Machine Learning (WiSe 2025/2026)

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Assignment 3 Task 3.1

From the Cancer problem in the slides we know the following details:

P(cancer) = 0.008
P(¬cancer) = 0.992
P(+|cancer) = 0.98
P(-|cancer) = 0.02
P(+|¬cancer) = 0.03
P(-|¬cancer) = 0.97

To calculate the first test being +ve we use Bayes' rule:

$$P(C|+) = \frac{P(+|C)P(C)}{P(+|C)P(C)P(+|\neg C)P(\neg C)}$$

Plugging in the numbers we get:

P(C|+) = 0.00784/0.0376 = 0.2081 or 20.81%

To do the second test, we need to consider both tests to be conditionally independent.

so,

$$P(C \mid +,+) = \frac{P(+|C)P(C|+)}{P(+|C)P(C|+)P(+|\neg C)P(\neg C|+)}$$

Plugging in the values we get:

P(C|+,+) = 0.2043/0.2280 = 0.8951 or 89.51%