

## 1. Unanswered Questions

There are unanswered questions from the lecture, and there are likely more questions we haven't covered.

- Take a moment to think about these questions.
- Write down the ones you find important, confusing, or interesting.
- You do **not** need to answer them—just state them clearly.

1. 在講到 2-dim 的 Newton's method 中

$$\theta_{n+1} = \theta_n - \bar{H}^{-1} \nabla_{\theta} \text{Loss}$$

但計算出來  $H$  會是

$$H = \nabla(\nabla^T x) \begin{bmatrix} x_1^2 & x_1 x_2 & 1 \\ x_1 x_2 & x_2^2 & x_2 \\ x_1 & x_2 & 1 \end{bmatrix}$$

But  $H$  is not invertible, 即  $H^{-1}$  不存在

Q: 要如何解釋此現象?

若在  $n$ -dim,  $n \geq 2$  時, 也有  $H$  is not invertible 的情況, 要如何執行?

2. 在講到 Gaussian discriminant analysis 時, 假設了

$$P(x|y=0) = N(\mu_0, \sigma_0^2) = \frac{1}{\sqrt{2\pi}\sigma_0} e^{-\frac{(x-\mu_0)^2}{\sigma_0^2}}$$

$$P(x|y=1) = N(\mu_1, \sigma_1^2) = \frac{1}{\sqrt{2\pi}\sigma_1} e^{-\frac{(x-\mu_1)^2}{\sigma_1^2}}$$

$$P(y) = \phi^y (1-\phi)^{1-y}, \quad 0 \leq \phi \leq 1$$

但若資料的 pdf 不是 Gaussian, 那如此學出來的模型會準嗎? 有其它改善方式嗎?