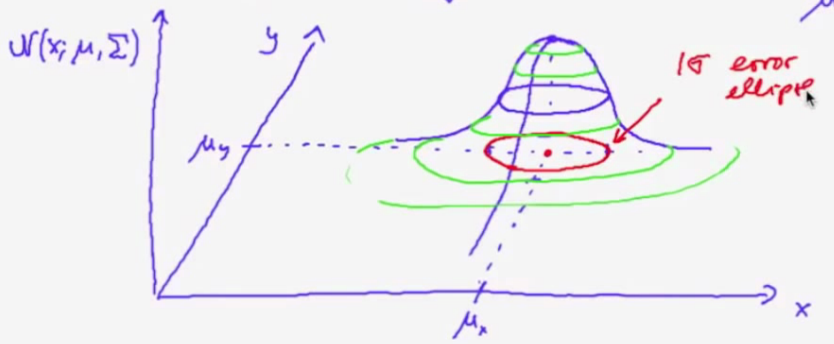
$$\begin{bmatrix} 1/\sigma_x^2 & 0 \\ 0 & 1/\sigma_y^2 \end{bmatrix} = \Sigma^{-1}$$

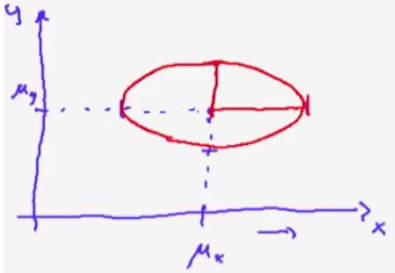
$$\Sigma = \begin{bmatrix} \sigma_x^2 & 0 \\ 0 & \sigma_y^2 \end{bmatrix}$$

Covariance matrix

$$PDF = \alpha \cdot e^{-\frac{1}{2}(x-\mu)^T \Sigma^{-1} (x-\mu)}$$

$$x = \begin{bmatrix} x \\ y \end{bmatrix} \qquad \mu = \begin{bmatrix} \mu_x \\ \mu_y \end{bmatrix}$$

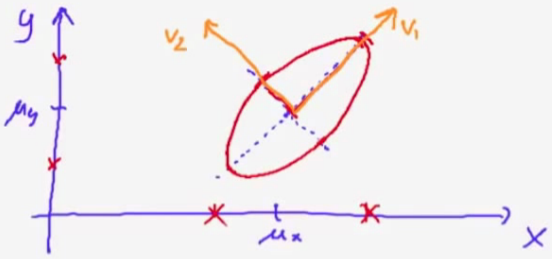




$$\Sigma = \begin{bmatrix} \sigma_x^2 & 0 \\ 0 & \sigma_y^2 \end{bmatrix}$$

Uncorrelated

x, y independent



$$\Sigma = \begin{bmatrix} \sigma_x^2 & \sigma_{xy} \\ \sigma_{xy} & \sigma_y^2 \end{bmatrix}$$

x, y .. correlated

$$\Sigma = V \begin{bmatrix} \lambda_1 & 0 \\ 0 & \lambda_2 \end{bmatrix} V^T$$

$$\begin{bmatrix} | & | \\ v_1 & v_2 \\ | & | \end{bmatrix} \rightarrow w_1, w_2$$

Eigenvectors Eigenvalues