MSE ⇒ quardinc eq



Advantage ⇒ 1 Convex fn ⇒

2 easy to interpret

gradient decent ⇒ differentiation

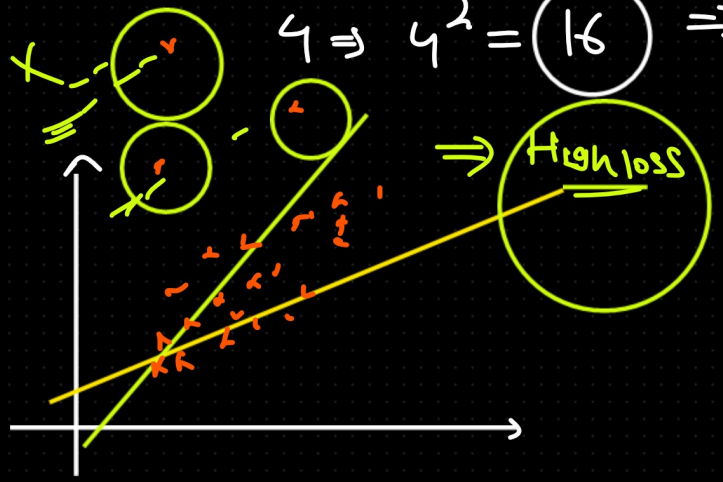
not robust with

Disadvantage → ① Outlier

② real value ⇒ inverse the value

$$M_{new} = M_{old} - \eta \frac{\partial L}{\partial m} \; ?$$

Loss → MSE



$y = 4 \Rightarrow y^2 = 16 \Rightarrow$ Square $\sqrt{16} \Rightarrow 4$ ← Actual loss

⇒ High loss

$y - \hat{y}$ ⇒ Updation

MAE ⇒ $\frac{1}{n}\sum_{i=1}^{n} |y - \hat{y}|$

⇓

≡ Mode

Height	weight	BMI	Pred_BMI	
170	65	22	21	1
180	60	21	24	-3
185	61	19	20	-1

Advantage ⇒ ① Giving me a value in range

② robust to the outlier

Disadvantage ⇒ we can not use GD

⇐ It is not convex fn

|1| = 1

|-3| = 3

|-1| = 1

|1+3+1| = 5

≡ MSE → Loss → Warsner

Mode fn ⇒ It is not a convex fn

≡ 

← this is not Differensia-ble

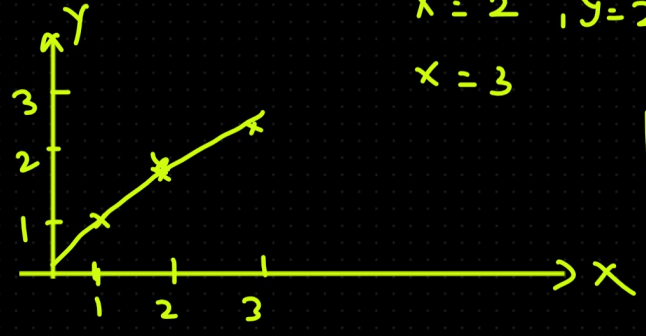
$y \Rightarrow f(x) \Rightarrow x$ $\Rightarrow$ $y = x$

- functions
- limits
- derivation
- Integration

$x = 1, y = 1$

$x = 2, y = 2$

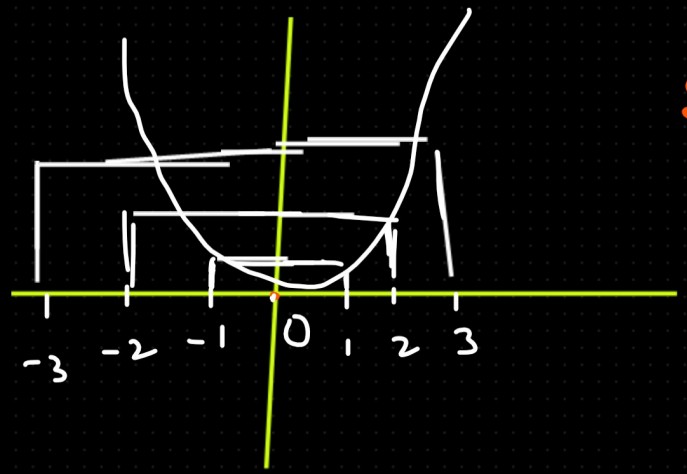
$x = 3$



$y = f(x) = x$

$y = f(x) = x^2$

$y = f(x) = x^3$



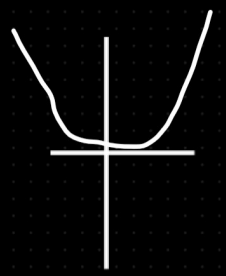
$y = 0$

$y = f(2) = 4$

$y = f(3) = 9$

$f(-2) = 4$

$f(-3) = 9$



Quadratic

Parabola

$x^2 = (y - \hat{y})^2$

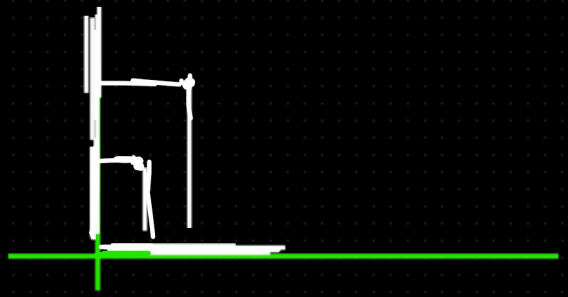
$\frac{dy}{dx} = \frac{y}{x} = x^2 = dx$

$$w_{new} = w_{old} - \eta \frac{\partial L}{\partial w}$$

$$\frac{dy}{dx} = x_{21}$$

$x_{21} = 2x1 = 2$

$x_{22} = 2x2 = 4$



$$\frac{dx}{dy} = 1$$