Bayes Theorem

$$P(h|D) = \frac{P(D|h)P(h)}{P(D)}$$

Prior probability of hypothesis

Find best hypothesis given data

Evidence

D → training data

h → function mappings for target

From candidate hypotheses, iterate all of them with same data & find maximum a posteriori (MAP) hypothesis.

$h_{MAP} = \text{argmax}\, P(h|D)$

most probable hypothesis = highest a posteriori

$$= \text{argmax} \frac{P(D|h)P(h)}{P(D)} = \text{argmax}\, P(D|h)P(h)$$

This doesn't change from one hypothesis to another

we are left with this!

☆ If we don't have any prior or for some cases all P(h) might be equal.

$P(h) = \frac{1}{|H|}$

$h_{ML} = \text{argmax}\, P(D|h)$

max likelihood hypothesis

ex// $P(\text{cancer}) = 0.008$ $\quad P(+|\text{cancer}) = 0.98$

data (test result)

priors $\leftarrow P(\neg\text{cancer}) = 0.992$ $\quad P(-|\text{cancer}) = 0.02$ → likelihoods

(dun)

$P(+|\neg\text{cancer}) = 0.03$ $\quad P(-|\neg\text{cancer}) = 0.97$

Calculating MAPs:

You had test result (+), do you have cancer?

$P(\text{cancer}|+) = P(+|\text{cancer})P(\text{cancer}) = 0.0078$

Probability of not having cancer given your test is (+):

$P(\neg\text{cancer}|+) = P(+|\neg\text{cancer})P(\neg\text{cancer}) = 0.0298$

If A is $n \times n$ is there a nonzero vector x such that Ax is a scaler multiple of x

$Ax = \lambda x$

same