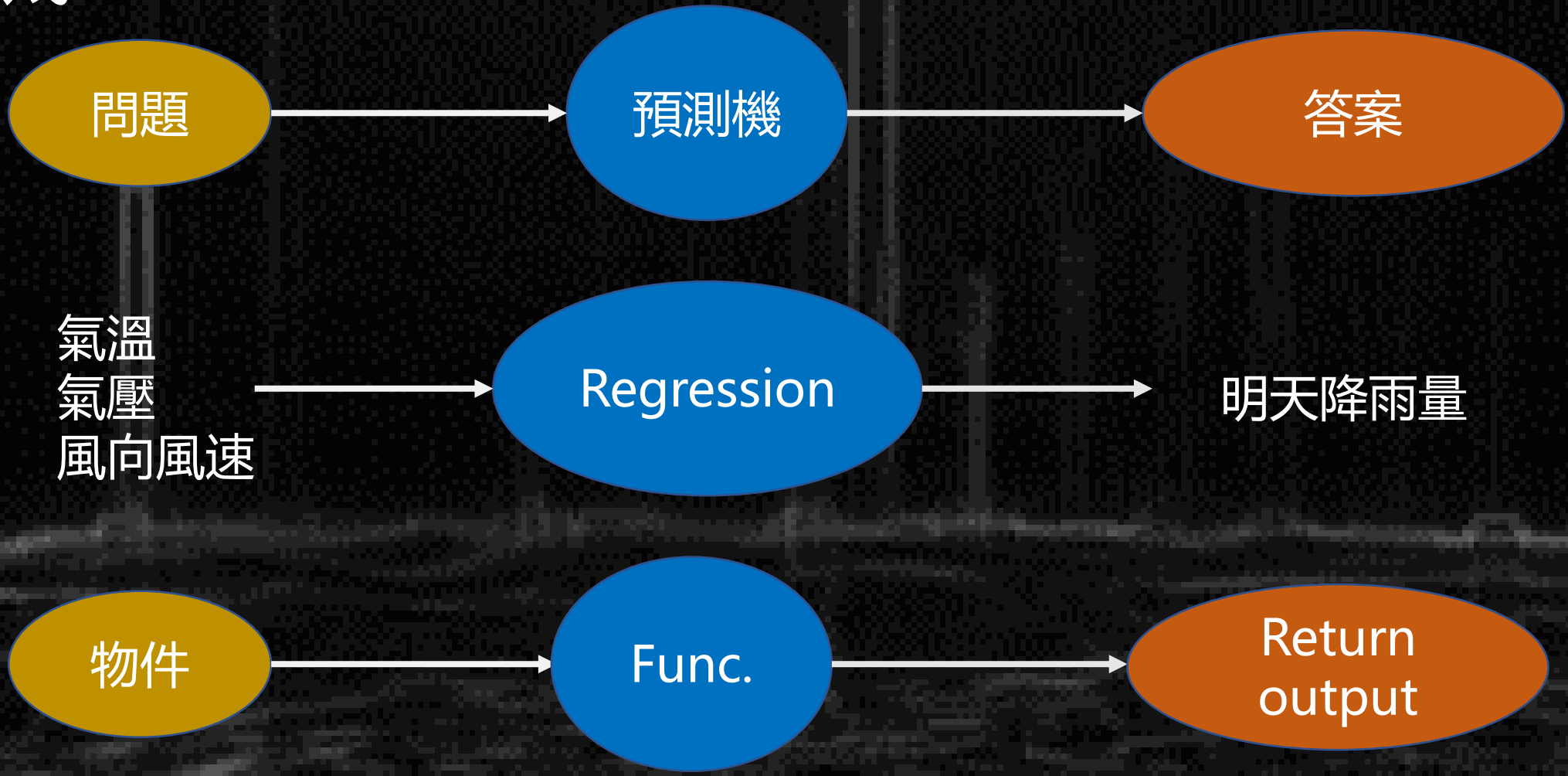
實作線性分類機

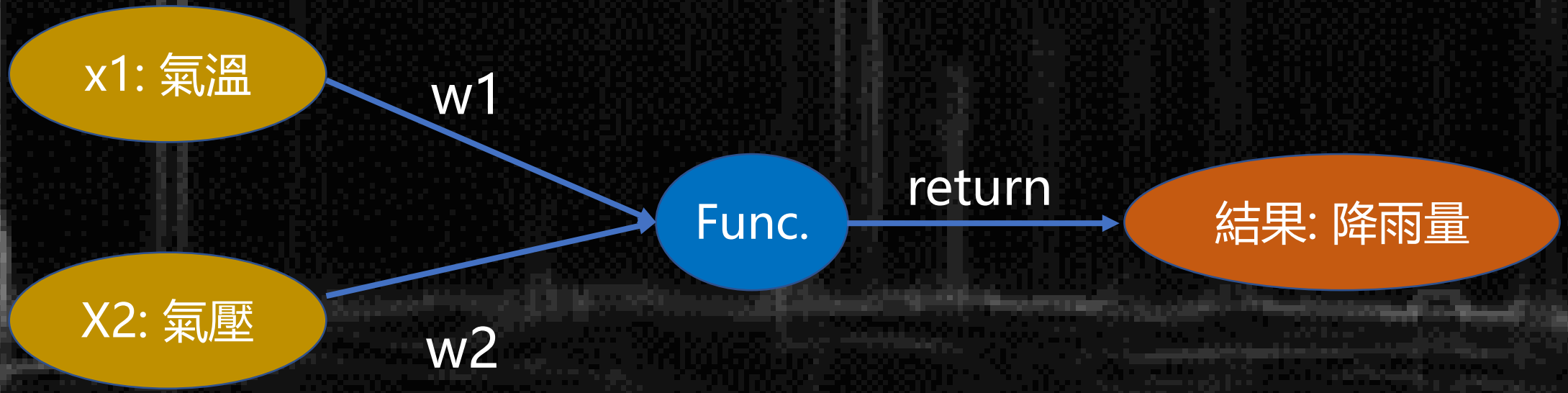
黃熠程

2022/01/30

預測機?



Like our practice...



x1*w1 + x2*w2 =?

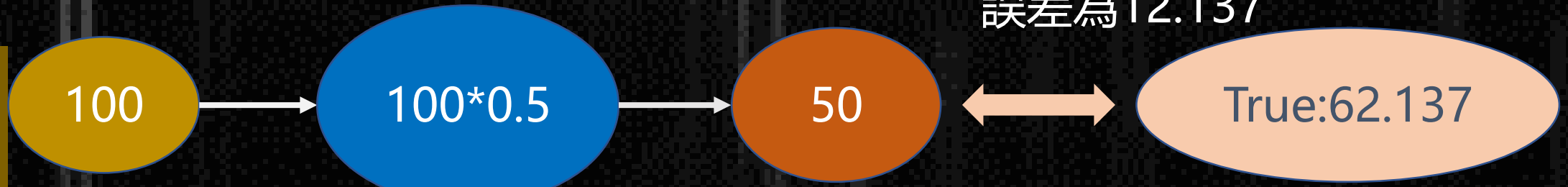
英里 = 公里 x W

公里	英里
100	62.137

真值-預測 = 誤差

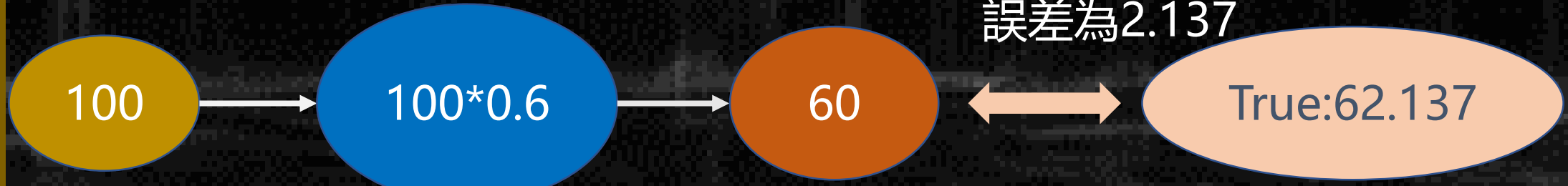
誤差為12.137

If W = 0.5



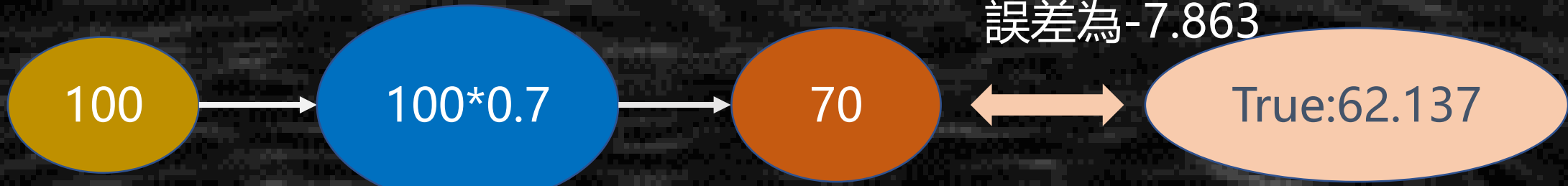
誤差為2.137

If W = 0.6



誤差為-7.863

If W = 0.7



Iteration...

...

About Math

定義模型

$y = wx$

y:預測值 x: 觀測值(特徵) w:係數(權重)

定義誤差

$L = y - \hat{y}$

$\hat{y}$:目標值 (真值)

Pick the best function

$\hat{y} = (w + \Delta w)x$

Δw: 係數(權重)變化量

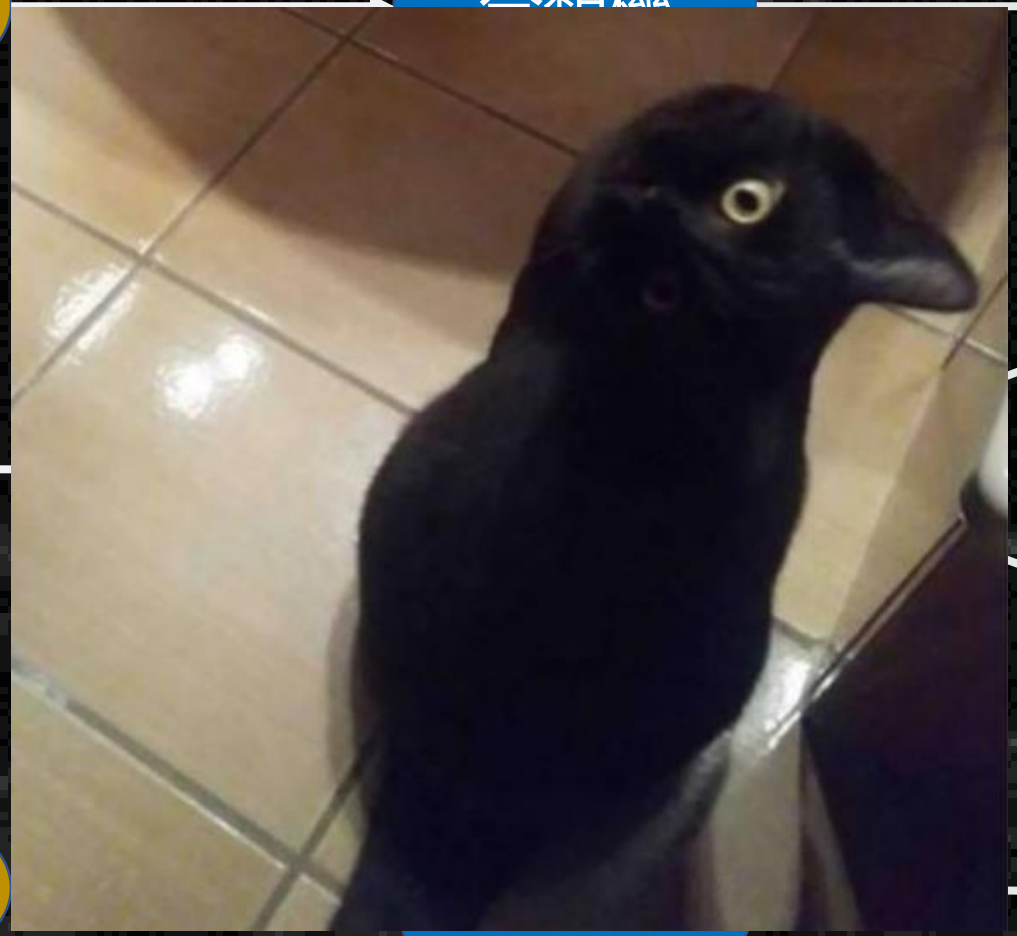
$\hat{y} - y = \Delta wx$

$\Delta w = \frac{L}{x}$

分類機?

問題

物件



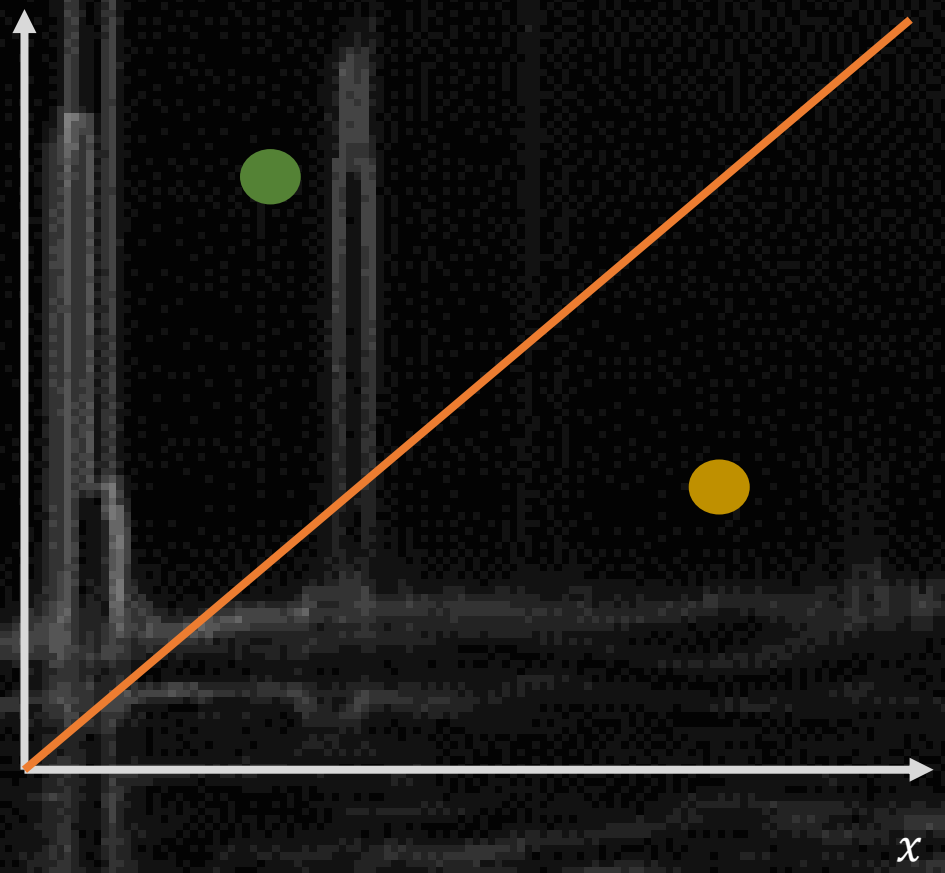
答案

98% ‘ Cat’

2% ‘ dog’

Return output

分類機?



$y = wx$

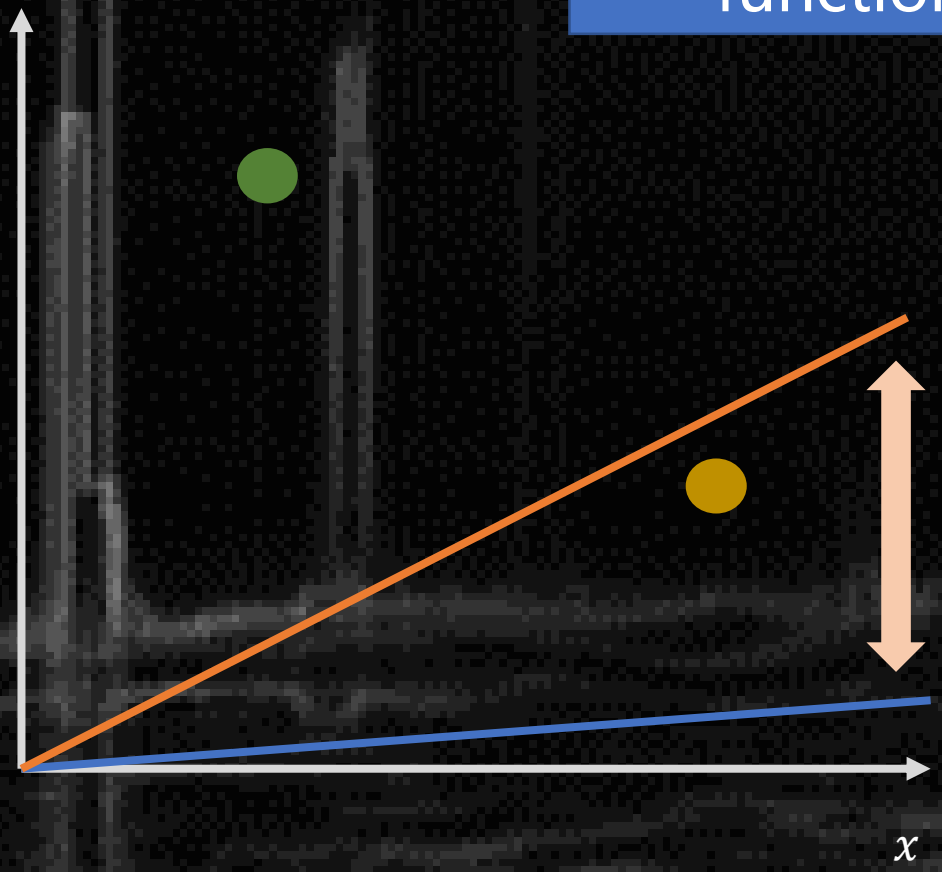
$w = ?$

分類機?

Pick the best function

$\hat{y} = (w_0 + \Delta w)x$ Δw: 係數(權重)變化量

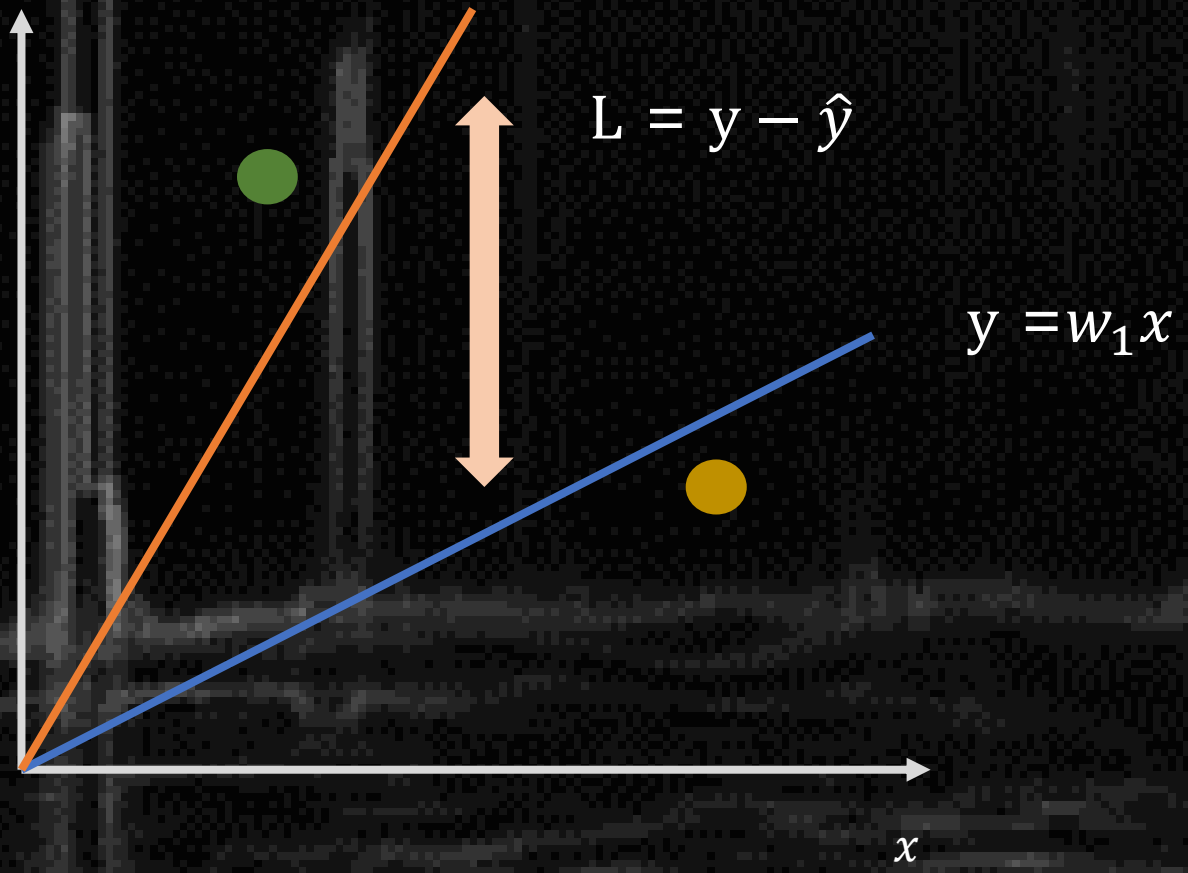
$\hat{y} - y = \Delta w x$ $\Delta w = \frac{L}{x}$



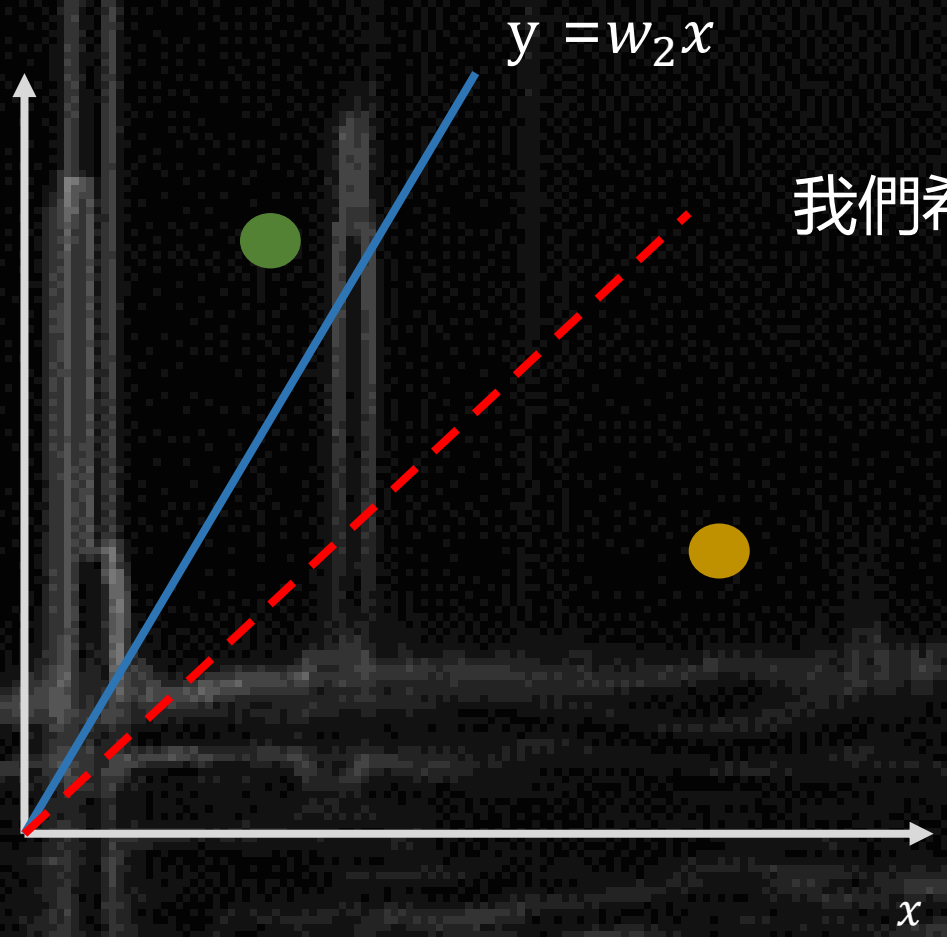
定義誤差 $L = y - \hat{y}$ $\hat{y}$:目標值 (真值)

定義模型 $y = w_0 x$

分類機?



分類機?



我們希望的分類線能在中間...

About Math

定義模型

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y:預測值 x: 觀測值(特徵) w:係數(權重)

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Pick the best function

$\hat{y} = (w + \Delta w)x$

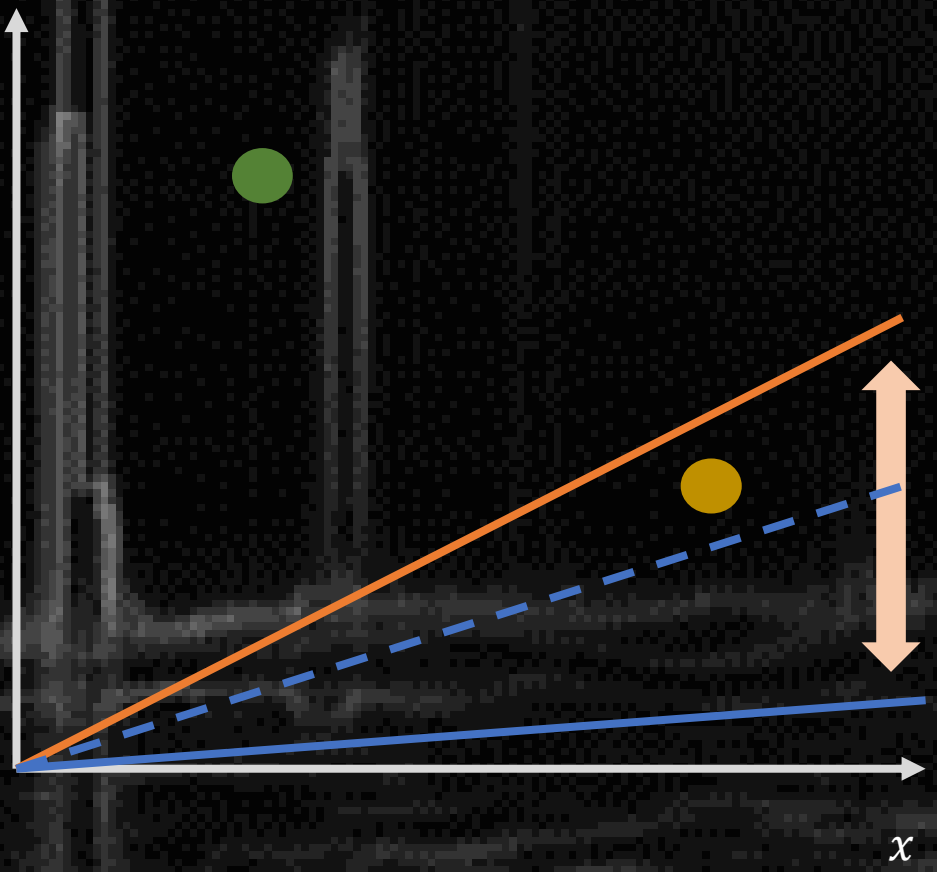
Δw: 係數(權重)變化量

$\hat{y} - y = \Delta wx$

$\Delta w = \eta \frac{L}{x}$

η: 學習率

分類機?

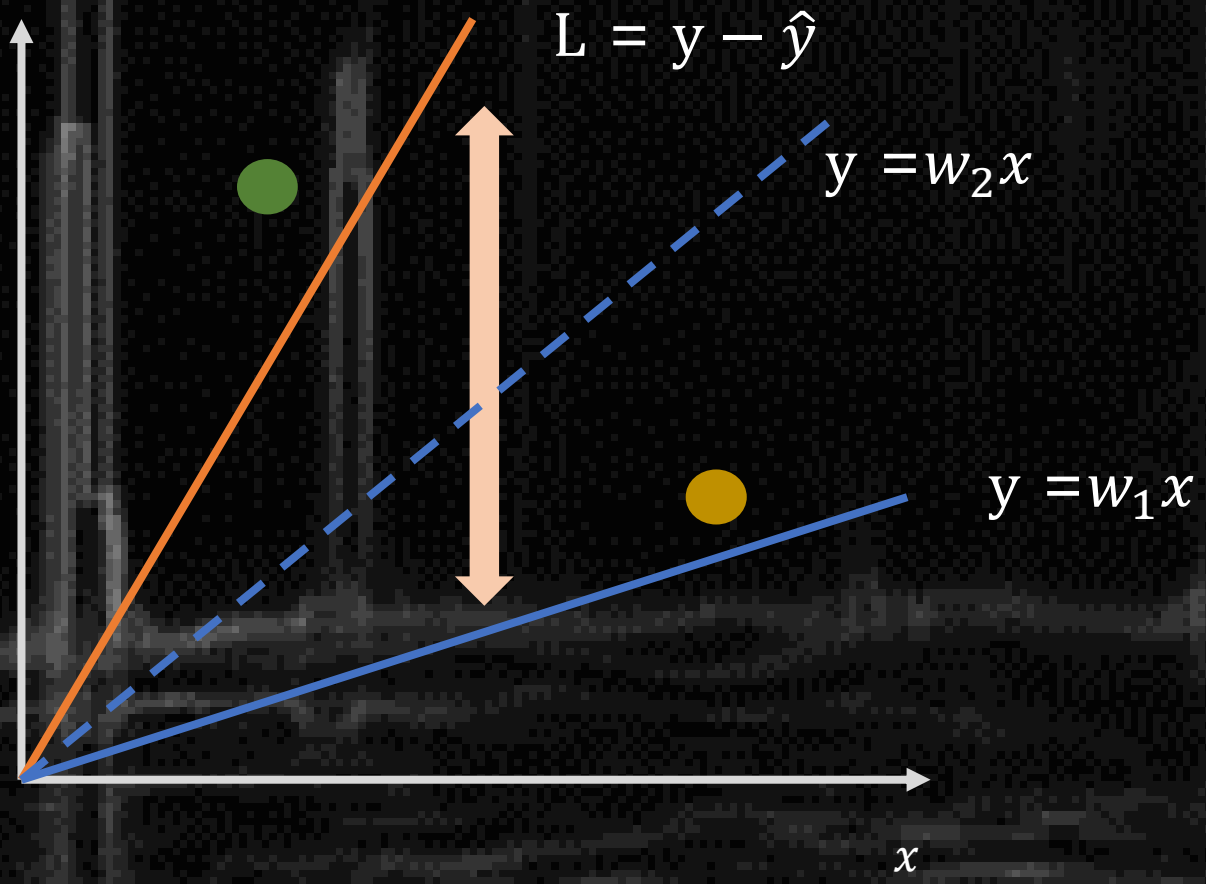


定義誤差 $L = y - \hat{y}$ $\hat{y}$:目標值 (真值)

$y = w_1 x$

定義模型 $y = w_0 x$

分類機?



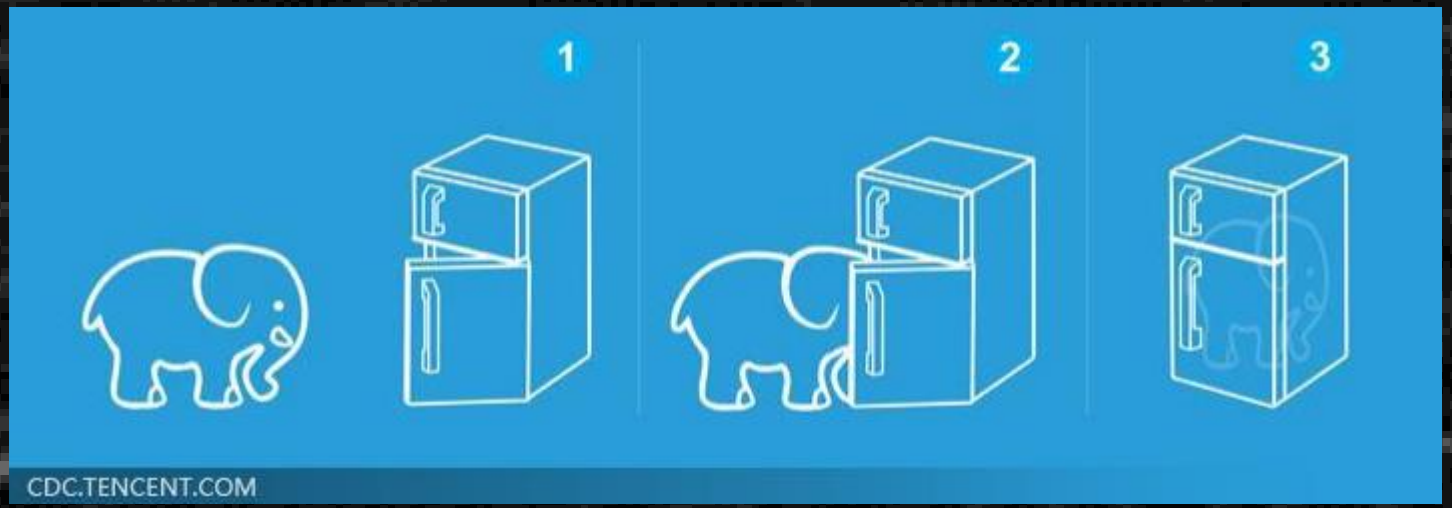
Using Colab to check Linear classification model

- AIWorkshop0301
- AIWorkshop0302

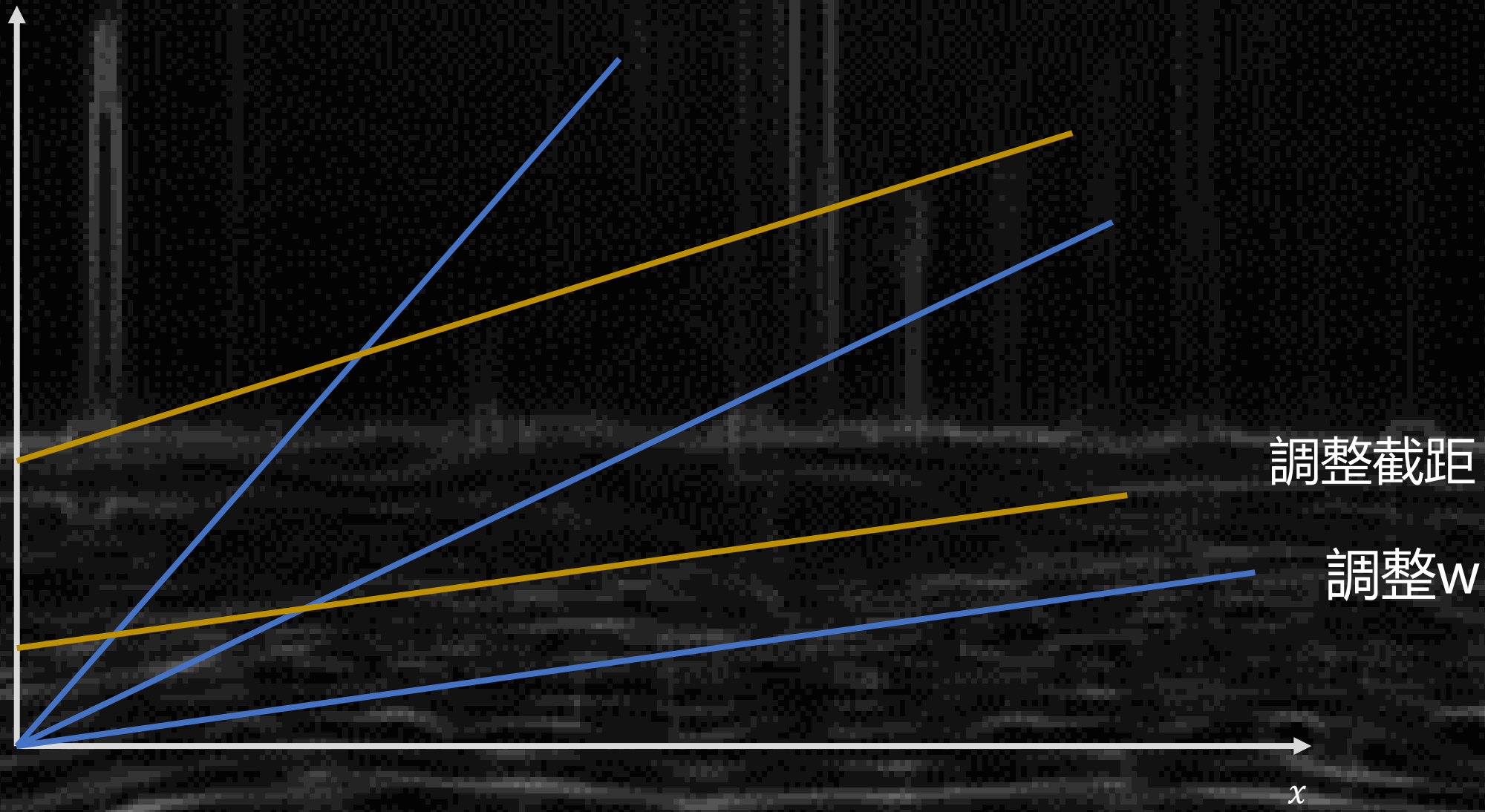
Machine Learning is so simple ...

Define a function → Define the Loss → Pick the best Function

就好像把大象塞進冰箱...

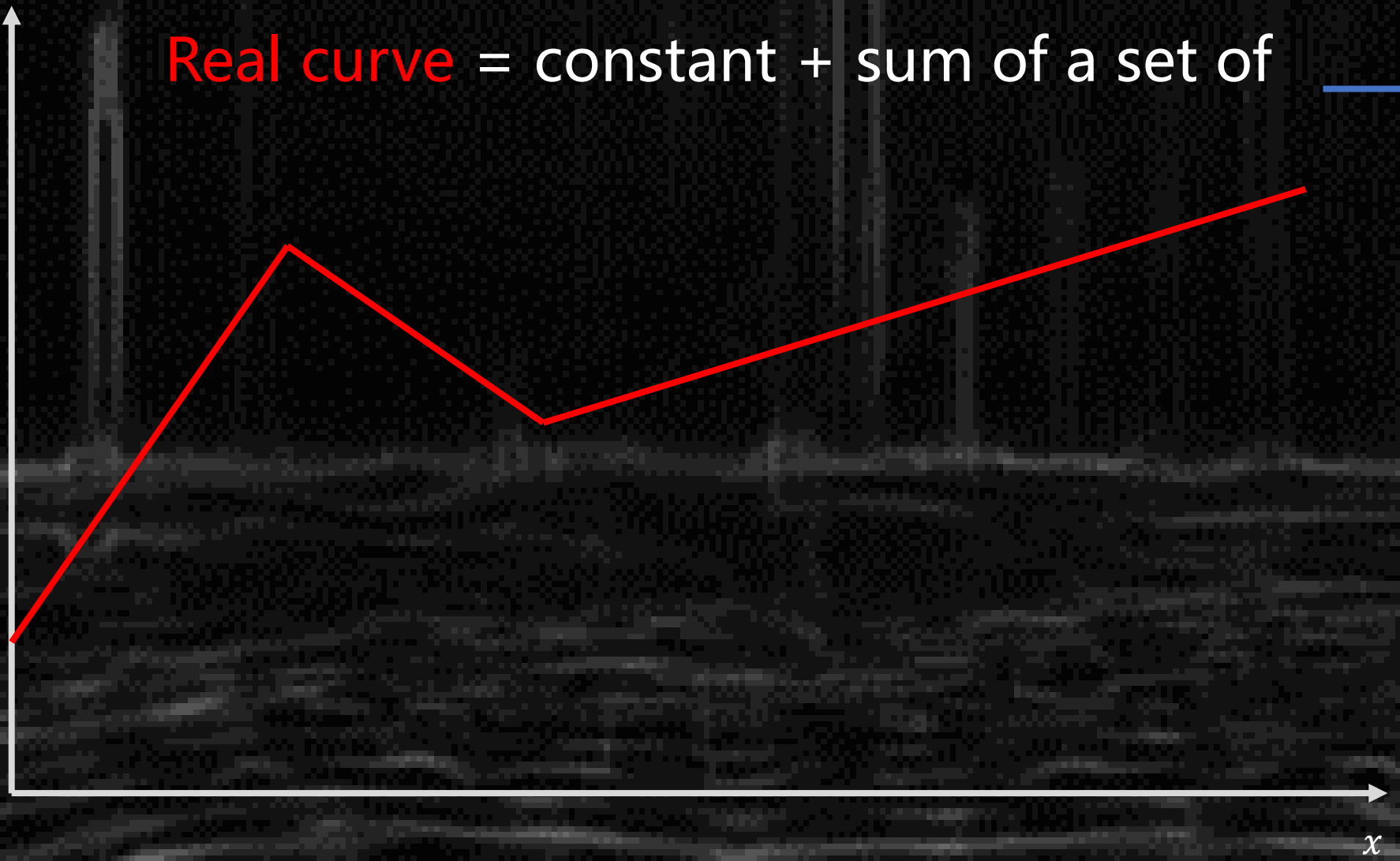


線性分類器的不足...

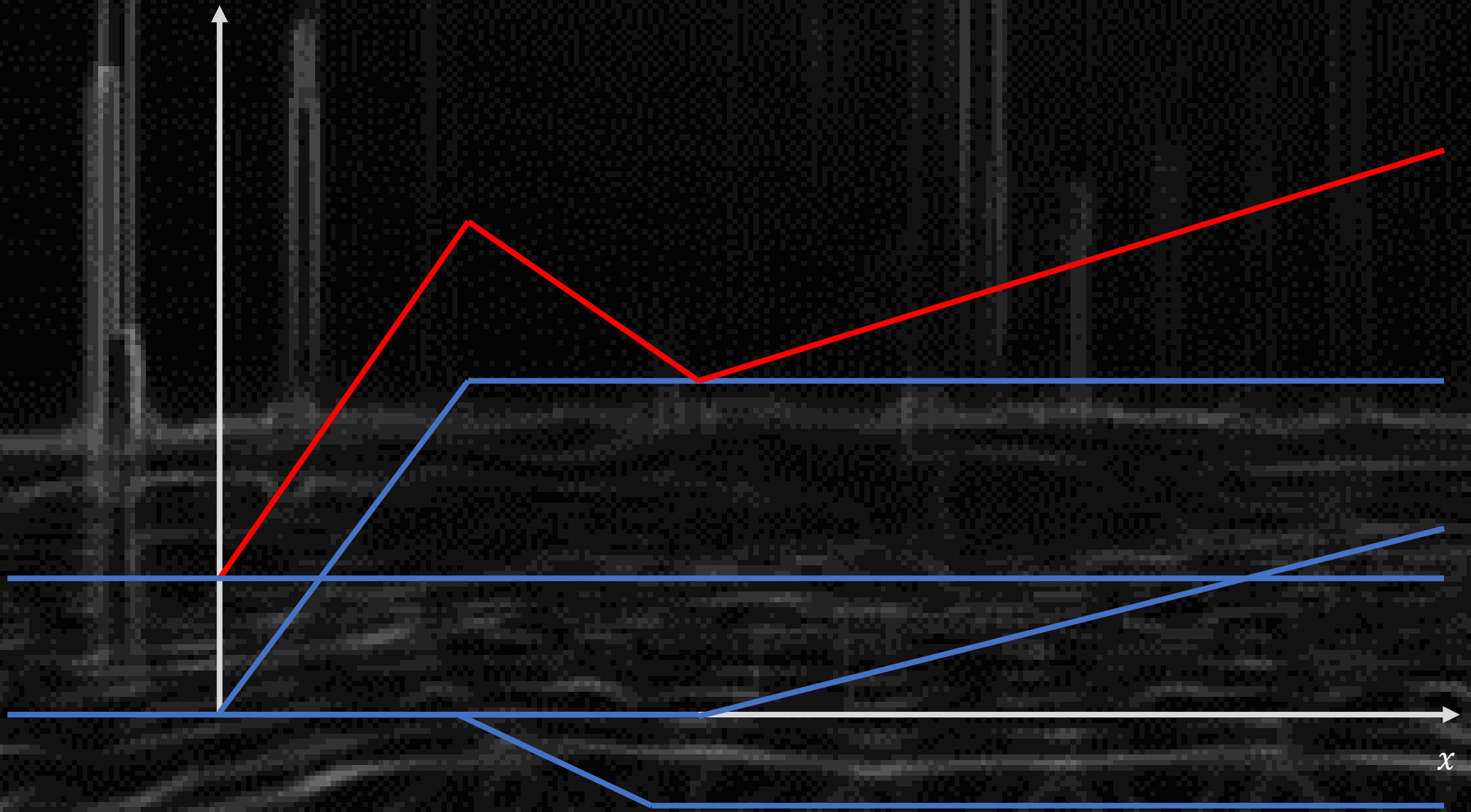


線性分類器的不足…

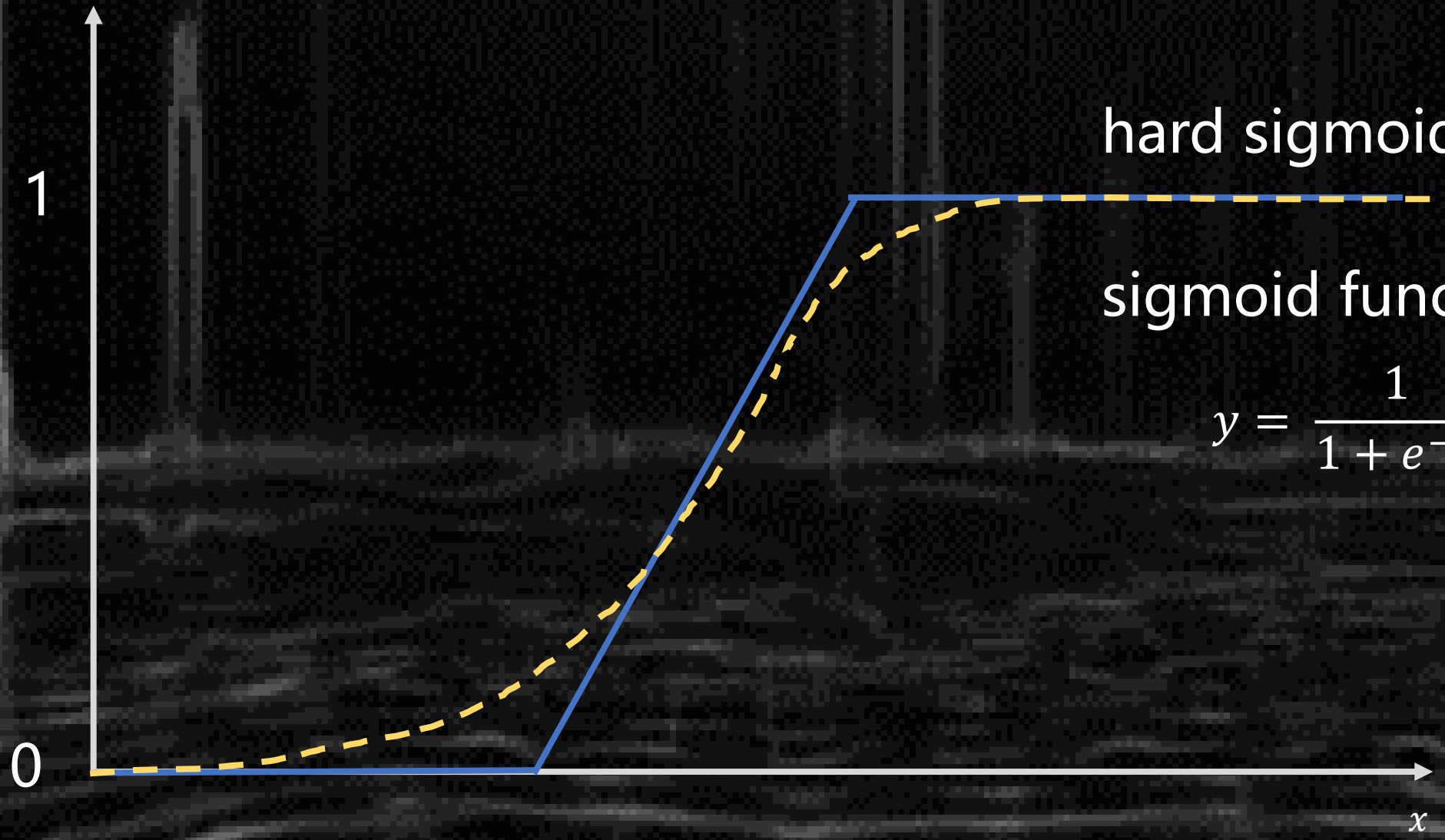
Real curve = constant + sum of a set of 



Real curve = constant + sum of a set of



Real curve = constant + sum of a set of

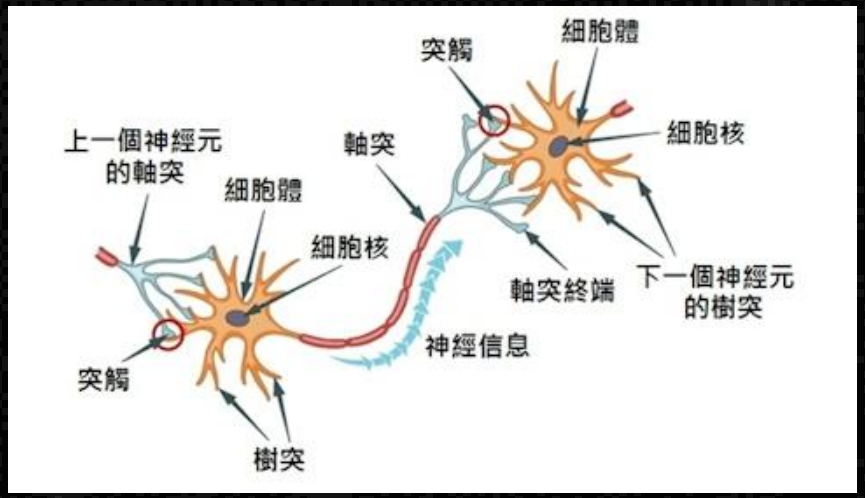


hard sigmoid function

sigmoid function

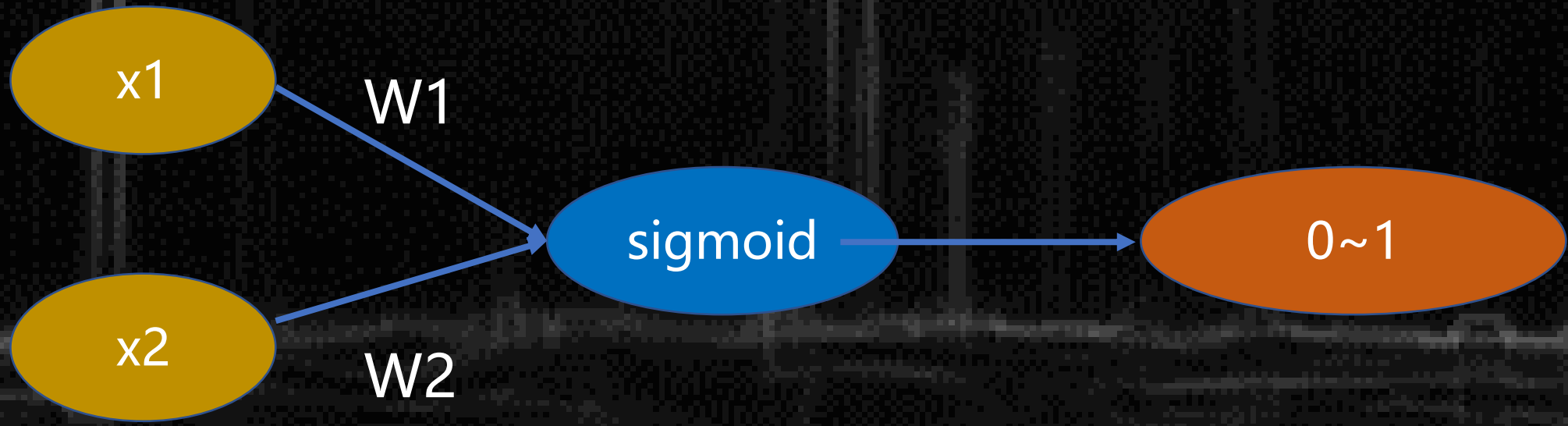
$$y = \frac{1}{1 + e^{-x}}$$

A neuron



$$y = \frac{1}{1 + e^{-x}}$$

A neuron



Sigmoid (X1*W1 + X2*W2) = 0~1

A neuron network

深度學習

Input Layer

x1

x2

x3

...

Hidden Layer

sigmoid

sigmoid

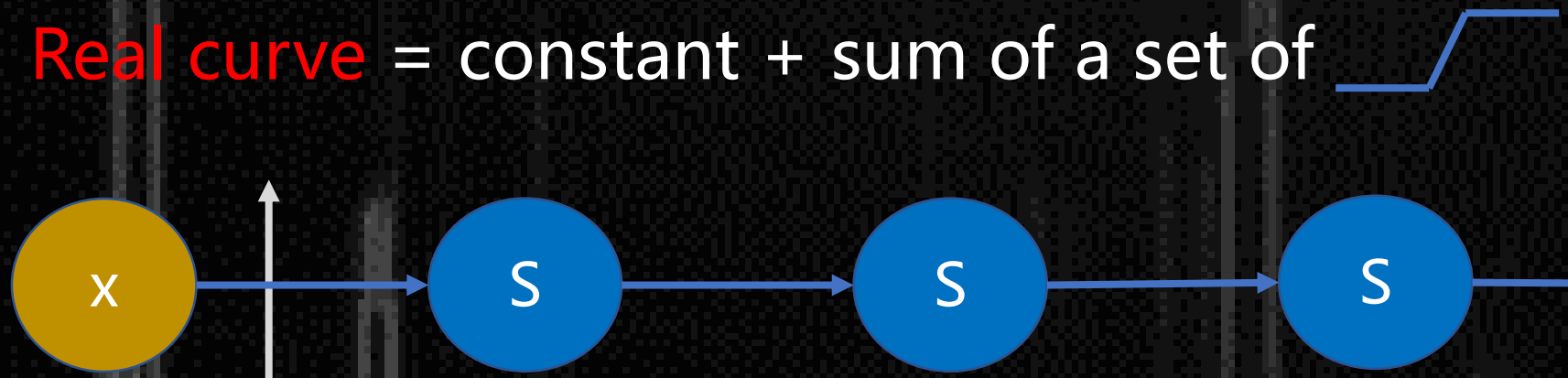
...

Output Layer

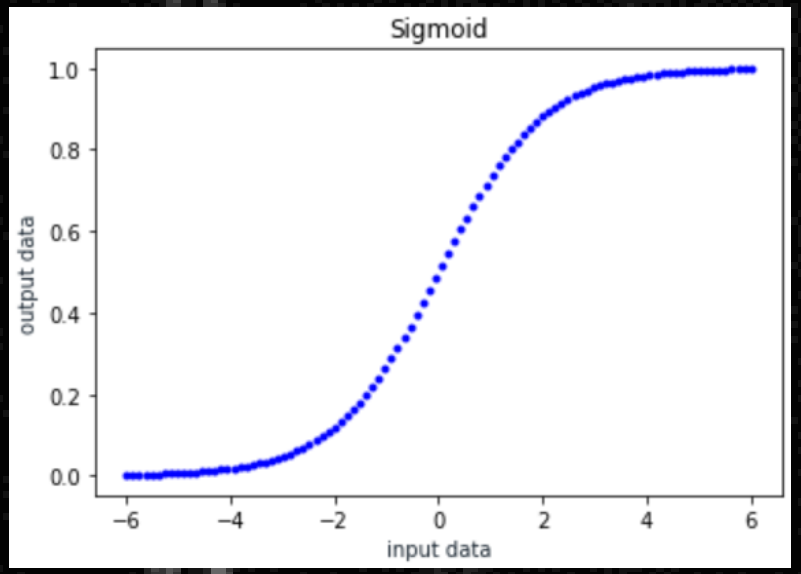
0~1

...

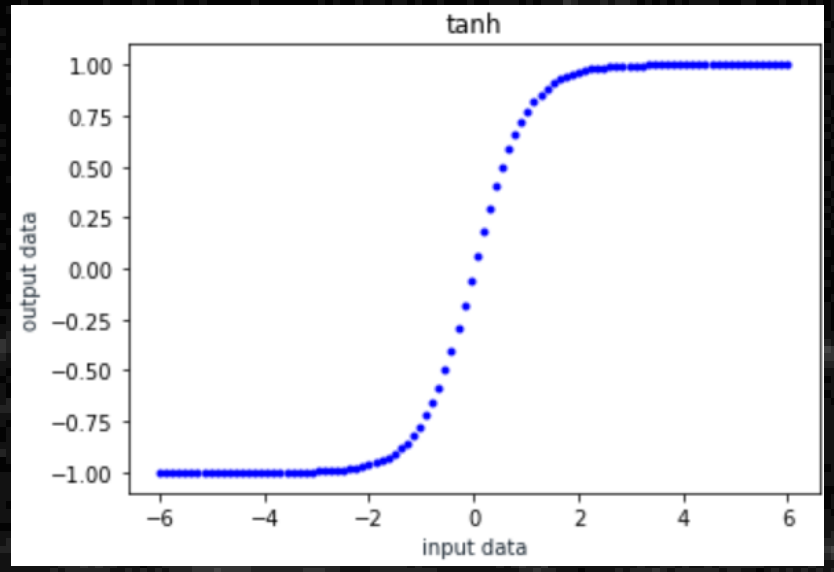
Real curve = constant + sum of a set of



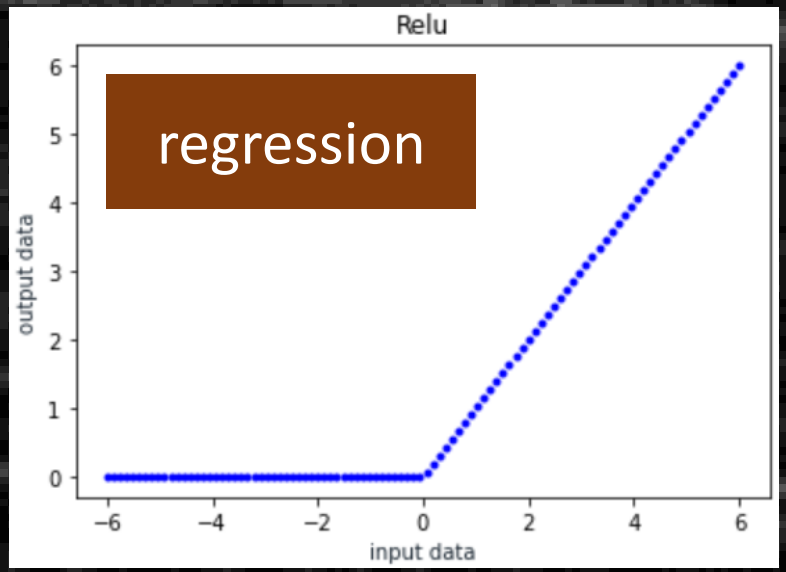
Why use sigmoid function?



classification



Activate function



regression

Why use sigmoid function?

不下雨機率較大，所以不下雨

Summary

- 機器學習的步驟: 定義模型, 定義損失, 找到最佳模型
- 學習率可以決定每次修正權重的速度
- 透過激活函式能擬合複雜模型
- 激活函式就像神經元，使用很多個激活函式就是神經網路