1. probability of event A occurs given event B

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

similarity,

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

combian both formula

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

Bayes theoream is a method for calculating conditional probabilities or the likelihood of one event occurring if another has previously occurred.

A condition probaility can lead to more accurate outcomes cause using condition probaility means more data we have.

2. if the two tests are independent, the posterior probabilities for cancer and ¬ cancer are the same.

$P(\text{cancer}) = 0.008$ $P(\neg \text{cancer}) = 0.992$.

$P(+ \mid \text{cancer}) = 0.98$ $P(- \mid \text{cancer}) = 0.02$

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

$h(\text{cancer})_{max} = P(+ \mid \text{cancer}) P(\text{cancer}) = 0.98 * 0.08 = 0.0078$

$h(\neg \text{cancer})_{max} = P(+ \mid \neg \text{cancer}) P(\neg \text{cancer}) = 0.03 * 0.992 = 0.0298$

The step is warranted as Bayes theorem states that the posterior probabilities are just $P(+)$.

3.

$P(\text{yes}) P(\text{sun} \mid \text{yes}) P(\text{cool} \mid \text{yes}) P(\text{high} \mid \text{yes}) P(\text{strong} \mid \text{yes})$

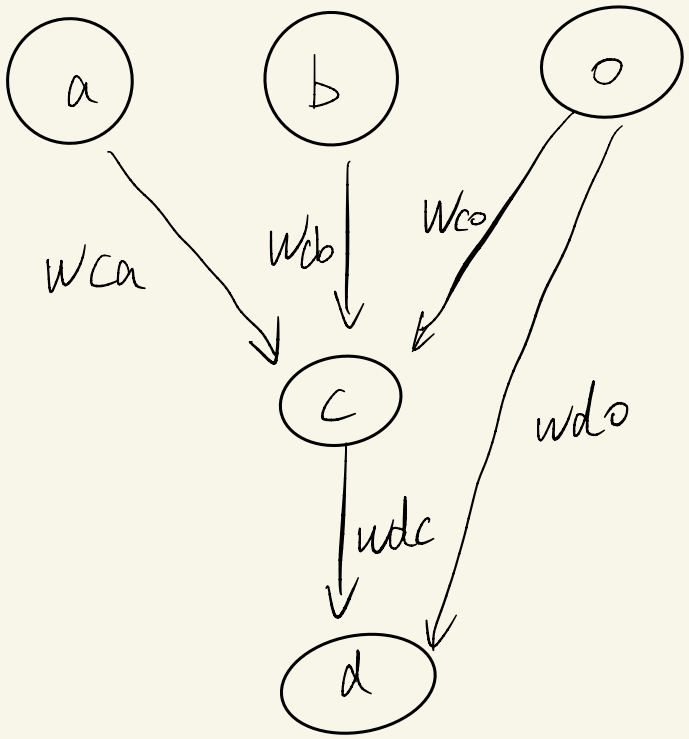
$= \frac{8}{12} \cdot \frac{2}{8} \cdot \frac{3}{8} \cdot \frac{3}{8} \cdot \frac{3}{8} = 0.00879$

$P(\text{no}) P(\text{sun} \mid \text{no}) P(\text{cool} \mid \text{no}) P(\text{high} \mid \text{no}) P(\text{strong} \mid \text{no})$

$= \frac{4}{12} \cdot \frac{3}{4} \cdot \frac{1}{4} \cdot \frac{3}{4} \cdot \frac{2}{4} = 0.0234$

predict result is no

4.



as activation function $G(y) = \frac{1}{1+e^{-y}}$ $G'(y) = (1-G(y))G(y)$

training 1:

$O_c = G(0.1\cdot1 + 0.1\cdot0 + 0.1\cdot1) = G(0.2) = 0.55$

$O_d = G(0.1\cdot0.55 + 0.1\cdot1) = G(0.155) = 0.54$

$\delta_d = O_d(1-O_d)(d-O_d) = 0.54\cdot(1-0.54)\cdot(1-0.54) = 0.115$

$\delta'_c = O_c(1-O_c)(w_{dc} * \delta_d) = 0.55(1-0.55)\cdot 0.1\cdot 0.115 = 0.0028$

$W_{ca} = W_{ca} + \delta_{ca} = 0.1 + 0.0085 = 0.10085$

$W_{co} = W_{co} + \delta_{co} = 0.1 + 0.0085 = 0.10085$

$W_{do} = W_{do} + \delta_{do} = 0.1 + 0.034 = 0.134$

$W_{dc} = W_{dc} + \delta_{dc} = 0.1 + 0.019 = 0.119$

$W_{cb} = W_{cb} + \delta_{cb} = 0.1 + 0 = 0.1$

training 2:

$O_c = G(0.10085\cdot1 + 0.10085\cdot0 + 0.1\cdot1) = G(0.20085) = 0.55$

$O_d = G(0.119\cdot0.55 + 0.134\cdot1) = G(0.1996) = 0.5497$

$$\theta'_d = 0.5497 \cdot (1 + 0.5497)(1 - 0.5497) = -0.1361$$

$$\theta'_C = 0.55 \cdot (1 - 0.55) + 0.119 \cdot (-0.1361) = -0.0004$$

as before

$$w_{Ca} = 0.10085$$

$$w_{Co} = 0.1016$$

$$w_{do} = 0.1242$$

$$w_{dc} = 0.1134$$

$$w_{Cb} = 0.0988$$