OSY.SSI[2015][A]

Detection, Surveillance

Bonus: Video

Detection and Surveillance

What for?

Fact:

Detection and Surveillance

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Fact: optimal security efforts are adapted to context.

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Preliminary: On statistics
- Binary classifiers
- Bayes' theorem

Detection theory
- Blind source separation
- Some examples

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Confusion matrix:

	Danger	No danger
1	True positive	False positive
0	False negative	True negative

Confusion matrix

Type II and type I error rates

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Sensitivity

Confusion matrix

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Sensitivity (identify a condition correctly, i.e. no loose criminal):

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Theorem (Bayes, 1763)

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$A, B, \mathbb{P}(B) > 0,$

$$\mathbb{P}(A|B) = \frac{\mathbb{P}(B|A)\mathbb{P}(A)}{\mathbb{P}(B)}$$

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Application: catching criminals

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$$\begin{aligned}
\mathbb{P}(X \text{ criminal} | D = 1) &= \mathbb{P}(D = 1 | X \text{ criminal}) \frac{\mathbb{P}(X \text{ criminal})}{\mathbb{P}(D = 1)} \\
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Consequence: there is a 99% chance that X is innocent...
Remark: in reality, tests are not that accurate, and there are not that many criminals.

Note: This is one of the reasons why unwarranted search is illegal and invalid in a court of justice.

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There's no free meal

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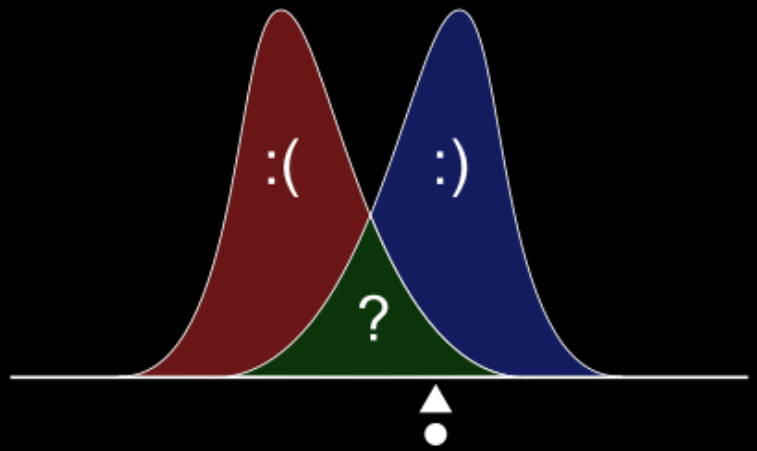
- etc.

What is a detector?

Illustration



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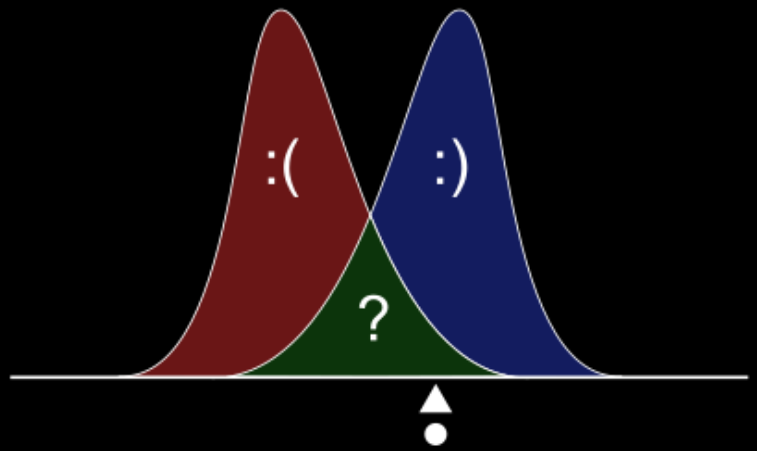

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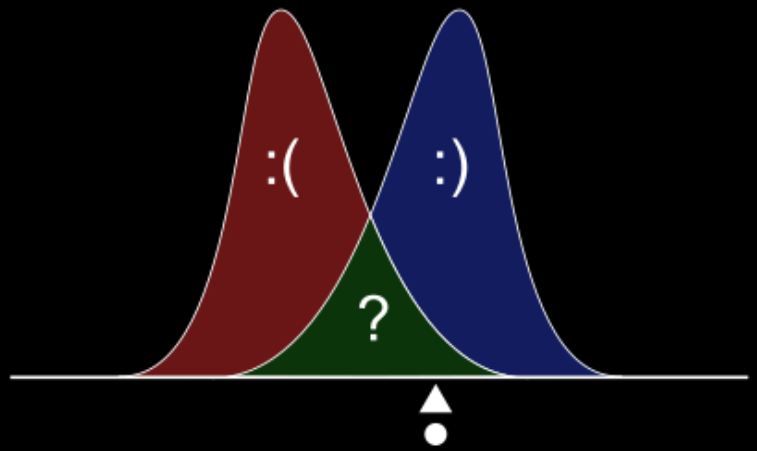

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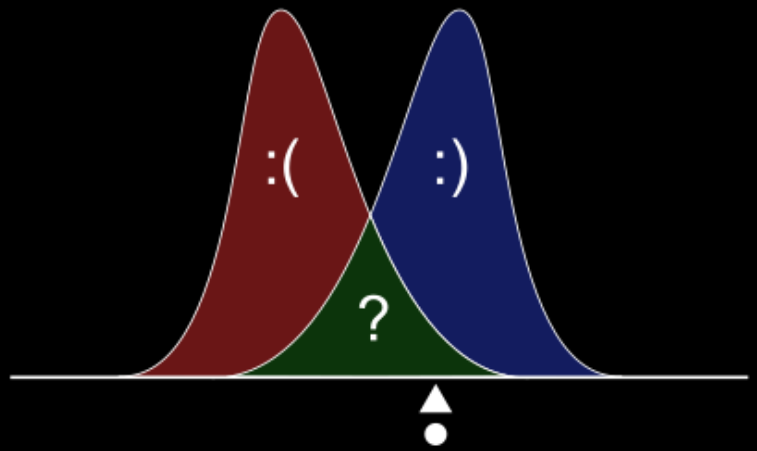

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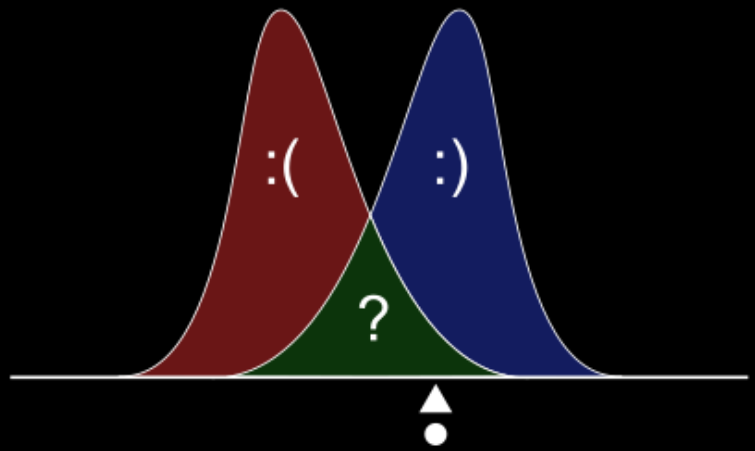

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Note: usually, distributions aren't really known nor static

Data mining

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Solution: put many detectors!

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The Nanny's Solution

Causality, symptoms and psychopaths

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Causality, symptoms and psychopaths

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Question 2: what has the nanny solved ?

The SSL warning page

Bad design, bad design, and evil users

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Also, Lenovo SuperFish.

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Success stories: Equation Group (14 years undetected), Windows (17 years), Gemalto ($\sim$10 years).

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There is no silver bullet.

Should we vaccinate?

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Conclusion: Use protection and vaccinate your stuff. Those telling you otherwise are dangerous.

Next time

Prepare your computers, learn/remember HTML, SQL, XML, javascript basics.

See y'all next time!