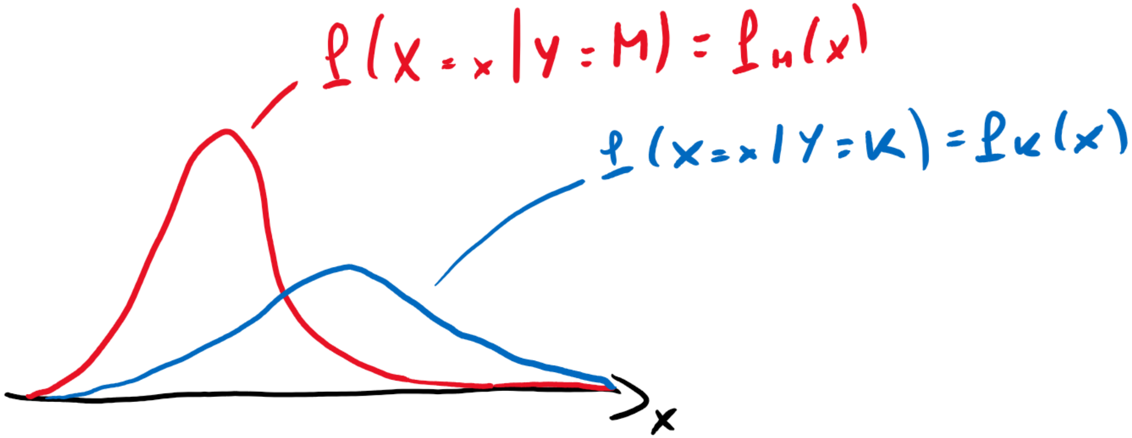
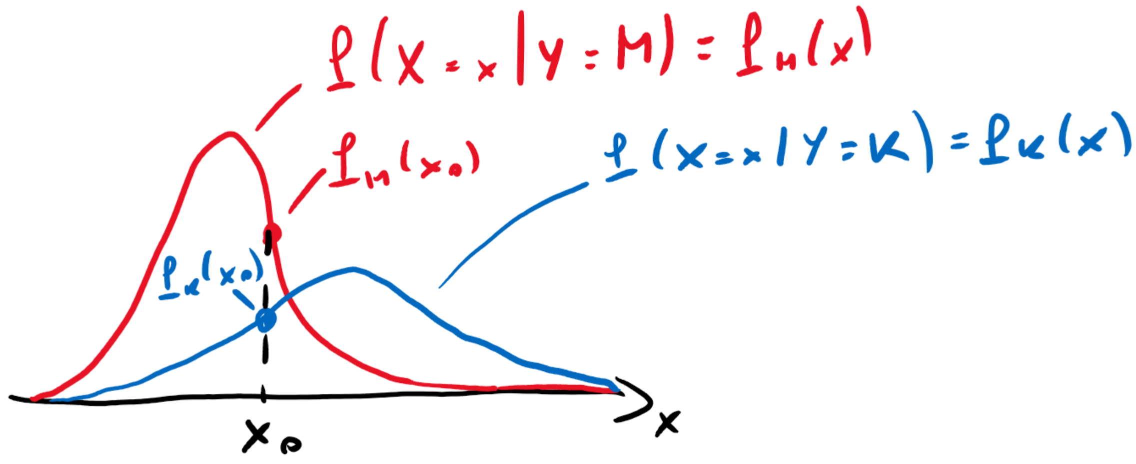
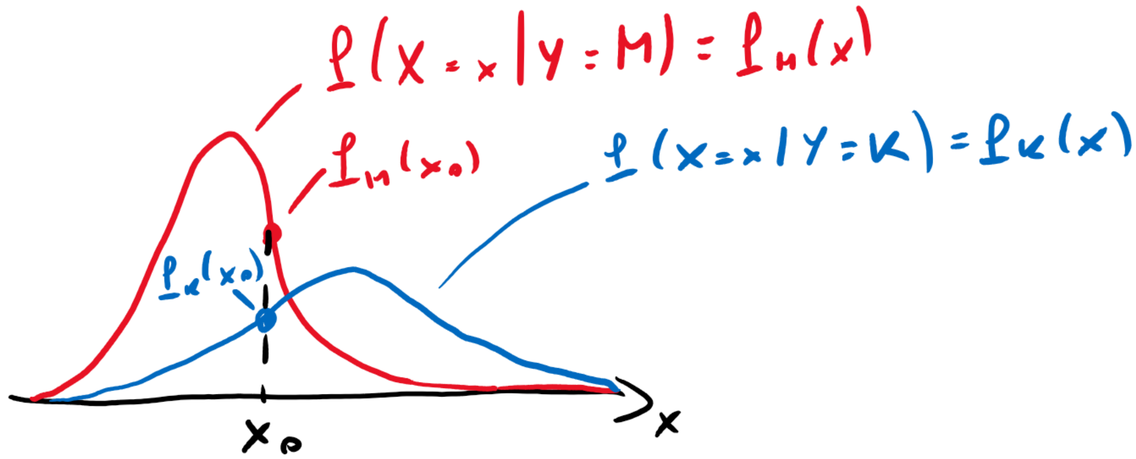

f(X = x | Y = M) = f_M(x)
f(X = x | Y = K) = f_K(x)
x



f(X = x | Y = M) = f_M(x)
f_M(x_0)
f(X = x | Y = K) = f_K(x)
f_K(x_0)
x_0
x

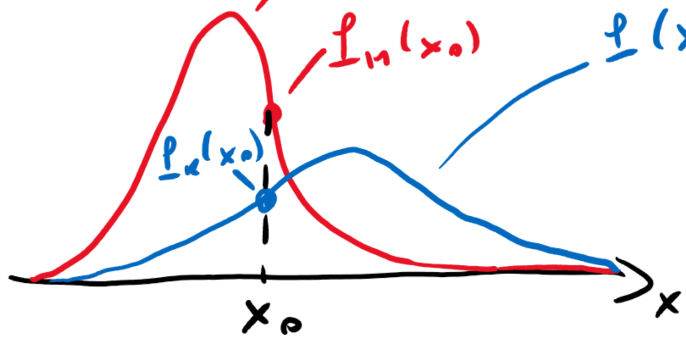


$P(Y=M)=\pi_M$

$P(Y=K)=\pi_K$

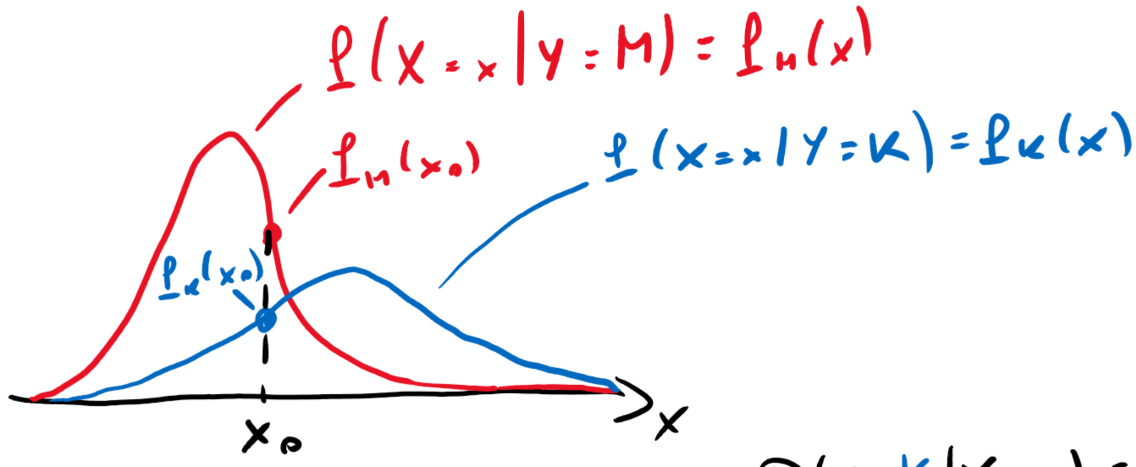
$f(X=x \mid Y=M) = f_M(x)$

$f(X=x \mid Y=K) = f_K(x)$



$P(Y=M) = \pi_M = \frac{N_M}{N}$

$P(Y=K) = \pi_K = \frac{N_K}{N}$



$$P(Y=K|X=x_0)=\frac{\pi_K\cdot f_K(x_0)}{\pi_K\cdot f_K(x_0)+\pi_M f_M(x_0)}$$

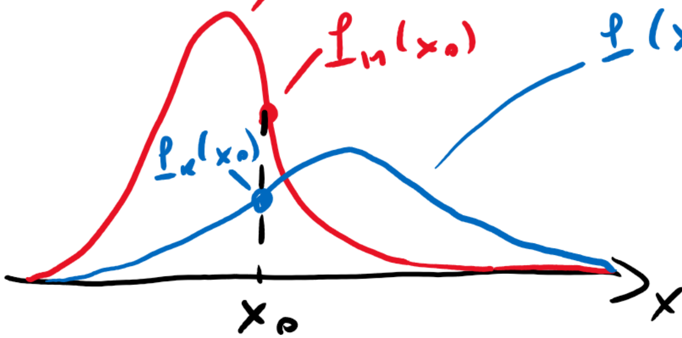
$$P(Y=M)=\pi_M=\frac{N_M}{N}$$

$$P(Y=K)=\pi_K=\frac{N_K}{N}$$

$$P(Y=M|X=x_0)=\frac{\pi_M f_M(x_0)}{\pi_K f_K(x_0)+\pi_M f_M(x_0)}$$

$$f(X=x \mid Y=M) = f_M(x)$$

$$f(X=x \mid Y=K) = f_K(x)$$



$$P(Y=K \mid X=x_0) = \frac{\pi_K \cdot f_K(x_0)}{\pi_K \cdot f_K(x_0) + \pi_M f_M(x_0)}$$

$$\vee$$

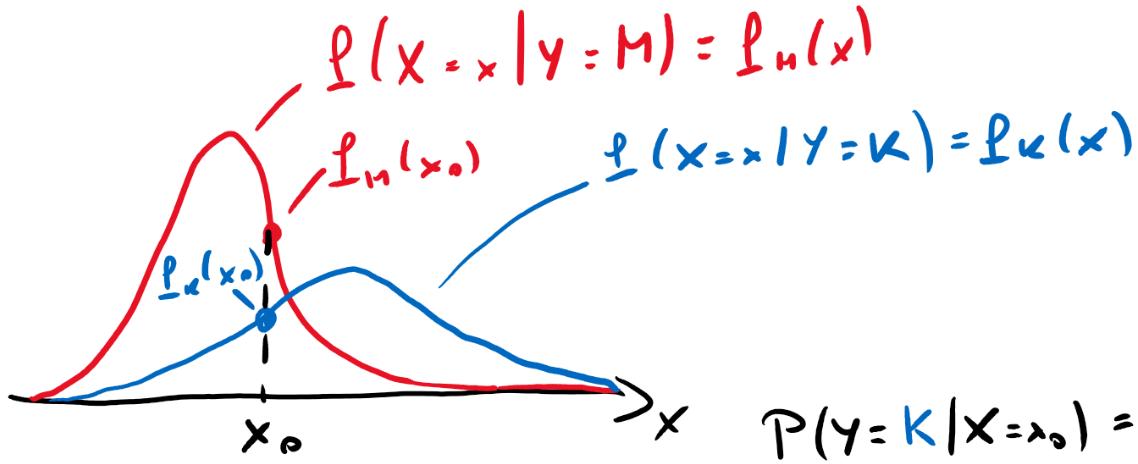
$$P(Y=M \mid X=x_0) = \frac{\pi_M \, f_M(x_0)}{\pi_K f_K(x_0) + \pi_M f_M(x_0)}$$

$$\Downarrow$$

$$K$$

$$P(Y=M) = \pi_M = \frac{N_M}{N}$$

$$P(Y=K) = \pi_K = \frac{N_K}{N}$$



$$P(Y=K \mid X=x_0) = \frac{\pi_K \cdot f_K(x_0)}{\pi_K \cdot f_K(x_0) + \pi_M f_M(x_0)}$$

$$P(Y=M \mid X=x_0) = \frac{\pi_M f_M(x_0)}{\pi_K f_K(x_0) + \pi_M f_M(x_0)}$$

$$\Downarrow$$

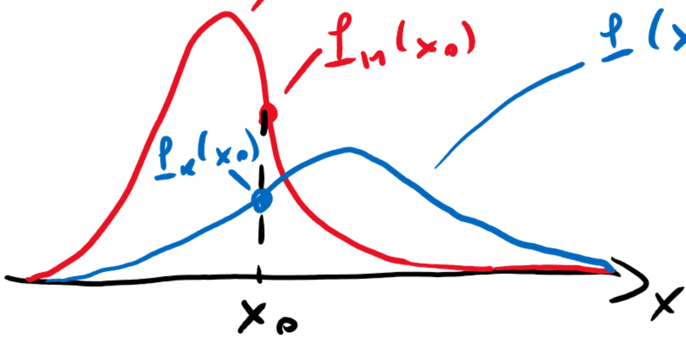
$$M$$

$$P(Y=M) = \pi_M = \frac{N_M}{N}$$

$$P(Y=K) = \pi_K = \frac{N_K}{N}$$

$$f(X=x \mid Y=M) = f_M(x)$$

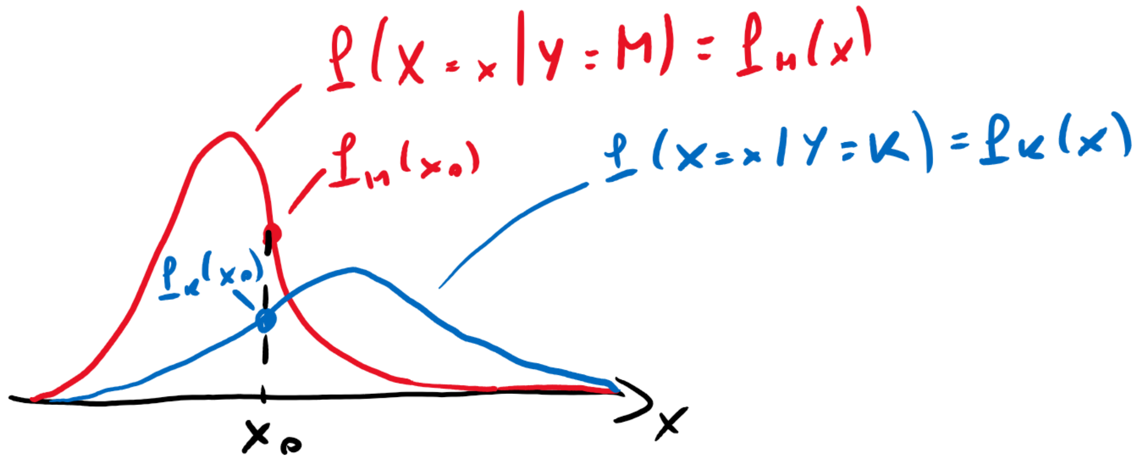
$$f(X=x \mid Y=K) = f_K(x)$$



$$\pi_K \cdot f_K(x_0) > \pi_M f_M(x_0) \Rightarrow K$$

$$P(Y=M) = \pi_M = \frac{N_M}{N}$$

$$P(Y=K) = \pi_K = \frac{N_K}{N}$$



$$\pi_K \cdot f_K(x_0) < \pi_M f_M(x_0) \Rightarrow M$$

$$P(Y=M) = \pi_M = \frac{N_M}{N}$$

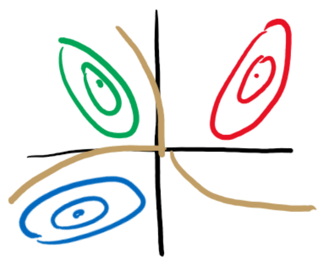
$$P(Y=K) = \pi_K = \frac{N_K}{N}$$

μ_1 μ_2 μ_3

Σ_1 Σ_2 Σ_3

π_1 π_2 π_3

QDA

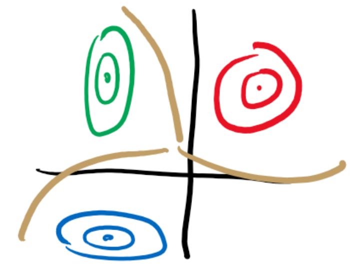


DQDA

μ_1 μ_2 μ_3

Σ_1 Σ_2 Σ_3

π_1 π_2 π_3

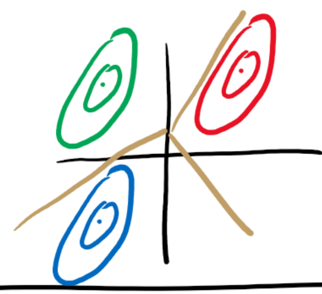


LDA

μ_1 μ_2 μ_3

$\Sigma_1 = \Sigma_2 = \Sigma_3$

π_1 π_2 π_3

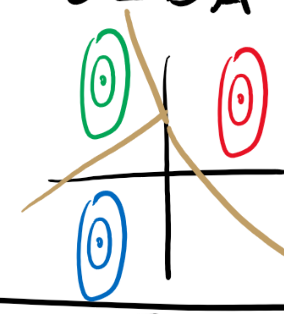


DLDA

μ_1 μ_2 μ_3

$\Sigma_1 = \Sigma_2 = \Sigma_3$

π_1 π_2 π_3

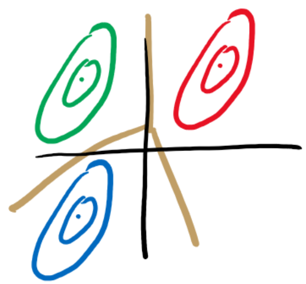


MIN. MAHALAN.

μ_1 μ_2 μ_3

$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\pi_1 = \pi_2 = \pi_3$

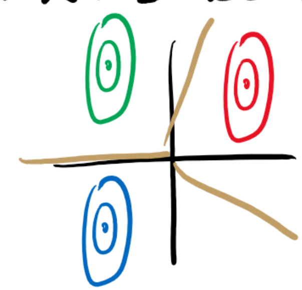


MIN. W. EUKLIDE

μ_1 μ_2 μ_3

$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\pi_1 = \pi_2 = \pi_3$

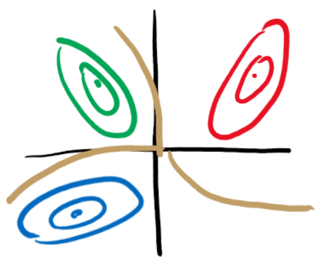


QDA

$\mu_1 \quad \mu_2 \quad \mu_3$

$\Sigma_1 \quad \Sigma_2 \quad \Sigma_3$

$\pi_1 \quad \pi_2 \quad \pi_3$

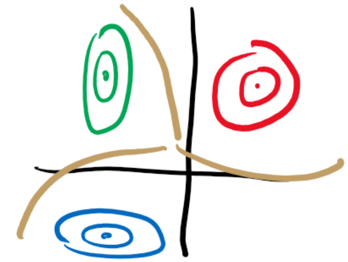


DQDA

$\mu_1 \quad \mu_2 \quad \mu_3$

$\Sigma_1 \quad \Sigma_2 \quad \Sigma_3$

$\pi_1 \quad \pi_2 \quad \pi_3$

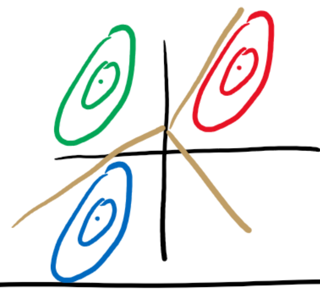


LDA

$\mu_1 \quad \mu_2 \quad \mu_3$

$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\pi_1 \quad \pi_2 \quad \pi_3$

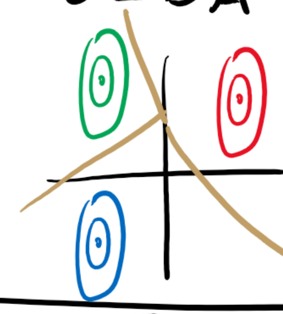


DLDA

$\mu_1 \quad \mu_2 \quad \mu_3$

$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\pi_1 \quad \pi_2 \quad \pi_3$

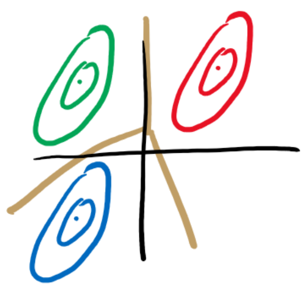


MIN. MAHALAN.

$\mu_1 \quad \mu_2 \quad \mu_3$

$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\pi_1 = \pi_2 = \pi_3$

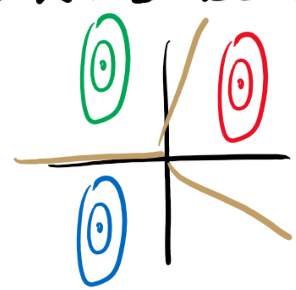


MIN. W. EUKLIDE

$\mu_1 \quad \mu_2 \quad \mu_3$

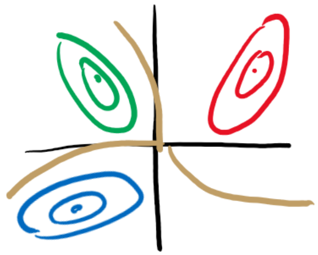
$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\pi_1 = \pi_2 = \pi_3$



μ_1	μ_2	μ_3
Σ_1	Σ_2	Σ_3
π_1	π_2	π_3

QDA

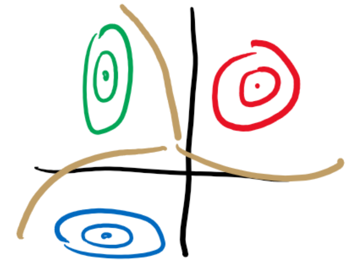


$\mu_1 \quad \mu_2 \quad \mu_3$

$\Sigma_1 \quad \Sigma_2 \quad \Sigma_3$

$\pi_1 \quad \pi_2 \quad \pi_3$

DQDA



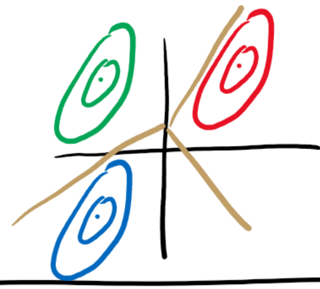
$\Downarrow$

LDA

$\mu_1 \quad \mu_2 \quad \mu_3$

$\underline{\Sigma_1 = \Sigma_2 = \Sigma_3}$

$\pi_1 \quad \pi_2 \quad \pi_3$

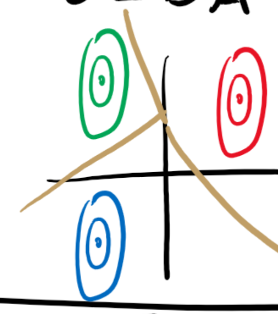


DLDA

$\mu_1 \quad \mu_2 \quad \mu_3$

$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\pi_1 \quad \pi_2 \quad \pi_3$



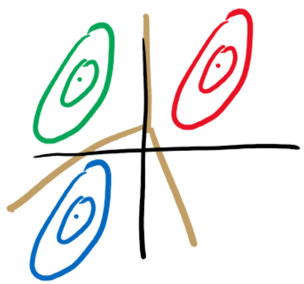
$\Downarrow$

MIN. MAHALAN.

$\mu_1 \quad \mu_2 \quad \mu_3$

$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\underline{\pi_1 = \pi_2 = \pi_3}$

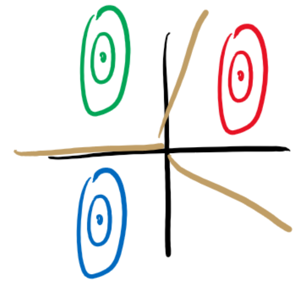


MIN. W. EUKLIDE

$\mu_1 \quad \mu_2 \quad \mu_3$

$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\pi_1 = \pi_2 = \pi_3$



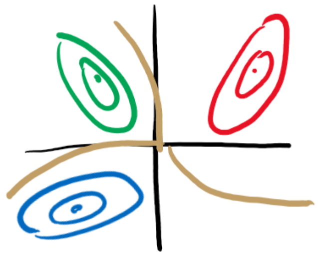
$\mu_1 \quad \mu_2 \quad \mu_3$

$\Sigma_1 \quad \Sigma_2 \quad \Sigma_3$

$\pi_1 \quad \pi_2 \quad \pi_3$

$$\Sigma = \begin{bmatrix} \sigma_1 & \sigma_{12} \\ \sigma_{21} & \sigma_2 \end{bmatrix}$$

QDA



$\Rightarrow$

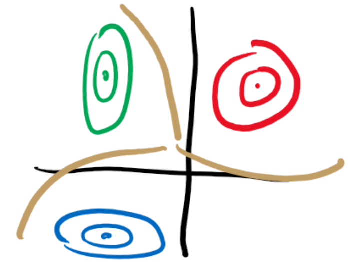
$\mu_1 \quad \mu_2 \quad \mu_3$

$\Sigma_1 \quad \Sigma_2 \quad \Sigma_3$

$\pi_1 \quad \pi_2 \quad \pi_3$

$$\Sigma = \begin{bmatrix} \sigma_1 & 0 \\ 0 & \sigma_2 \end{bmatrix}$$

DQDA



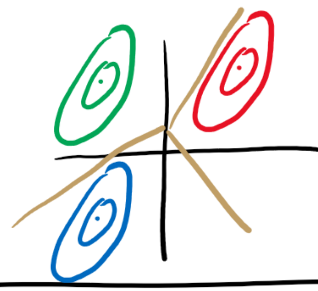
$\Downarrow$

LDA

$\mu_1 \quad \mu_2 \quad \mu_3$

$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\pi_1 \quad \pi_2 \quad \pi_3$

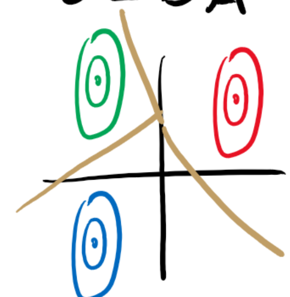


DLDA

$\mu_1 \quad \mu_2 \quad \mu_3$

$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\pi_1 \quad \pi_2 \quad \pi_3$



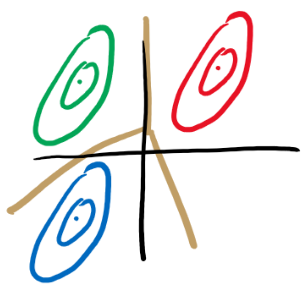
$\Downarrow$

MIN. MAHALAN.

$\mu_1 \quad \mu_2 \quad \mu_3$

$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\pi_1 = \pi_2 = \pi_3$

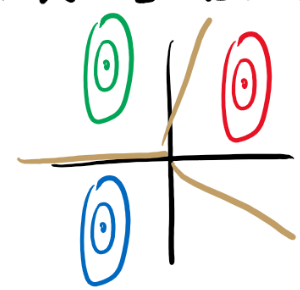


MIN. W. EUKLIDE

$\mu_1 \quad \mu_2 \quad \mu_3$

$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\pi_1 = \pi_2 = \pi_3$



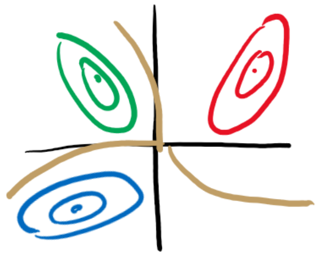
μ_1 μ_2 μ_3

Σ_1 Σ_2 Σ_3

π_1 π_2 π_3

$$\Sigma = \begin{bmatrix} \sigma_1 & \sigma_{12} \\ \sigma_{21} & \sigma_2 \end{bmatrix}$$

QDA



$\Rightarrow$

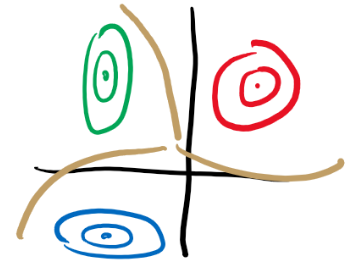
DQDA

μ_1 μ_2 μ_3

Σ_1 Σ_2 Σ_3

π_1 π_2 π_3

$$\Sigma = \begin{bmatrix} \sigma_1 & 0 \\ 0 & \sigma_2 \end{bmatrix}$$



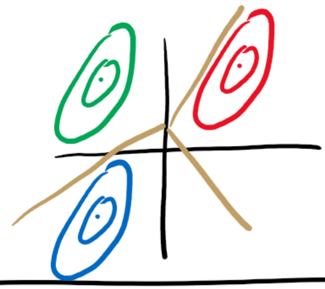
$\Downarrow$

LDA

μ_1 μ_2 μ_3

$\underline{\Sigma_1 = \Sigma_2 = \Sigma_3}$

π_1 π_2 π_3



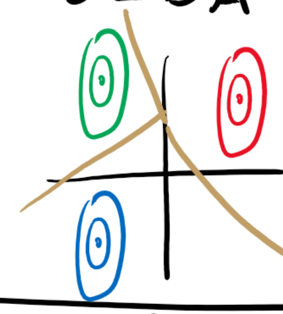
$\Downarrow$

DLDA

μ_1 μ_2 μ_3

$\underline{\Sigma_1 = \Sigma_2 = \Sigma_3}$

π_1 π_2 π_3



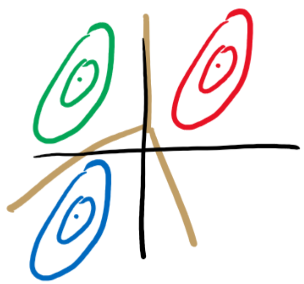
$\Downarrow$

MIN. MAHALAN.

μ_1 μ_2 μ_3

$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\underline{\pi_1 = \pi_2 = \pi_3}$

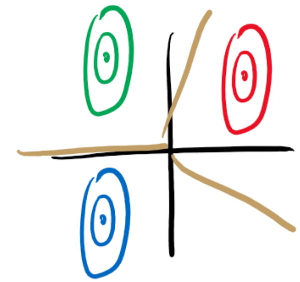


MIN. W. EUKLIDE

μ_1 μ_2 μ_3

$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\pi_1 = \pi_2 = \pi_3$



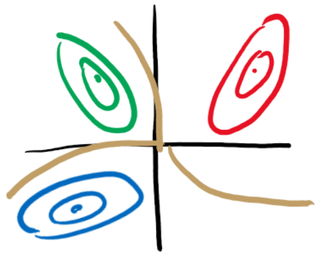
μ_1 μ_2 μ_3

Σ_1 Σ_2 Σ_3

π_1 π_2 π_3

$$\Sigma = \begin{bmatrix} \sigma_1 & \sigma_{12} \\ \sigma_{21} & \sigma_2 \end{bmatrix}$$

QDA



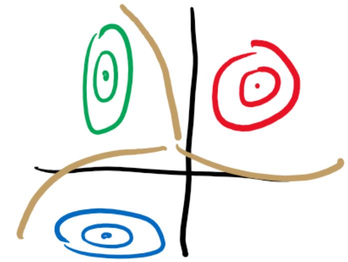
DQDA

μ_1 μ_2 μ_3

Σ_1 Σ_2 Σ_3

π_1 π_2 π_3

$$\Sigma = \begin{bmatrix} \sigma_1 & 0 \\ 0 & \sigma_2 \end{bmatrix}$$

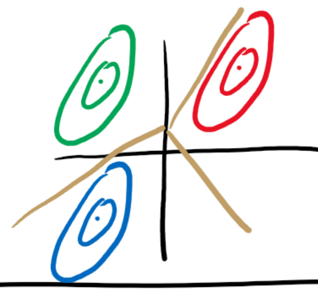


LDA

μ_1 μ_2 μ_3

$\underline{\Sigma_1 = \Sigma_2 = \Sigma_3}$

π_1 π_2 π_3

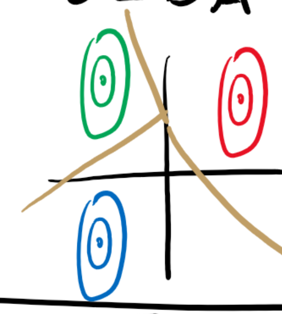


DLDA

μ_1 μ_2 μ_3

$\underline{\Sigma_1 = \Sigma_2 = \Sigma_3}$

π_1 π_2 π_3

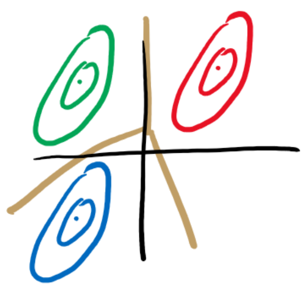


MIN. MAHALAN.

μ_1 μ_2 μ_3

$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\underline{\pi_1 = \pi_2 = \pi_3}$

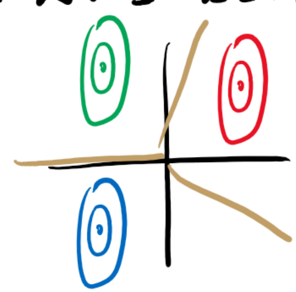


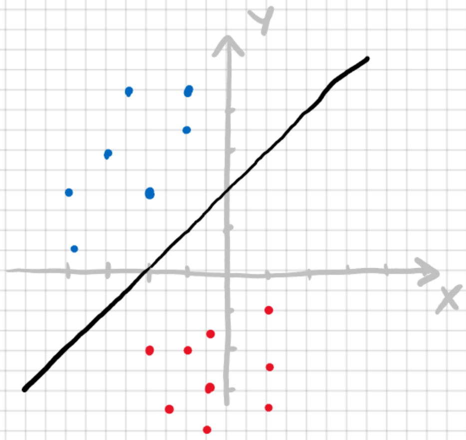
MIN. W. EUKLIDE

μ_1 μ_2 μ_3

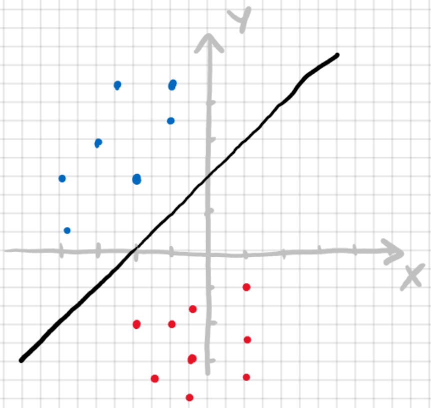
$\Sigma_1 = \Sigma_2 = \Sigma_3$

$\underline{\pi_1 = \pi_2 = \pi_3}$

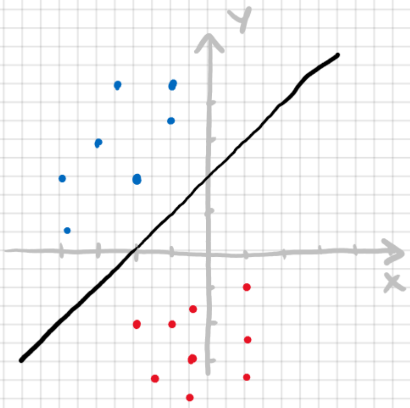




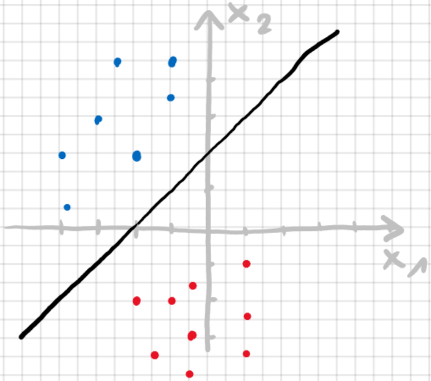
$y = ax + b$



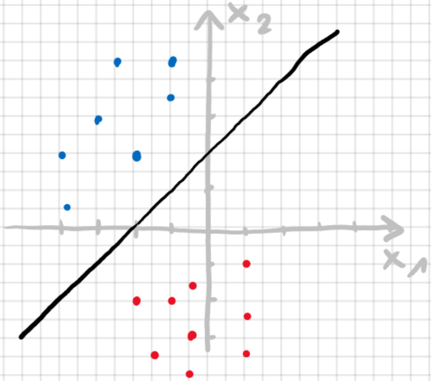
$ax - y + b = \emptyset$



$$w_1 x + w_2 y + w_0 = \emptyset$$



$$w_1 x_1 + w_2 x_2 + w_0 = \emptyset$$

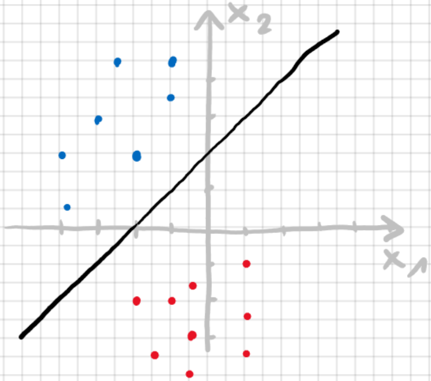


$$\underbrace{w_1 x_1 + w_2 x_2 + w_0 = 0}_{w^T \cdot x + w_0 = 0}$$

$$x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

$$w = \begin{bmatrix} w_1 \\ w_2 \end{bmatrix}$$

w_0

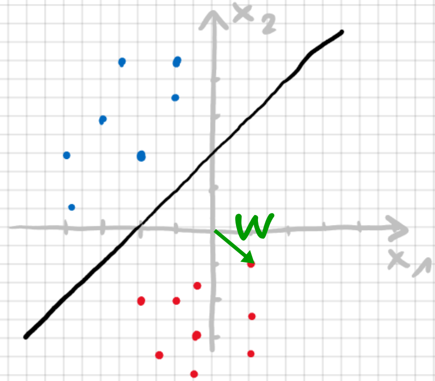


$$\underbrace{w_1 x_1 + w_2 x_2 + w_0 = \emptyset}_{w^T \cdot x + w_0 = \emptyset}$$

$$x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

$$w = \begin{bmatrix} w_1 \\ w_2 \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

$$w_0 = 2$$

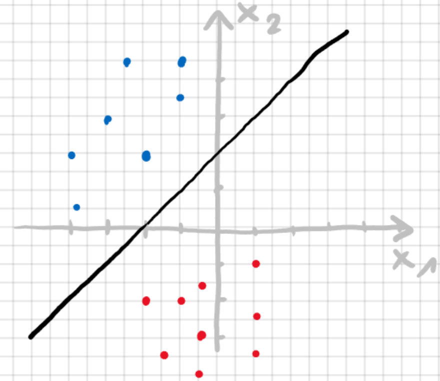


$$\underbrace{w_1 x_1 + w_2 x_2 + w_0 = \emptyset}_{w^T \cdot x + w_0 = \emptyset}$$

$$x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

$$w = \begin{bmatrix} w_1 \\ w_2 \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

$$w_0 = 2$$



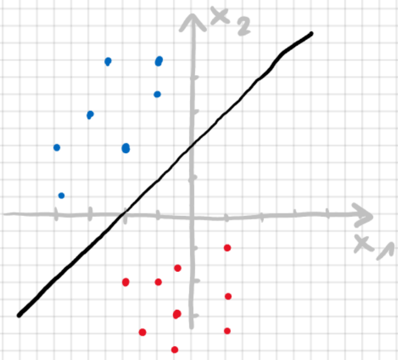
$$\underbrace{w_1 x_1 + w_2 x_2 + w_0 = \emptyset}_{w^T \cdot x + w_0 = \emptyset}$$

$$x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

$$w = \begin{bmatrix} w_1 \\ w_2 \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

$$w_0 = 2$$

$$\delta(x) = w_1 x_1 + w_2 x_2 + w_0$$



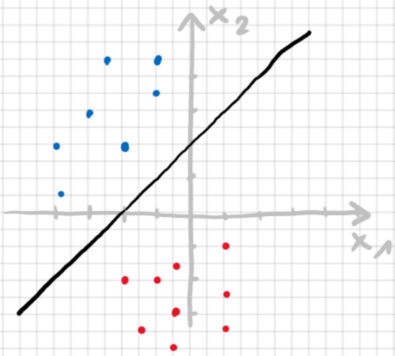
$$\underbrace{w_1 x_1 + w_2 x_2 + w_0 = \phi}_{w^T \cdot x + w_0 = \phi}$$

$$x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} -2 \\ -2 \end{bmatrix}$$

$$w = \begin{bmatrix} w_1 \\ w_2 \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

$$w_0 = 2$$

$$\delta(x) = w_1 x_1 + w_2 x_2 + w_0 \quad \Rightarrow \quad \delta(x) = 1 \cdot (-2) + (-1) \cdot (-2) + 2 = 2$$



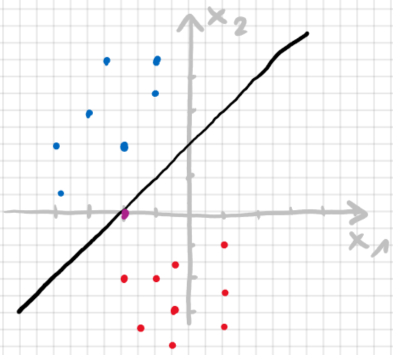
$$\underbrace{w_1 x_1 + w_2 x_2 + w_0 = \emptyset}_{w^T \cdot x + w_0 = \emptyset}$$

$$x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} -2 \\ 2 \end{bmatrix}$$

$$w = \begin{bmatrix} w_1 \\ w_2 \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

$$w_0 = 2$$

$$\delta(x) = w_1 x_1 + w_2 x_2 + w_0 \Rightarrow \delta(x) = 1 \cdot (-2) + (-1) \cdot 2 + 2 = -2$$



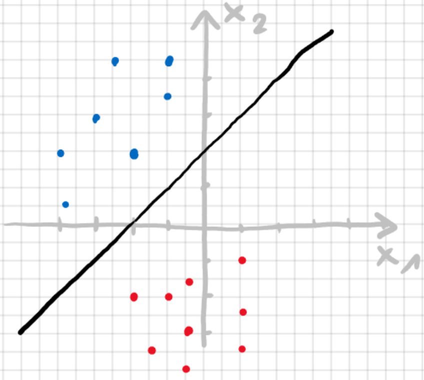
$$\underbrace{w_1 x_1 + w_2 x_2 + w_0 = \emptyset}_{w^T \cdot x + w_0 = \emptyset}$$

$$x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} -2 \\ 0 \end{bmatrix}$$

$$w = \begin{bmatrix} w_1 \\ w_2 \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

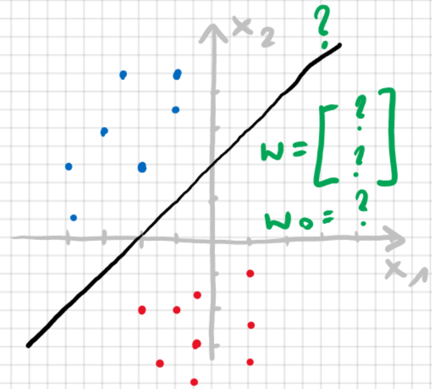
$$w_0 = 2$$

$$\delta(x) = w_1 x_1 + w_2 x_2 + w_0 \quad \Rightarrow \delta(x) = 1 \cdot (-2) + (-1) \cdot \emptyset + 2 = \emptyset$$



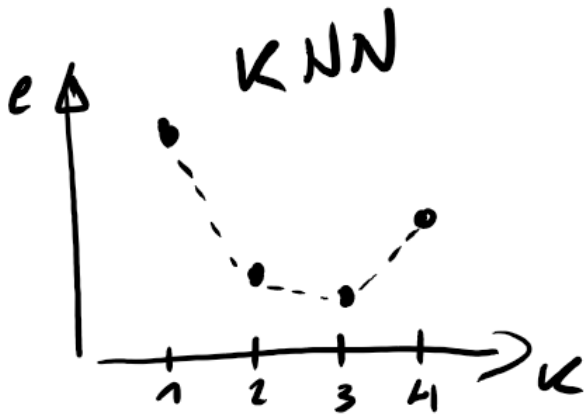
$$\delta(x) = w_1 x_1 + w_2 x_2 + w_0$$

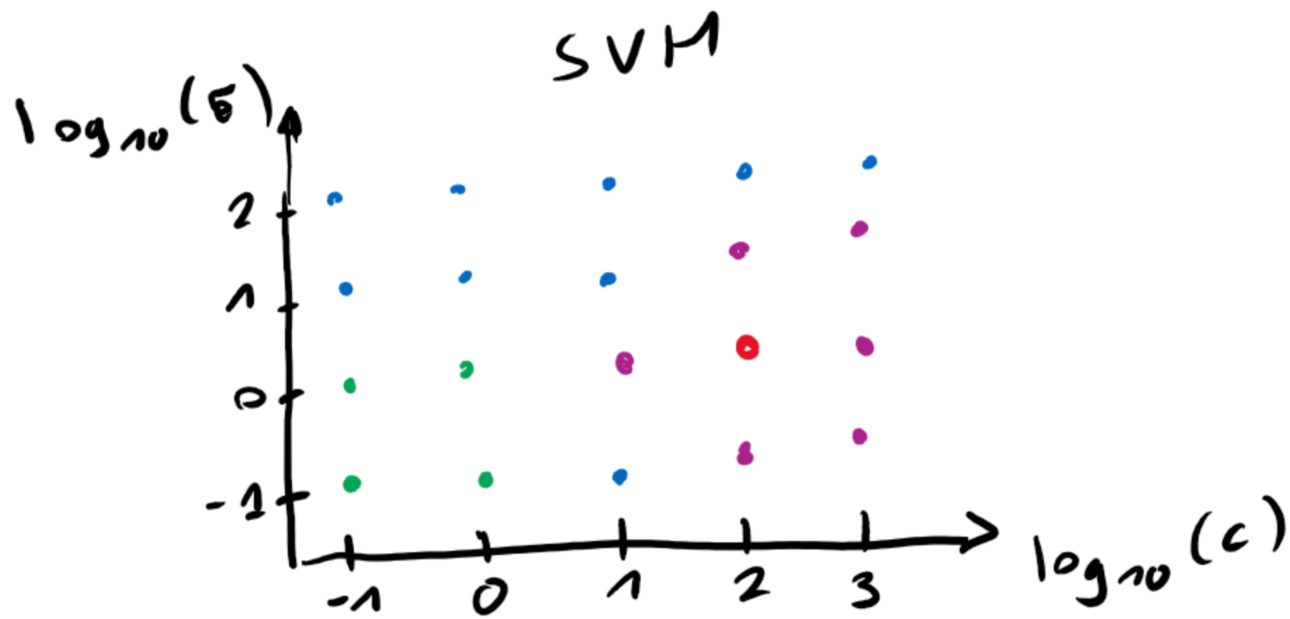
$$d(x) = \mathrm{sign}(\delta(x)) = \begin{cases} 1 \Leftrightarrow \delta(x) > \emptyset \\ -1 \Leftrightarrow \delta(x) \leq \emptyset \end{cases}$$



$$\delta(x) = w_1 x_1 + w_2 x_2 + w_0$$

$$d(x) = \mathrm{sign}(\delta(x)) = \begin{cases} 1 \iff \delta(x) > 0 \\ -1 \iff \delta(x) \leq 0 \end{cases}$$


KNN
e
k
1
2
3
4


SVM
log10(σ)
log10(c)
-1
0
1
2
3