CS 572(Assignment 7)

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Problem 13.11
Medical Tests
Let's introduce three events for a certain person:

- A - indicates whether test A is positive
- B - indicates whether test B is positive
- V - indicates if the person carries virus or not

Now we can write the problems in the task as follows:

- $P(A|V) = 0.9$
- $P(A|\neg V) = 0.1$
- $P(B|V) = 0.9$
- $P(B|\neg V) = 0.05$
- $P(V) = 0.01$

Our goal here is to compare $P(A|V)$ and $P(B|V)$.
Let's calculate both of them using Bayes rule:

- $$P(A|V) = \frac{P(A|V)P(V)}{P(A|V)P(V)P(A|\neg V)P(\neg V)} = \frac{0.95 * 0.01}{0.95 * 0.01 + 0.1 * 0.99} \approx 0.088$$
- $$P(B|V) = \frac{P(B|V)P(V)}{P(B|V)P(V)P(B|\neg V)P(\neg V)} = \frac{0.9 * 0.01}{0.9 * 0.01 + 0.05 * 0.99} \approx 0.15$$
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  Test B is more reliable than Test A even though both have pretty low accuracy.