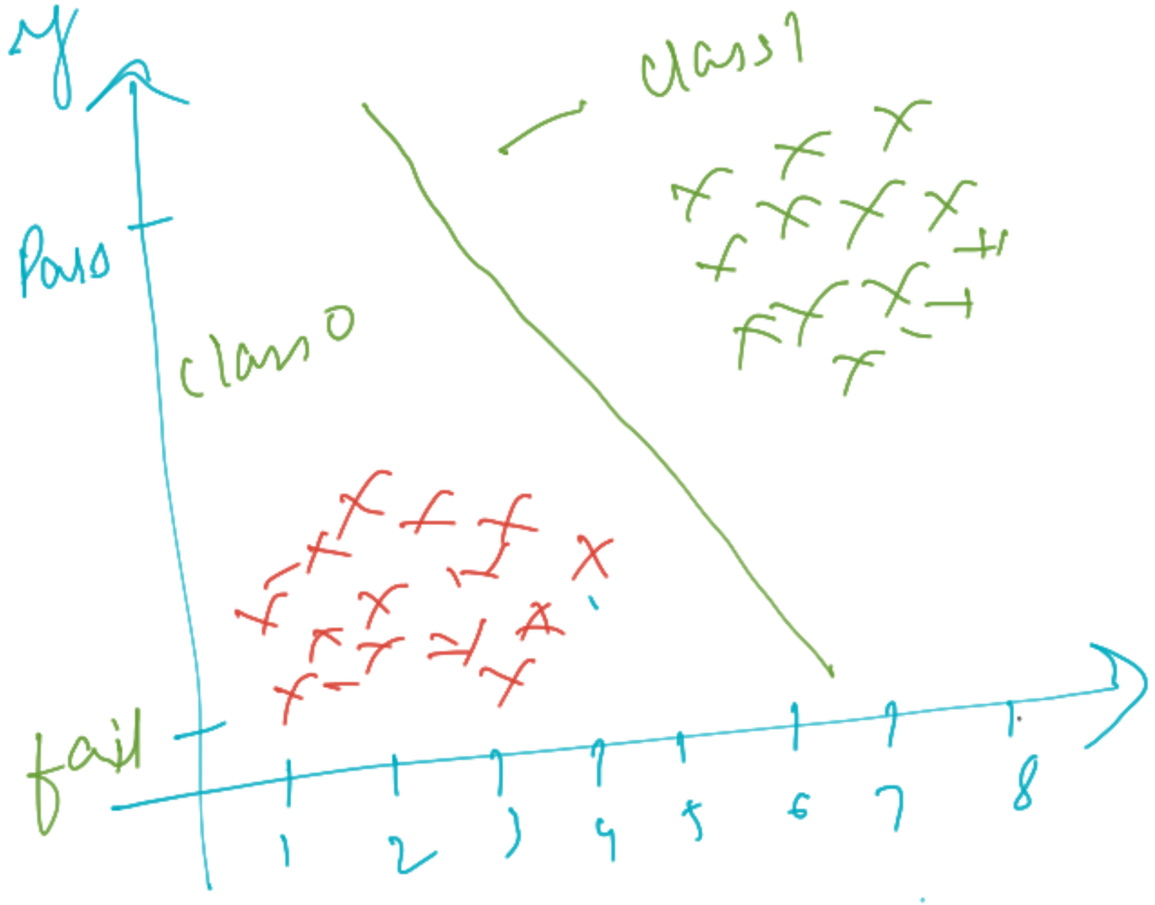
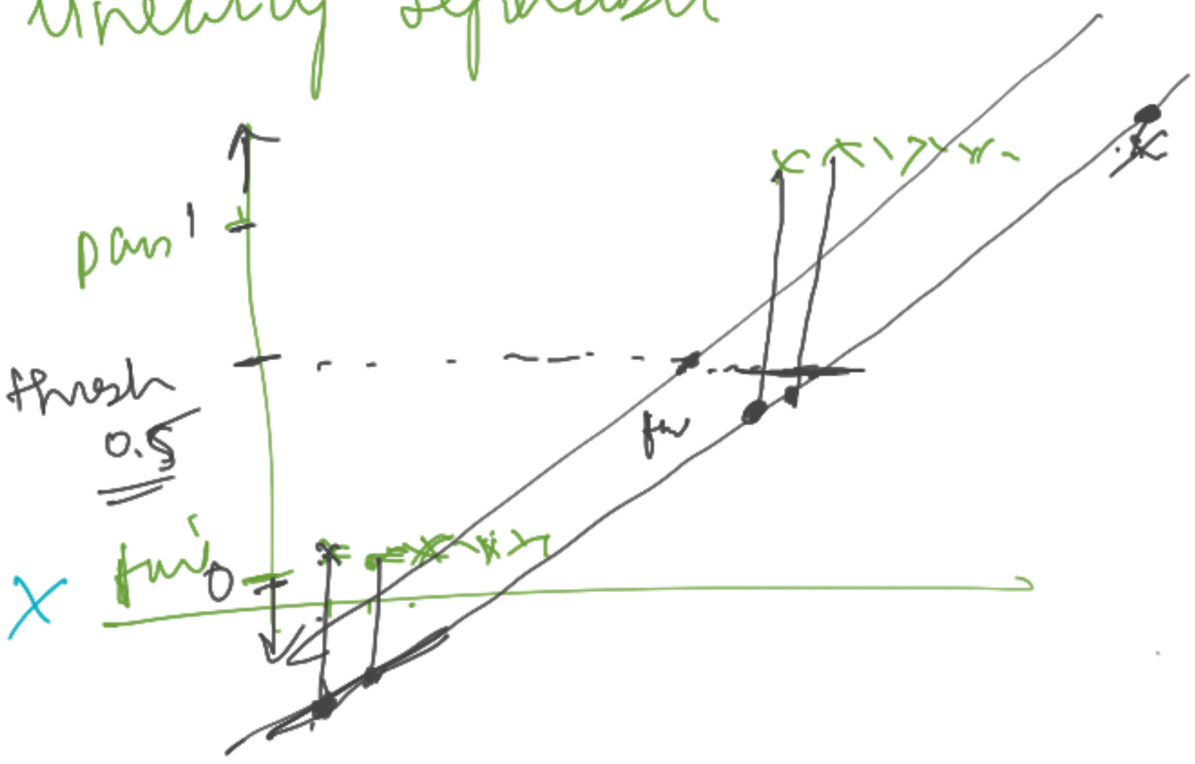


linearly separable



- outlier
- out of range

$\hat{y} = mx + C \quad [-\infty, \infty]$

$p = mx + C \quad [0, 1]$

$\text{odds} \Rightarrow \frac{\text{prob. of occ}}{\text{prob. of non occ}} \Rightarrow \frac{p}{1-p} \quad \frac{0}{1} = 0 \quad [0, +\infty]$

$\frac{1}{0} = \infty$

$\left(\frac{p}{1-p}\right) = mx + C \quad [$

$\log\left(\frac{p}{1-p}\right) = mx + C \quad [-\infty, +\infty]$

$\exp\left(\log\left(\frac{p}{1-p}\right)\right) : \exp(mx+c)$ $\quad e^{\log n} = n$

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

$$p = e^{(mx+c)}(1-p)$$

$$p = e^{(mx+c)} - pe^{(mx+c)}$$

$$p + pe^{(mx+c)} = e^{(mx+c)}$$

$$p\left[\frac{e^{(mx+c)}}{p} - e^{(mx+c)}\right]$$

$$1 = \left[\frac{e^{mx+c}}{p} - e^{mx+c}\right]$$

$$1 + e^{mx+c} = \frac{e^{mx+c}}{p}$$

$$p\left[1 + e^{(mx+c)}\right] = e^{(mx+c)}$$

$$p = \frac{e^{mx+c}}{1+e^{mx+c}} \Big/ e^{mx+c}$$

$$y = mx + c$$

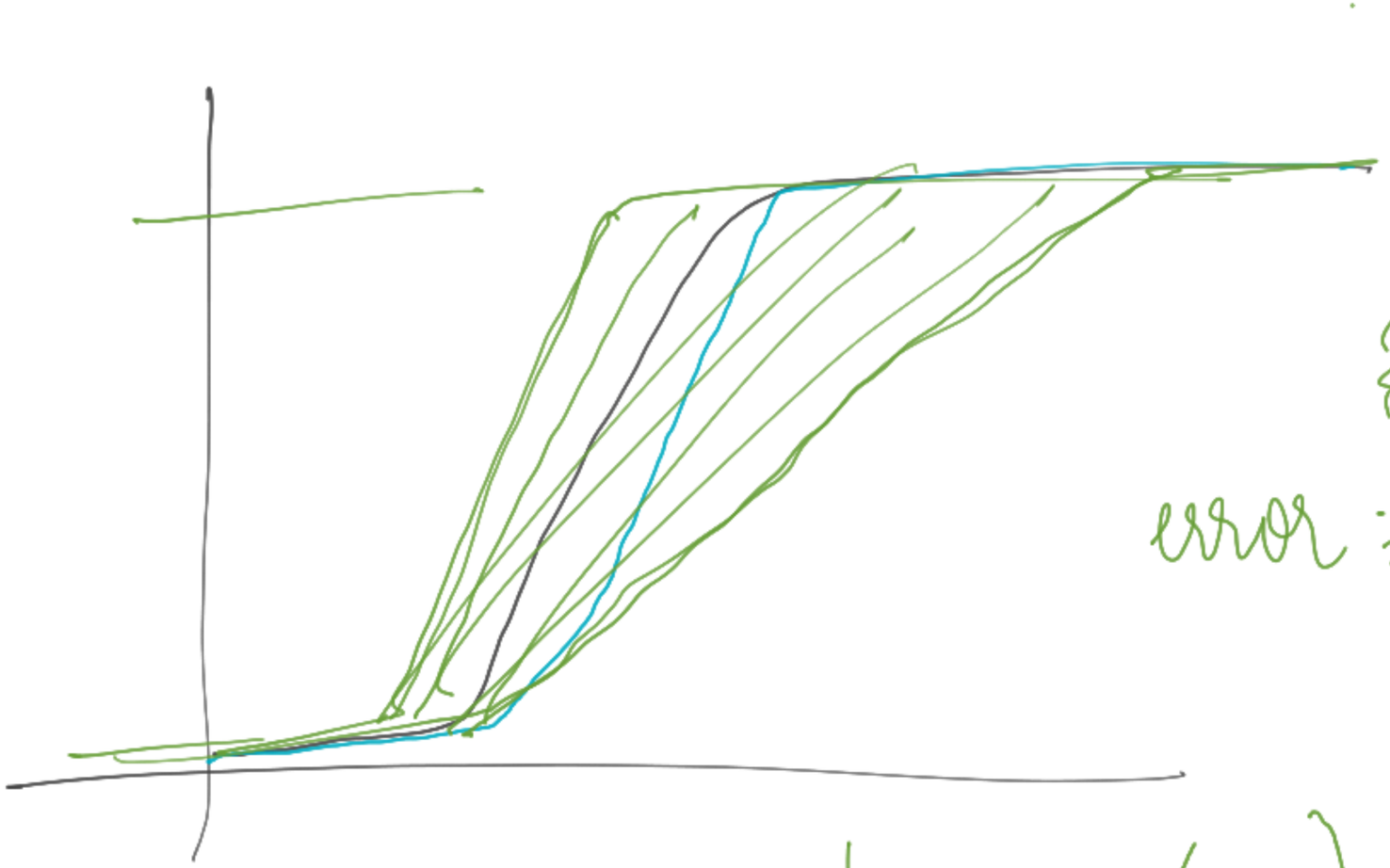
$$p = \frac{e^{mx+c}}{e^{mx+c}} \cdot \frac{1}{\frac{1}{e^{mx+c}} + \frac{e^{mx+c}}{e^{mx+c}}}$$

$$\frac{1}{e^2} = e^{-2}$$

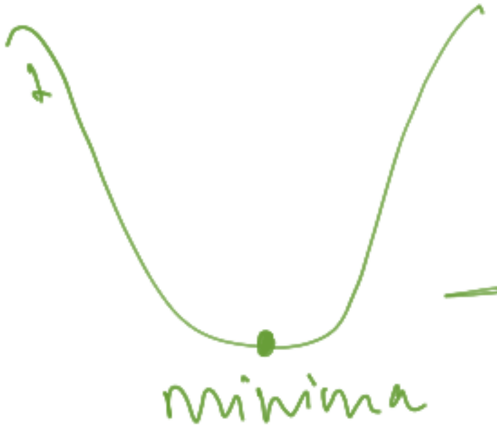
$$\frac{1}{2^5} = 2^{-5}$$

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

sig



$$\text{error} : \frac{1}{n} \sum_{i=0}^{n} (y_i - \hat{y})^2$$



$$\log\text{loss} = \frac{1}{n}\sum_{i=1}^{n} -(y_i \log \hat{y}_i) + (1-y_i)\log(1-\hat{y}_i)$$

$\log \hat{y}_i$ — y_i

$(1-y_i)$ — 0

$\log(1-\hat{y}_i)$ — 1

$\log(1-\hat{y}_i)$ — p

$\log y_i$ — p —

$$\text{log loss} = \frac{1}{n}\sum_{i=1}^{n} -y_i \log(\hat{y}_i) + (1-y_i)\log(1-\hat{y}_i)$$

$y_i \in \{0, 1\}$

$-y_i \log(\hat{y}_i)$

$\log(1-\hat{y}_i)$

$0 \rightarrow \log(1-\hat{y}_i)$

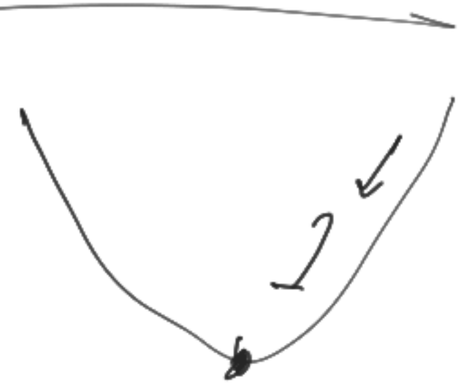
$1 \rightarrow \log(\hat{y}_i)$

0.7 0.25

1 1

0.3 0.75

$$\theta_{new} = \theta_{old} + \alpha \frac{\partial \theta}{\partial \theta_j}$$



der. log loss - sigmoid (σ)

$$\frac{\partial J(\theta)}{\partial \theta_j} = \sigma\left(\theta^T x - y\right) x_j$$

0 ; 1

Linear reg.

- simple
- multiple
- polynomial

logistic

- binary
- multinomial — pass, fail, appear
- ordinal — good, avg, poor, ex.

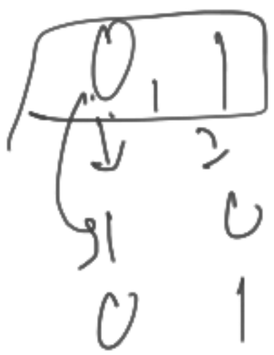
poor < avg < good < ex

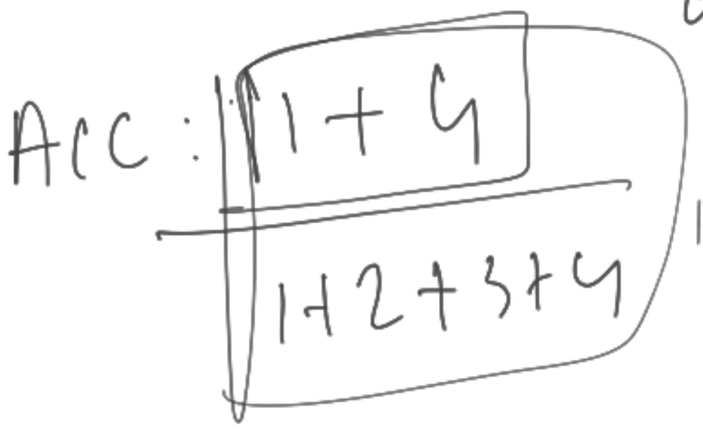
75 ± 5

70 80

MSE MAE

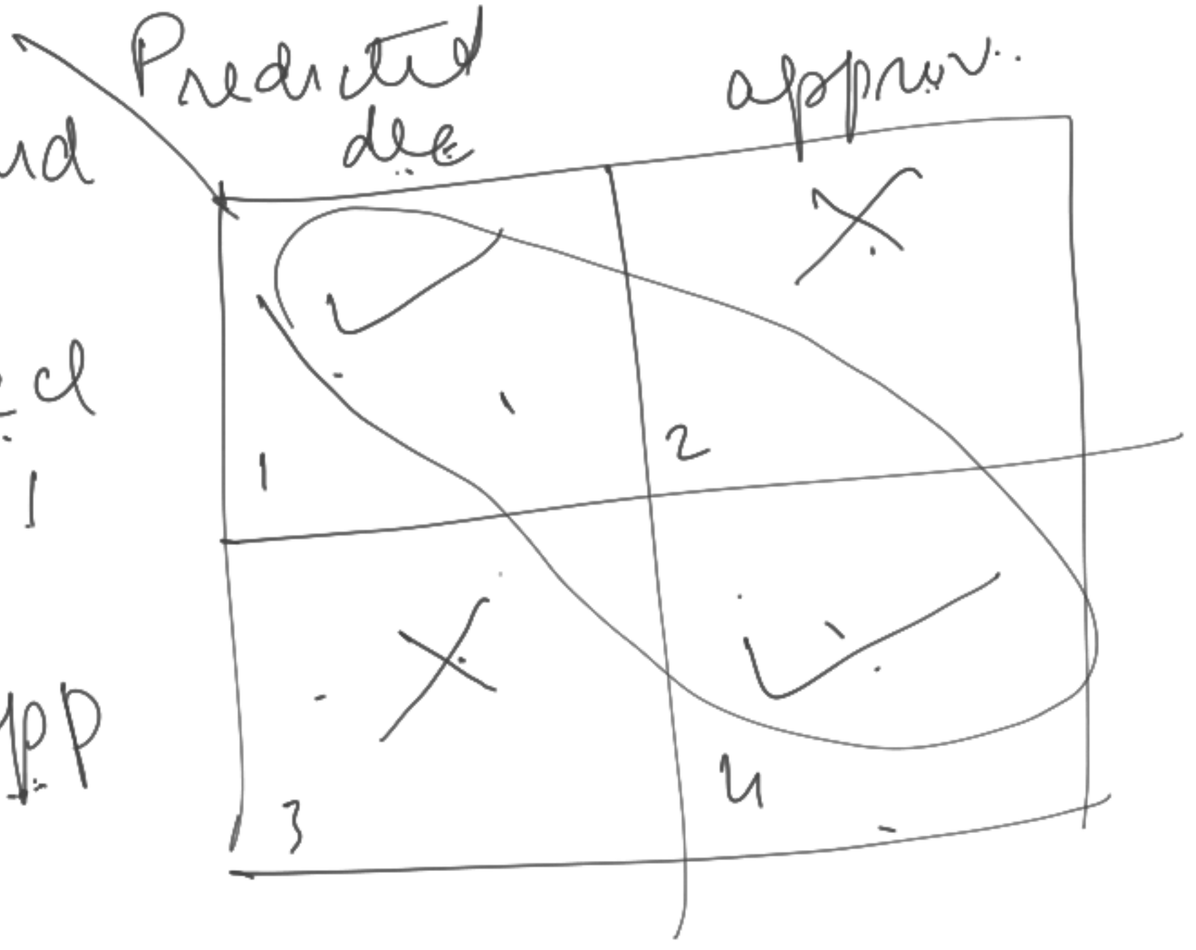
Performance Metric — Confusion Metrix

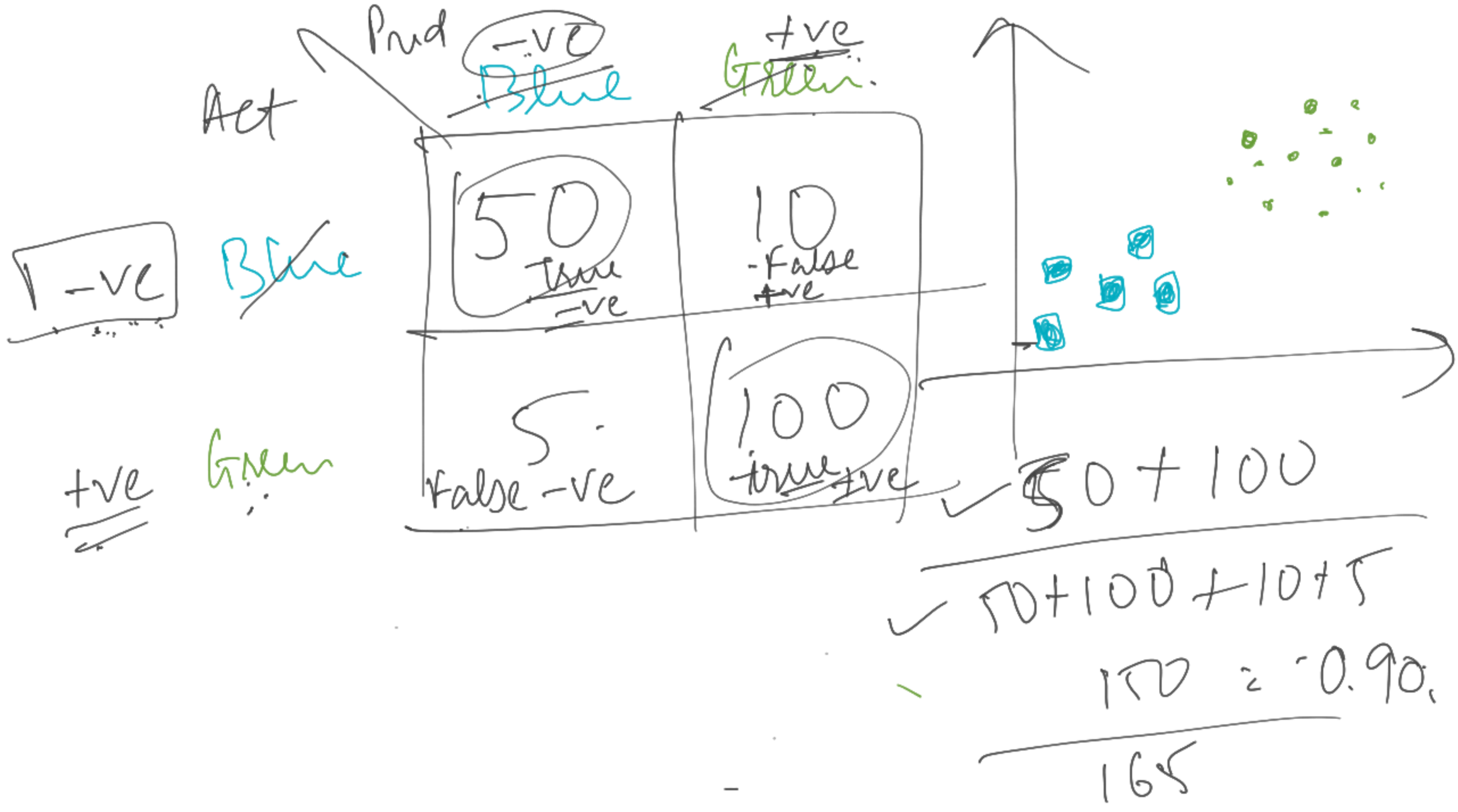


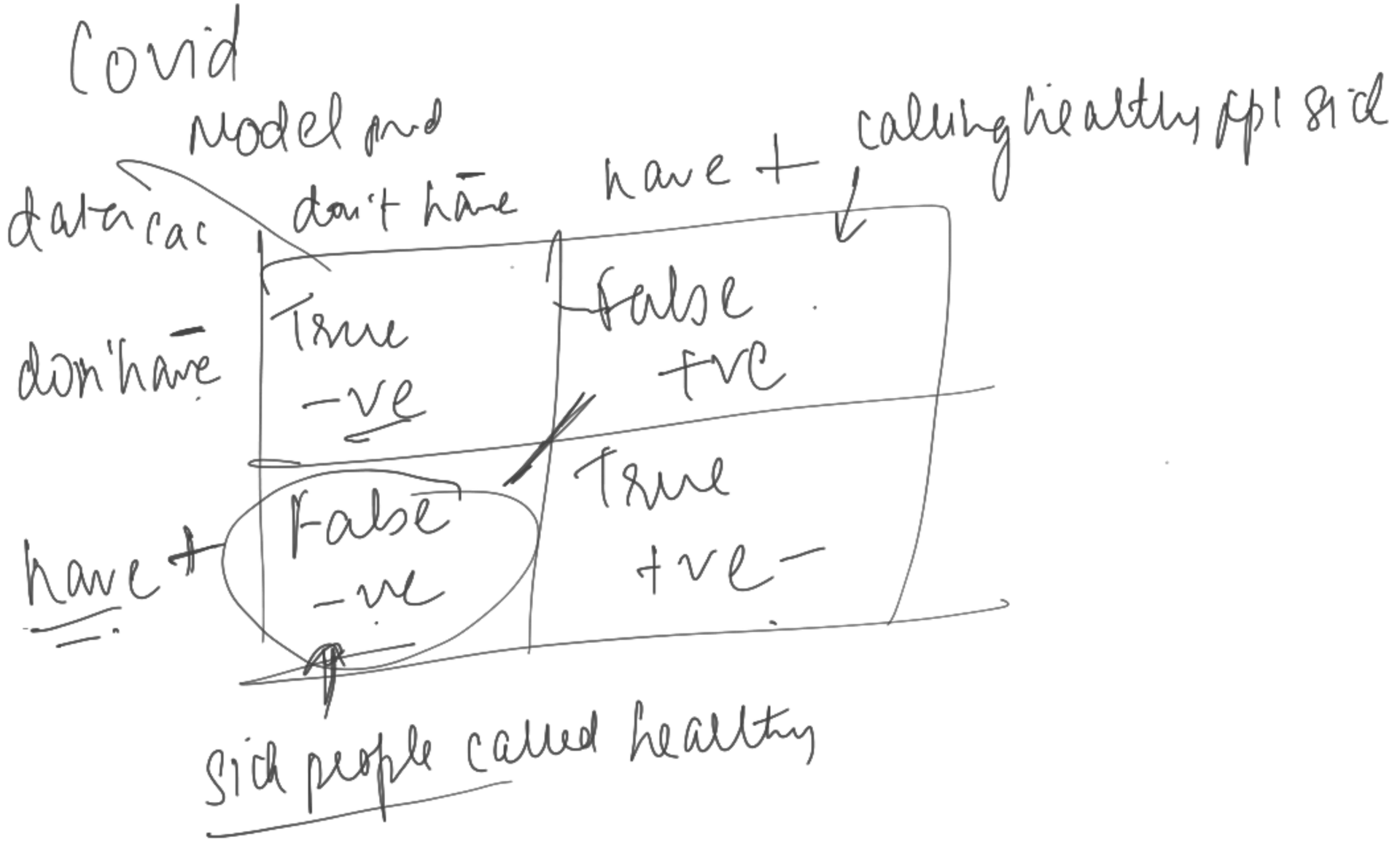


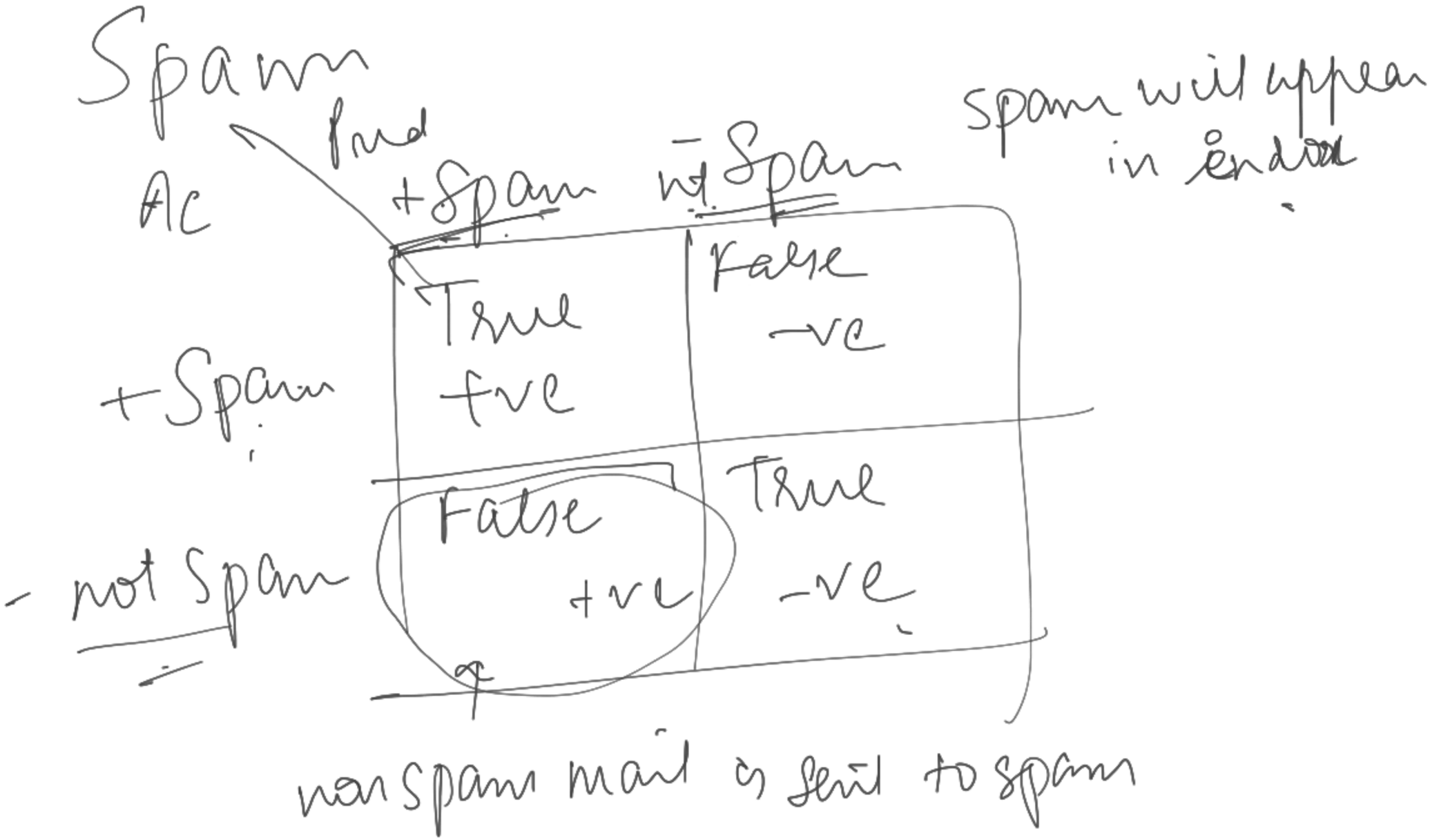
decl : 1

app




Pred
-ve
Blue
+ve
Green
Act
-ve
Blue
+ve
Green
50
True -ve
10
False +ve
5
False -ve
100
True +ve
50 + 100
10 + 100 + 10 + 5
150 = 0.90
165


Covid
Model pred
don't have
have +
calling healthy ppl sick
actual
don't have
True
-ve
False
+ve
have +
False
-ve
True
+ve
sick people called healthy


Spam
Pred
Ac
+Spam
-ve Spam
spam will appear in inbox
True +ve
False -ve
+Spam
False +ve
True -ve
- not Spam
non spam mail is sent to spam