Week 1

Linear Regression with one variable

Q1.

x	y
5	4
3	4
0	1
4	3

$\uparrow$ 1^{st} year no. of A

$\uparrow$ 2^{nd} year no. of A

training sample no.
$m=4$

$$h_\theta(x) = \theta_0 + \theta_1 x$$

Q2. what is $J(0,1)$, i.e. $h_\theta(x) = x$

$$\because J(\theta_0, \theta_1) = \frac{1}{2m}\sum_{i=1}^{m}(h_\theta(x^{(i)}) - y^{(i)})^2$$

$$\Rightarrow J(0,1) = \frac{1}{2m}\left[(5-4)^2 + (3-4)^2 + (0-1)^2 + (4-3)^2\right]$$

$$= \frac{1}{2\times 4}(4)$$

$$= 1/2$$

Q3. If set $\theta_0 = 0$, $\theta_1 = 1.5$, $h_\theta(2) = ?$

$$\Rightarrow h_\theta(x) = 1.5x$$

$$h_\theta(2) = 3$$

Linear Algebra

Q1. $A = \begin{bmatrix} 1 & -4 \\ -2 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 0 & 3 \\ 5 & 8 \end{bmatrix}$

$$A - B = \begin{bmatrix} 1 & -7 \\ -7 & -7 \end{bmatrix}$$

Q2. $x = \begin{bmatrix} 5 \\ 5 \\ 2 \\ 7 \end{bmatrix}$

$2 \cdot x = \begin{bmatrix} 10 \\ 10 \\ 4 \\ 14 \end{bmatrix}$

Q3 $u = \begin{bmatrix} 4 \\ -4 \\ -3 \end{bmatrix}$ $v = \begin{bmatrix} 4 \\ 2 \\ 4 \end{bmatrix}$

$u^T v = \begin{bmatrix} 4 & -4 & -3 \end{bmatrix} \begin{bmatrix} 4 \\ 2 \\ 4 \end{bmatrix} = 16 + (-8) + (-12)$

$= -4$

week 2

Linear Regression with multiple variables

Q1 $h_\theta(x) = \theta_0 + \theta_1 x_1 + \theta_2 x_2$

$x_1^{(3)} = 94$

$\mu_{x_1} = 81$

range $= 94 - 69 = 25$

normalised feature $x_1^{(3)} = \dfrac{94 - \mu_{x_1}}{\text{range}}$

$= \dfrac{94 - 81}{25}$

$= 0.52$

octave / Matlab tutorial

Q 1: $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}$ $\quad B = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$

$C = A * B$

$C = B' + A$

Q3: $A = \begin{bmatrix} & \\ & \end{bmatrix}_{10}^{10}$ $\quad x = \begin{bmatrix} \\ \end{bmatrix}^{10}$

10×10 $\quad 10 \times 1$

$Ax \Rightarrow 10 \times 1$

week 3

Logistic Regression

Q 5

predict $y=1$ if $\theta^T x \geq 0$

$[-6 \quad 0 \quad 1] = \theta^T$

$-6 + x_2 \geq 0$

$x_2 \geq 6$