Thursday, May 7, 2020 10:23 AM

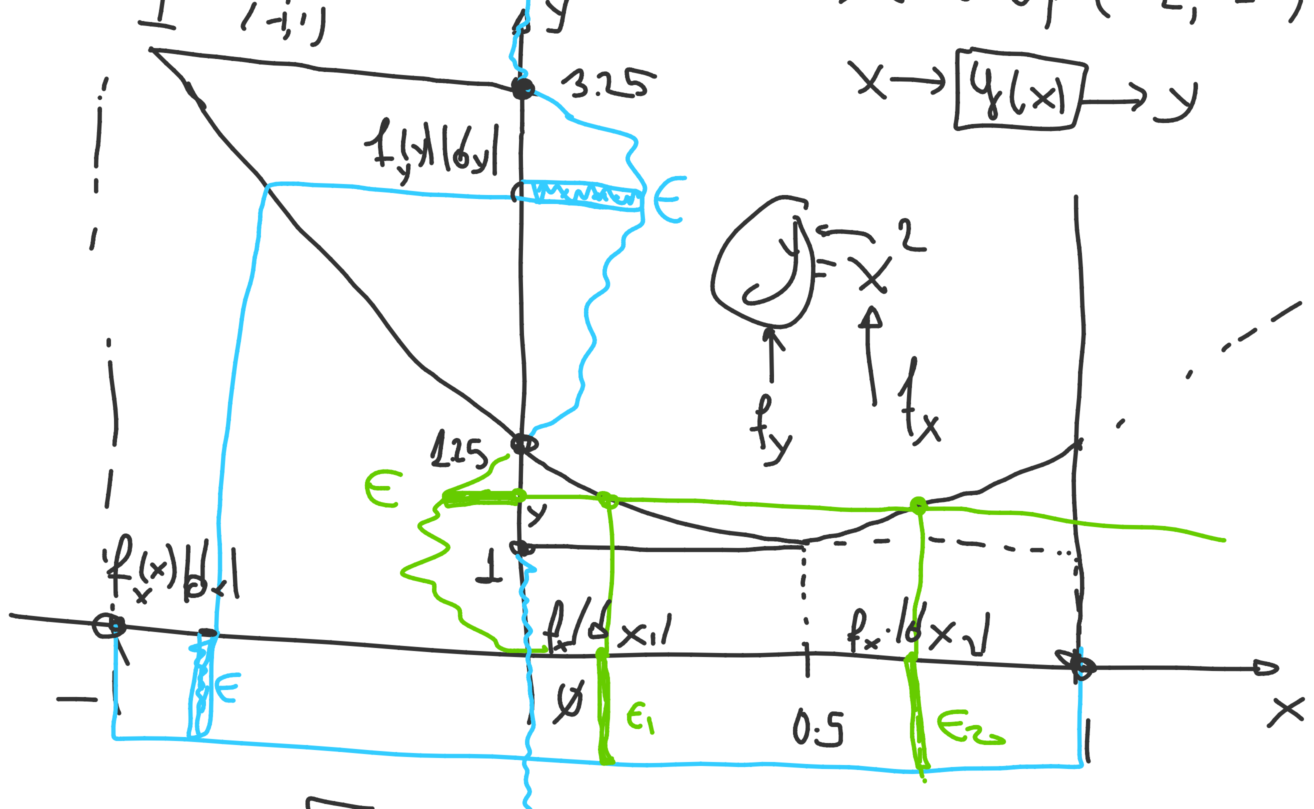
$$x = g^{-1}(y)$$

$$f_y(y) \leftarrow y = \left(x - \tfrac{1}{2}\right)^2 + 1$$

$(-1, 1)$

$$X \sim \text{Oμ.}(-1, 1)$$

$$X \to \boxed{g(x)} \to y$$



$$x_1 = -\frac{2\sqrt{y-1} - 1}{2} \qquad x_2 = \frac{2\sqrt{y-1} + 1}{2}$$

$$\frac{dx_1}{dy} = -\frac{1}{2\sqrt{y-1}}, \qquad \frac{\partial x_2}{\partial y} = \frac{1}{2\sqrt{y-1}}$$

$$\boxed{\epsilon = \epsilon_1 + \epsilon_2} \Rightarrow f_y(y)\frac{|dy|}{|dy|} = f_x^{1/2}(x_1)\frac{|dx_1|}{|dy|} + f_x^{1/2}(x_2)\frac{|dx_2|}{|dy|}$$

$$f_y(y) = \begin{cases} \boxed{\dfrac{1}{4\sqrt{y-1}}, \quad 1.25 < y < 3.25} \\[2ex] \dfrac{1}{2\sqrt{y-1}}, \quad 1 < y < 1.25 \end{cases}$$

$-1 < x < \emptyset$

$$\begin{cases} 2\sqrt{y-1} & \\ \emptyset, & \text{αλλού} \end{cases} \qquad \underline{y = x_1 \cdot x_2}$$

$$Y = \underset{\substack{\downarrow \\ \text{TM}}}{X_1} + \underset{\downarrow}{X_2} \Rightarrow f_Y(y) = f_{X_1}(x) \circledast f_{X_2}(x)$$

Πολυδιάστατη Gaussian

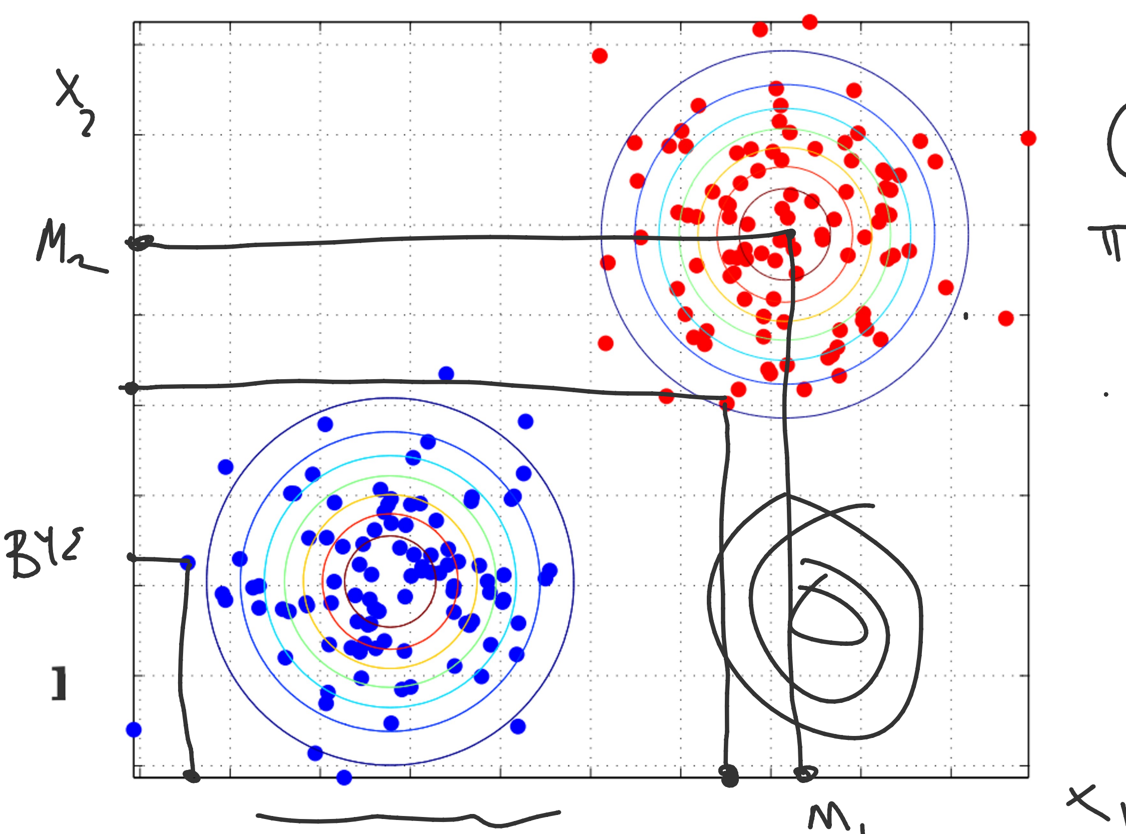
$$P(\mathbf{x}; \underbrace{\mathbf{m}, \mathbf{C}}) = \frac{1}{2\pi^{k/2} \mid \mathbf{C} \mid^{1/2}} e^{-(\mathbf{x}-\mathbf{m})^T \mathbf{C}^{-1} (\mathbf{x}-\mathbf{m})}$$

$k = 2$

$$\underline{m} = \begin{bmatrix} M_1 \\ M_2 \end{bmatrix}$$

$$C = \begin{bmatrix} \sigma^2 & \emptyset \\ \emptyset & \sigma^2 \end{bmatrix}$$

πορτ



$$\mathbf{C} = \frac{1}{N-1} (\mathbf{x} - \mathbf{m})^T \cdot (\mathbf{x} - \mathbf{m})$$

$$\mathbf{C} = \frac{1}{N-1}(\mathbf{x}-\mathbf{m})^T \cdot (\mathbf{x}-\mathbf{m})$$

$$\underline{m} = \frac{1}{N}\sum_{i=1}^{N} \underline{x}_i$$

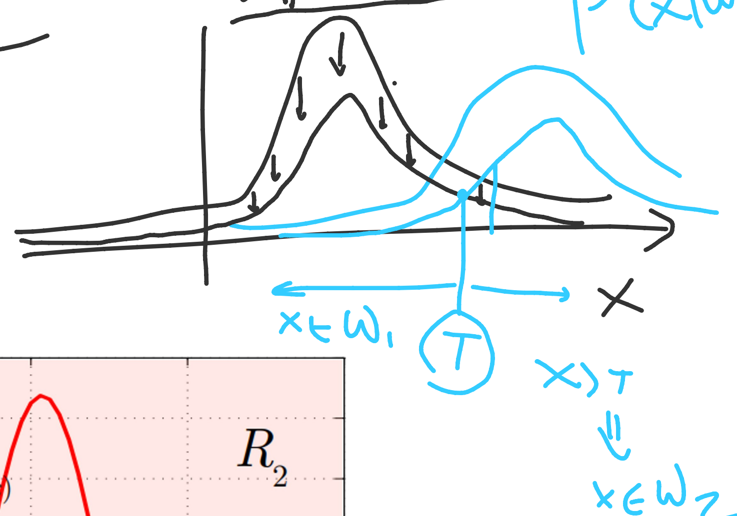
Ταξινόμηση

$$\boxed{P(\omega_i \mid \underline{x})} \underset{\text{Bayes}}{=} \frac{\overbrace{P(\underline{x} \mid \omega_i)}^{\text{Likelihood}}\overbrace{P(\omega_i)}^{\text{Priors}}}{\underbrace{\cancel{P(\underline{x})}}_{\text{Evidence}}}$$

<1

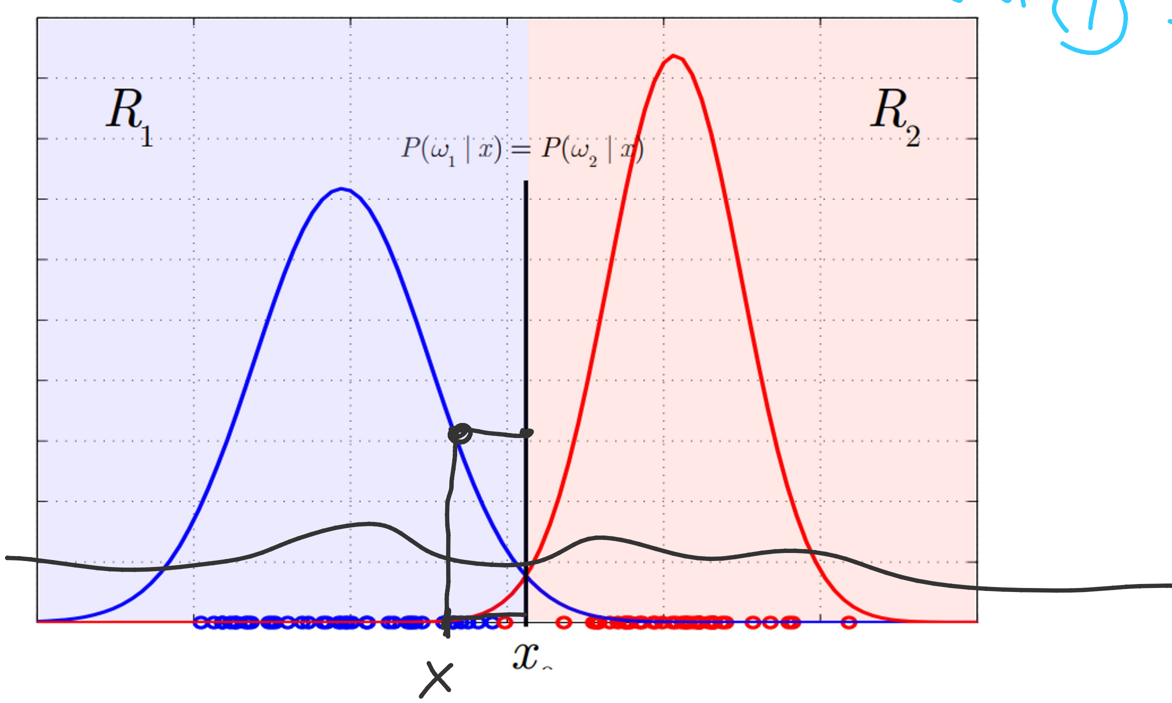
$p_{(\omega_1)} \cdot p(x|\omega_1)$

$P(x|\omega_2)$



$\omega_1 = \text{ΠΟΡ}$

$\omega_2 = \text{ΒΥΣ}$



Υπόθεση

$$\underline{\boldsymbol{\Sigma}_i = \sigma_i^2 \mathbf{I}} \Rightarrow \text{ΓΡΑΜΜΙΚΟΙ ΤΑΞΙΝΟΜΗΤΕΣ}$$

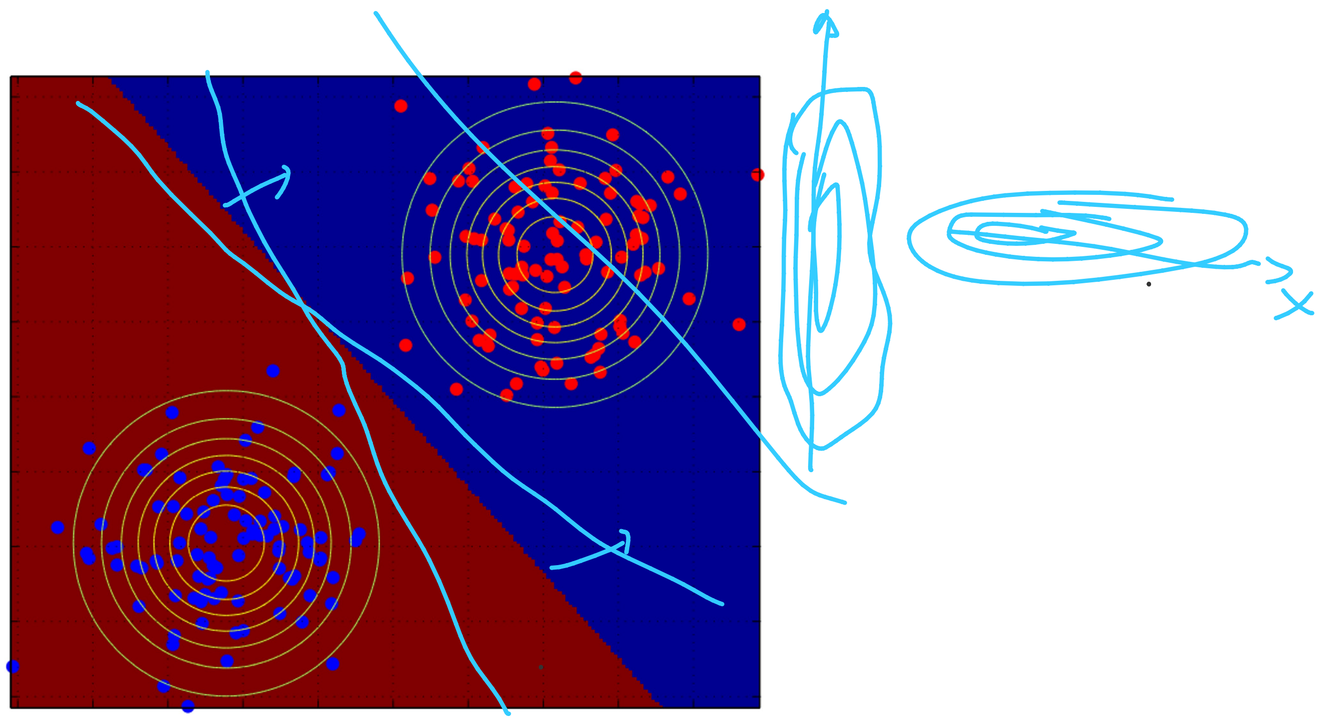
$$\Sigma_i = \sigma_i \mathbf{I}$$

$$\Sigma_i = \begin{bmatrix} \sigma_1^2 & & \emptyset \\ & \ddots & \\ \emptyset & & \sigma_2^2 \end{bmatrix}$$

$$g_i(\mathbf{x}) = \mathbf{w}_i^T \mathbf{x} + b$$

$$\mathbf{w}_i = \boldsymbol{\mu}_i \,/\, \sigma^2$$

$$b = -\frac{\boldsymbol{\mu}_i^T \boldsymbol{\mu}_i}{2\sigma^2} + \log P(\omega_i)$$



Τυχαίος Πίνακας συνδιασπορών δημιουργεί μη γραμμικές περιοχές

$$g_i(\mathbf{x}) = \mathbf{x}^T \mathbf{W}_i \mathbf{x} + \mathbf{w}_i^T \mathbf{x} + w_i$$

$$\mathbf{W}_i = -\frac{1}{2}\boldsymbol{\Sigma}_i^{-1}$$

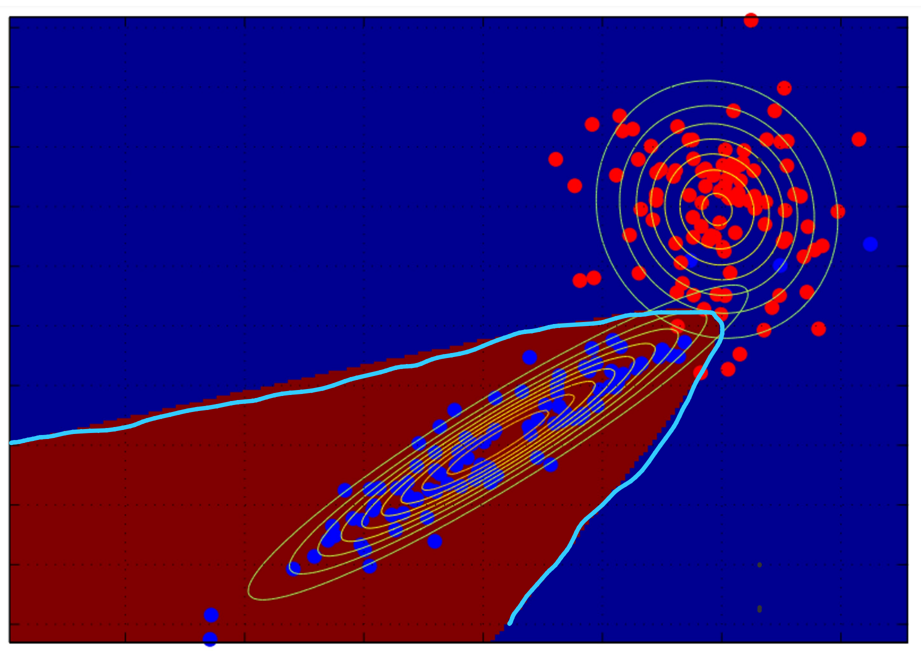
$$\mathbf{w}_i = \boldsymbol{\Sigma}_i^{-1}\boldsymbol{\mu}_i$$

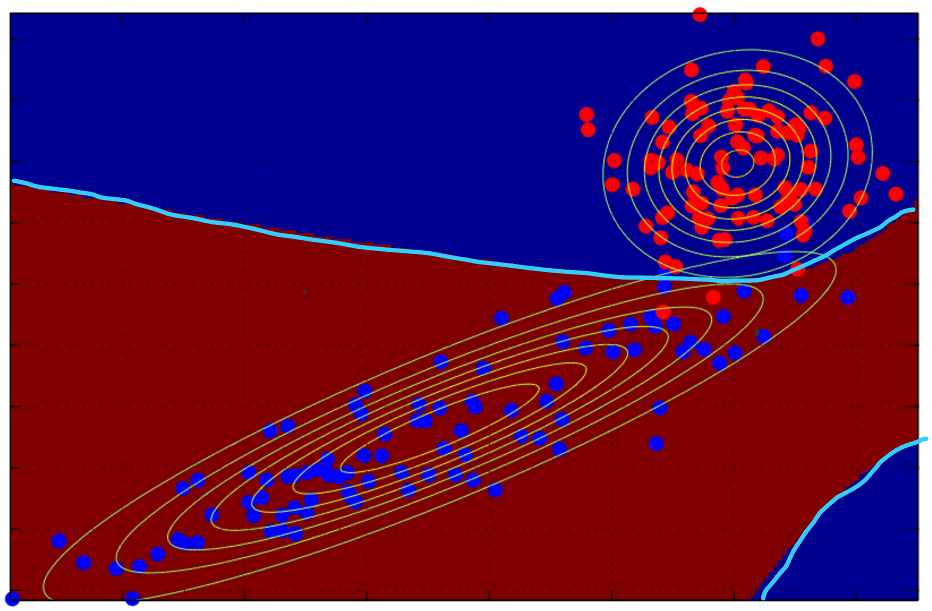
$$g_i(\mathbf{x}) = \mathbf{x}^T \mathbf{W}_i \mathbf{x} + \mathbf{w}_i^T \mathbf{x} + w_i$$

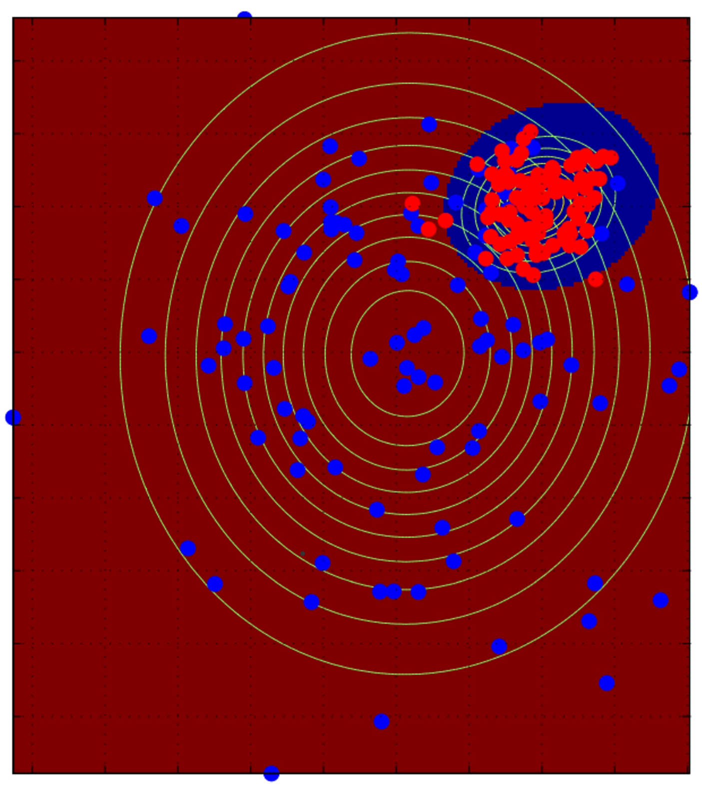
$$\mathbf{W}_i = -\frac{1}{2}\boldsymbol{\Sigma}_i^{-1}$$

$$\mathbf{w}_i = \boldsymbol{\Sigma}_i^{-1}\boldsymbol{\mu}_i$$

$$w_i = -\frac{1}{2}\boldsymbol{\mu}_i^T\boldsymbol{\Sigma}_i^{-1}\boldsymbol{\mu}_i - \frac{1}{2}\log\left|\boldsymbol{\Sigma}_i\right| + \log P(\omega_i)$$

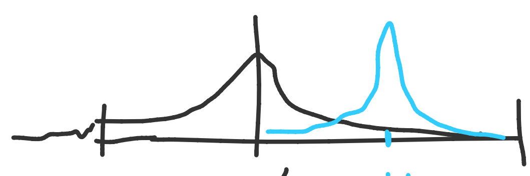




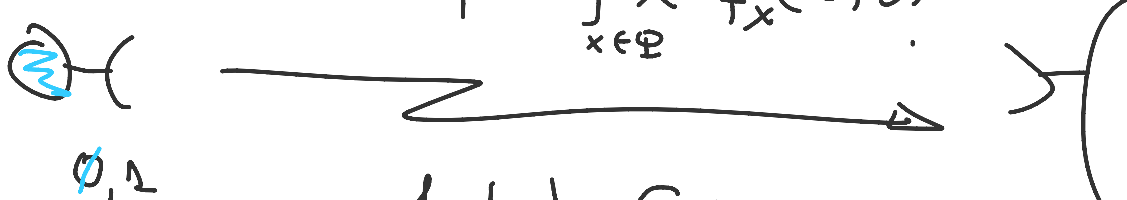


Δ

$$\frac{\alpha}{\varepsilon}x_1^2 + \frac{\beta}{\varepsilon}x_2^2 + \frac{\delta}{\varepsilon}x_1x_2 + \frac{\gamma}{\varepsilon}x_1 + \frac{\eta}{\varepsilon}x_2 + \frac{\varepsilon}{\phi} = \frac{\phi}{\varepsilon}$$



$$\rho^{(N)} = \int_{x\in\Phi} x^N f_x(x)\,dx$$



$\phi, 1$

$$f_1(x) = G(x;\phi,\sigma_n^2)$$

0, 1

ΠΗΓΗ

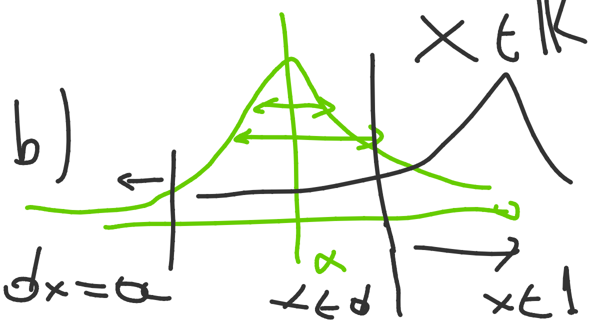
$f_0(x) = G(x, 0, \sigma_0^2) \quad x \in \mathbb{R}$

$f_1(x) = G(x, \mu, \sigma_1^2)$ ΔΕΚΤΗΣ

Συνάρτηση ππ: Cauchy

$$\frac{b}{\pi((x-a)^2+b^2)} = C(x, a, b)$$

$$\int_{-\infty}^{+\infty} x\, C_x(x,a,b)\, dx = a$$



ΣΤΟΝ ΔΕΚΤΗ: $f_0(x) = p(x|0) = C(x, 0, 1)$

$f_1(x) = p(x|1) = C(x, 1, 2)$

$p(0) = \cancel{\neq}\, p(1)$

Στον δέκτη ήλθε x $\quad p(0) = p(1) = \frac{1}{2}$

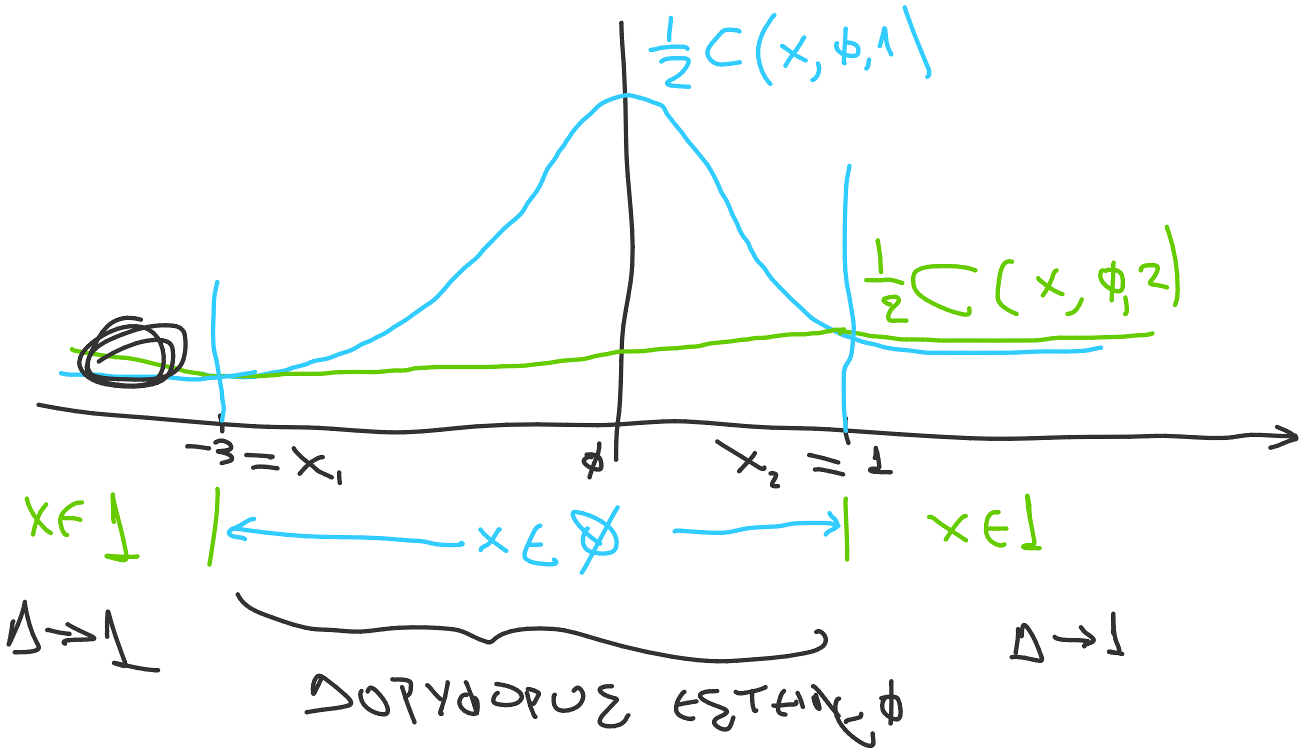
$$p(0|x) > p(1|x) \Rightarrow \frac{p(x|0)\cdot \cancel{p(0)}}{\cancel{p(x)}} > \frac{p(x|1)\,\cancel{p(1)}}{\cancel{p(x)}}$$

$$\Rightarrow p(x|0) > p(x|1) \Rightarrow f_0(x)\cancel{dx} > f_1(x)\cancel{dx} \Rightarrow$$

$$\Rightarrow C(x, 0, 1) \overset{>}{=} C(x, 1, 2) \Longrightarrow$$

$$\frac{1}{\pi(x^2+1)} = \frac{2}{\pi((x-1)^2+4)} \Rightarrow \begin{cases} x = -3 \\ x = 1 \end{cases}$$

$$\frac{\cdot}{\pi(x^2+1)} = \frac{-}{\pi((x-1)^2+4)} \Rightarrow \Big\{\ \underline{x=1}$$



Αν $\frac{P(0)}{P(1)} = k \neq 1 \Longrightarrow \underline{C_0(x,0,1)\cdot k = C_1(x,1,2)}$

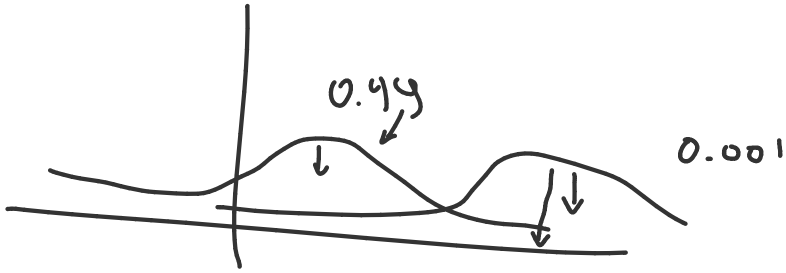
$$x_1 = -\frac{2\sqrt{-K^2+3K-1}-K}{K-2},\ x_2 = \frac{2\sqrt{-K^2+3K-1}+K}{K-2}$$

$$\Delta = \underline{-k^2+3k-1} > 0 \Rightarrow -\frac{\sqrt{13}+3}{2} < k < \frac{\sqrt{13}-3}{2}$$

$$0 < k < \underbrace{\frac{\sqrt{13}-1}{2}}$$

$$C_\phi(x, a_1, b_1)\cdot p(\phi) > C_1(x, a_2, b_2)\, p(1)$$

1 ϕ



	H_r	K_a
$A_v.$	ολα οκ $P(A,A)$	$P(A_v, k_a)$
$E_v.$	$P(E,H)$	$P(E, k_a)$

xp.

$$K_{EH}\cdot P(E,H) + K_{AK}\, p(A_v, k_a) = Q(S_1)$$

$$S_{1best} = \arg\min Q(S_1)$$

$$k_{..}\, f(x \mid H_r) \cdot p(H_r) \quad k \quad f(x \mid H \ldots) \quad p(k \ldots)$$

$$k_{EH}\, f(\underline{x} \mid H_0) \cdot p(H_0) > k_{AK}\, f(\underline{x} \mid K_A) \cdot p(K_A)$$

$$\boxed{P(\omega_1 \mid \underline{x}) > P(\omega_2 \mid \underline{x})} \Rightarrow S_1$$

$$\Updownarrow \qquad \Updownarrow$$

An np

$$P(\omega_1, \omega_2) + p(\omega_2, \omega_1) \Rightarrow S_1$$