Machine Learning

Logistic Regression

Python + Data Science + ML

⇒
- → dB
- → API
- → file handling

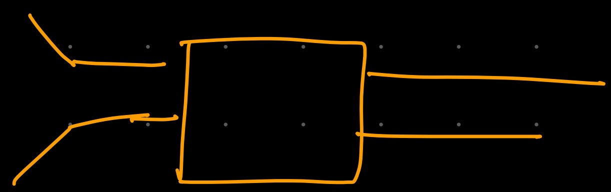
+ git + developm etc.

basic level project ⇒ 90%

⇓

end to end

sql



logging

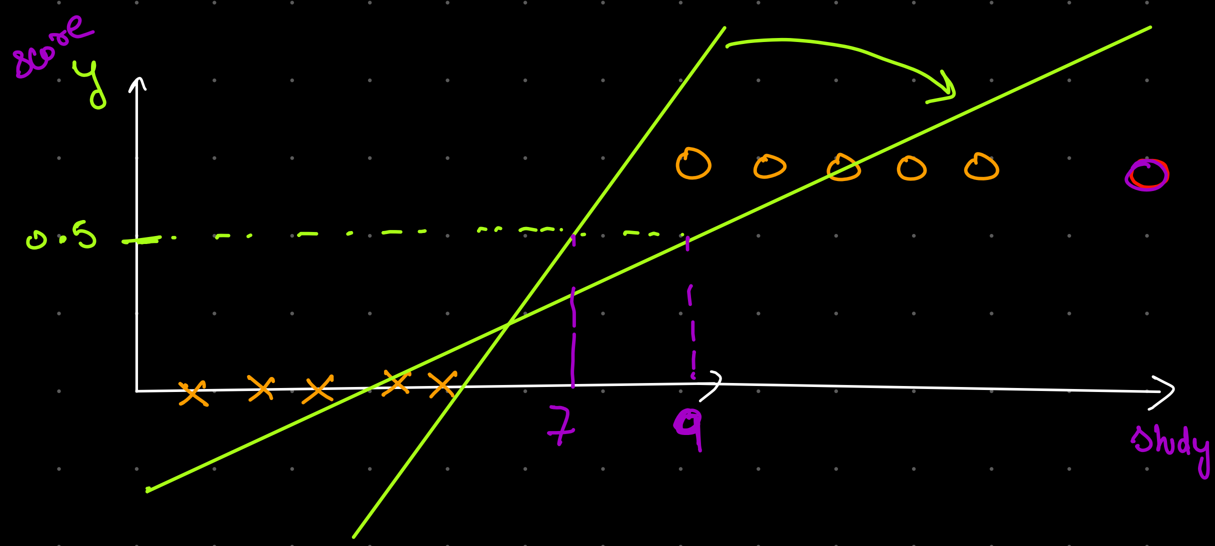
file handling

developer → API

define ~~a full life~~

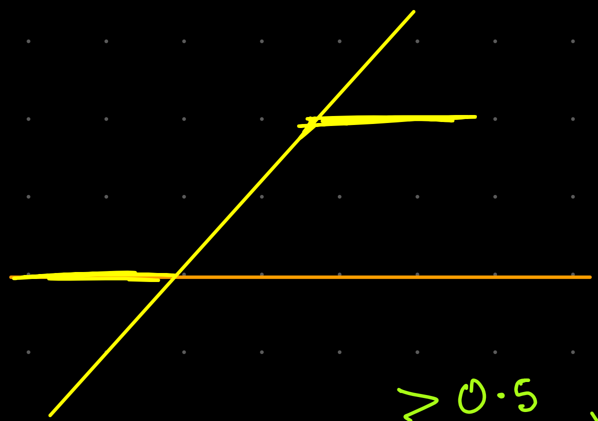
⇐ supporter

1. LoR
2. Practical + Code logistic + L1 / L2
3. Naive Bayes
4. Tree Based (DT , RF) ⟹
5. SVM / SVD
6. Boosting ,
7. Unsupervised learning.



$f(m,c) = y = mx + c$

$$y(m,c) = g(mx+c)$$



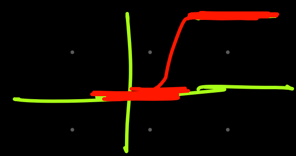
sigmoid/activation

$$\Downarrow$$

$$\left(\frac{1}{1+e^{-z}}\right) =$$

> 0.5 1

< 0.5 0



$$y(m,c) = \frac{1}{1+e^{-mx+c}}$$

We are again going to train on train data

$$\{(x_1,y_1),(x_2,y_2) \dots (x_n,y_n)\}$$

study	score
5	0
7	1
8	1

Aim ⇒ find value of m, c such that we can predict / classify y properly.

Cost f^n

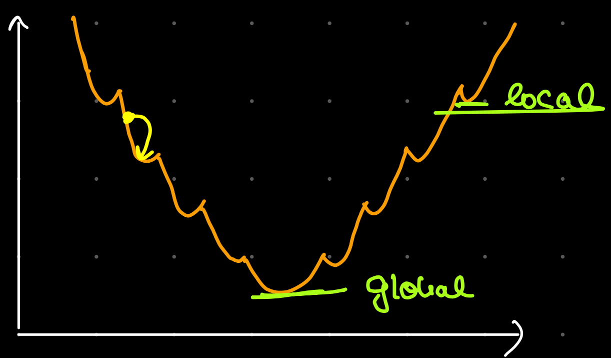
$$E = \frac{1}{2m} \sum_{i=1}^{m} (y_i - \hat{y}_i)^2$$

$\hat{y}_i \rightarrow (mx \cancel{+c})$

Now, $\boxed{y = \frac{1}{1+e^{-(mx+c)}}}$

say $c = 0$ (for easy explanation)

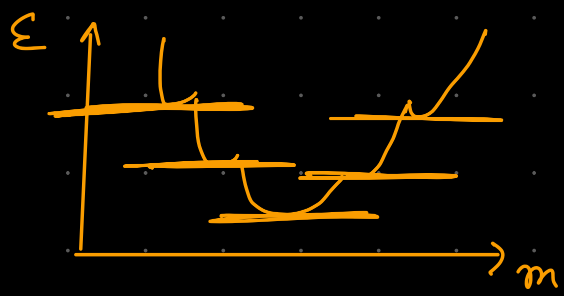
$$y = \frac{1}{1+e^{-mx}}$$



non-convex

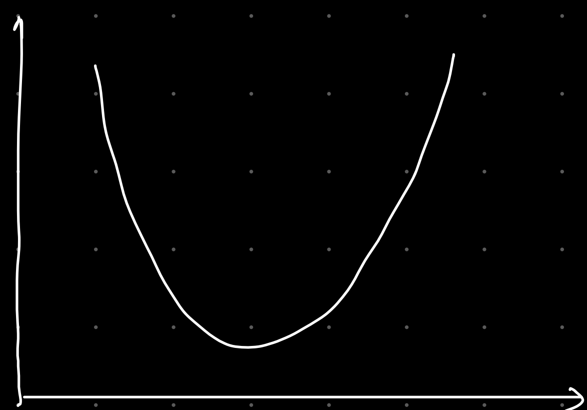
$$\frac{dE}{dm} = 0$$

$$E = \left(0 - \frac{1}{1+e^{-m5}}\right) + \left(1 - \frac{1}{1+e^{-7m}}\right)$$



Log Loss cost fn

$$E(m) = \begin{cases} -\log(\hat{y}) & y=1 \\ -\log(1-\hat{y}) & y=0 \end{cases}$$



Cost f^n / Error f^n

$$= \underbrace{-y \log \hat{y}}_{} \quad - (1-y) \log(1-\hat{y})$$

$y = 0$ $\quad \Downarrow 0 \quad \Downarrow 0 \quad \boxed{-\log(1-\hat{y})}$

$y=1 \Rightarrow -\log \hat{y} \quad - 0$

Cost / Error $= E(m, c)$

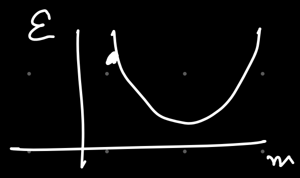
$$= -y \log \hat{y} \quad - (1-y) \log (1-\hat{y})$$

$$\hat{y} = \frac{1}{1+e^{-(mx+c)}}$$

$\boxed{y = 1}$ $\quad$ error $= \boxed{-\log \hat{y}} \rightarrow \frac{1}{1+e^{-mx+c}}$

We are gonna apply gradient descent.

$$\left\{ \begin{aligned} m_{new} &= m_{old} - \alpha \frac{\partial E}{\partial m} \\ c_{new} &= c_{old} - \alpha \frac{\partial E}{\partial c} \end{aligned} \right\}$$



$$\varepsilon(m, c) = -y \log \hat{y} - (1-y) \log(1-\hat{y})$$

$$\hat{y} = \frac{1}{1+e^{-(mx+c)}}$$

study	result y
5	0
6	0
7	1
8	1
9	0

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

for $x = 5$, $m = 2$

$$\hat{y} = \frac{1}{1+e^{-2 \cdot 5}}$$

0 $= 0.99 \rightarrow 1$

Confusion metrix

Predicted / Actual	pass	fail
pass		
fail