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How far away in z-units

$$\exp\left(-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right)$$

Review gaussian

1-var Meaning of σ. Why divide by sigma in exp.

multi-var. Covariance matrix Σ

$$\frac{1}{N}(\vec{x}-\mu)^T(\vec{x}-\mu)$$ What's μ?

$$\exp\left(-\frac{1}{2}(x-\mu)^T\Sigma^{-1}(x-\mu)\right)$$

$$\frac{1}{2}\left(\sqrt{\Sigma^{-1}}(x-\mu)\right)^T\left(\sqrt{\Sigma^{-1}}(x-\mu)\right)$$

How far away from μ in "z" units

"Mahalanobis distance"

$$X = \sqrt{\Sigma}(z-\mu)$$

$z \sim N(0,1^2)$

LDA Which group is nearest in Mahalanobis distance

Fig. 4.6 interpret as ↗

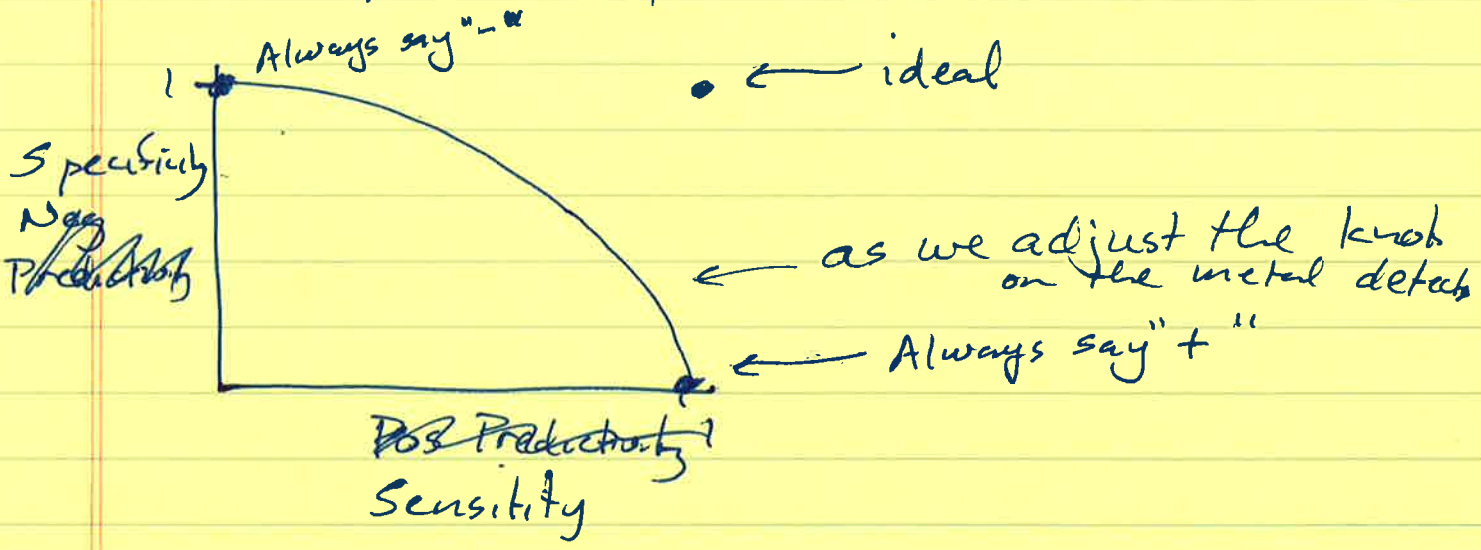
All classes treated as same Σ.

QDA Same as LDA but allow classes to have different Σ_i.

Fig. 4.9 Interpret

Role of prior: ~~1 Square~~ $\frac{1}{2}(\text{Mahalanobis})^2 + \log \pi_k$

President Garfield and ROC



Loss function: Make an explicit evaluation of the cost of FP and FN. Set parameters to minimize this.

Importance of prevalence

It's not just the classifier

A test of ~~little~~ little ~~use~~ use in one group can be very useful in another.

HIV testing
0.1% in general pop.
5% in special sub-pops.

Mad Cow Disease.
Prevalence 0.000001%
vs. 0.0% in downers.

		+ Test	−
Actual	+	.08	.02
	−	1	1,000,000