기계인공지능 final 손문제 solution.

p.4

$P(C) = 0.1$. $P(T|C) = 0.9$. $P(T|C^{-1}) = 0.7$

$\Rightarrow$ Bayes Rule $\Rightarrow$ $P(C|T) = \frac{P(C,T)}{P(T)} = \frac{P(C)P(T|C)}{P(T)}$

$P(C,T) = P(C)P(T|C) = 0.09$

$P(T) = P(C)P(T|C) + P(C^{-1})P(T|C^{-1})$

$= 0.1 \times 0.9 + 0.9 \times 0.7 = 0.09 + 0.63 = 0.72$

Thus, $P(C|T) = \frac{0.09}{0.72} = \frac{1}{8} = 0.125 = 12.5\%$

Since the percentage of $P(C|T)$ is 12.5% (less than 50%) it is reasonable that I wouldn't belive Sam has a cancer

P.5

$$\theta_{MAP} = \frac{m}{m+\sigma^2}\bar{x} + \frac{\sigma^2}{m+\sigma^2}\mu \quad \cdots (1)$$

A: Data (News)

B: Prior (information)

From the above equation (1) for θ_{MAP},

when $m \to \infty$ (or $\sigma^2 \to 0$) $\left[\begin{array}{l} \frac{m}{m+\sigma^2} \to 1 \\ \frac{\sigma^2}{m+\sigma^2} \to 0 \end{array}\right.$ Then, $\theta_{MAP} = \bar{x}$

when $m \to 0$ (or $\sigma^2 \to \infty$) $\left[\begin{array}{l} \frac{m}{m+\sigma^2} \to 0 \\ \frac{\sigma^2}{m+\sigma^2} \to 0 \end{array}\right.$ Then, $\theta_{MAP} = \mu$

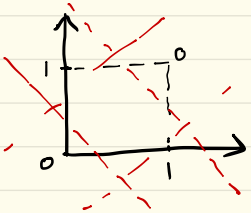
Eventhough A, B have had the similar amount of information and heard similar news, A believe the data (news) and B believe the prior (information), so their θ_{MAP} is different.

We can treat A has greater weight for m
so, $\theta_{MAP,A}$ is close to $\bar{x}$

and B has smaller weight for m
so, $\theta_{MAP,B}$ is close to μ

P. 6

1) We know perceptron is linear classifier.
However, XOR problem is not linearly separable.
Thus, perceptron can't solve XOR problem.



2) In ANN, we do nonlinear activation for each layer, so, we can classify XOR problem.

3) Since unit step function is not differentiable (at $x=0$)

4) In case of Autoencoder, we need only input data, not a label.
So, we can say Autoencoder is unsupervised learning.

5) In autoencoder, it reduce the demension of features.
So, it works as a feature extraction.

6) use activation function as linear function, and cost function as mean square error.

7) Since Autoencoder has multy layers.