③ Regression

Hidden → ReLU or variant of ReLU

o/p → Linear Activatn

↑

Seperate loss functn

LOSS FUNCTIONS

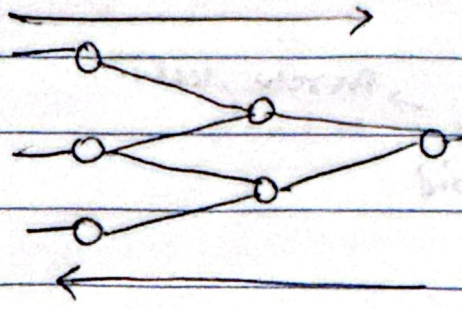
Deep learning (ANN)

Regression | classificatn

① Regression

- MSE
- MAE
- ~~RMSE~~ Huber Loss

for eg you have 100 records



$\hat{y}$ $\quad$ Loss $= \frac{1}{2}(y-\hat{y})^2$

Batch of 10 records

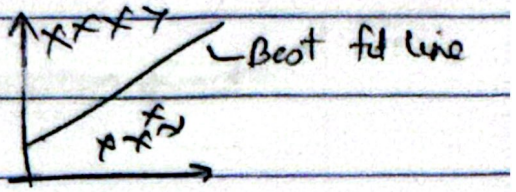
then it will be cost functn

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

① Mean Squared Error (MSE)

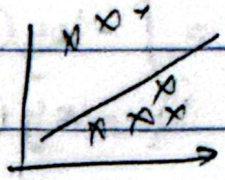
Loss funct^n $= \frac{1}{2n}(y-\hat{y})^2$ Cost funct^n $= \frac{1}{2}\sum_{i=1}^{n}(y-\hat{y})^2$

- Not robust to outliers



② Mean Absolute Error (MAE)

Loss function $= \frac{1}{2n}|y-\hat{y}|$ Cost funct^n $= \frac{1}{2n}\sum_{i=1}^{n}|y-\hat{y}|$



- Robust to outliers
- Time consuming

③ Huber loss

Combinat^n of MSE & MAE

Hyperparameter

$$\text{Loss} = \begin{cases} \frac{1}{2}(y-\hat{y})^2 & \text{if } |y-\hat{y}| \le \delta \\ \delta|y-\hat{y}| - \frac{1}{2}\delta^2, & \text{otherwise} \end{cases}$$

outliers not present

present

② Classification

Cross Entropy
- → Binary classification (Cross entropy) → Binary cl
- → Categorical cross entropy → multicla classifica

① Binary cross entropy

$$Loss = -y * \log(\hat{y}) - (1-y) * \log(1-\hat{y})$$ → used in Log Reg^n

$$\Downarrow$$

$$Loss = \begin{cases} -\log(1-\hat{y}) & \text{if } y=0 \\ -\log(\hat{y}) & \text{if } y=1 \end{cases}$$ } Binary classification

$$\boxed{\hat{y} = \frac{1}{1+e^{-x}}}$$

② Categorical cross entropy

~~f~~ f_1	f_2	f_3	o/p
2	3	4	Good
5	6	7	Bad
8	9	10	Neutral

Good	Bad	Neutral
1	0	0
0	1	0
0	0	1

No. of categories

first we convert it into one hot encoding

$$\text{loss} = L(a_i, y_i) = -\sum_{j=1}^{C} y_{ij} * \ln(\hat{y}_{ij})$$

learn about this

Here we use Softmax Activation funct^n

$$\sigma(z) = \frac{e^{z_i}}{\sum_{j=1}^{K} e^{z_j}}$$ } softmax Act^n funct^n

its applied in every output layer for multiclass classificat^n problem

Important

Binary classificat^n problem

- use ReLU Act^n funct^n for Hidden & then sigmoid in the output layer

multiclass classificat^n

- Middle layer use ReLU & the output ~~outside~~ use Softmax Act^n funct^n

→ Classification

Relu, Softmax – multiclass → Categorical

Relu, Sigmoid – Binary → Binary

→ Regression

Relu, Linear Acti^n function → MSE, MAE, Huber