deeplearning.ai

Multi-class classification

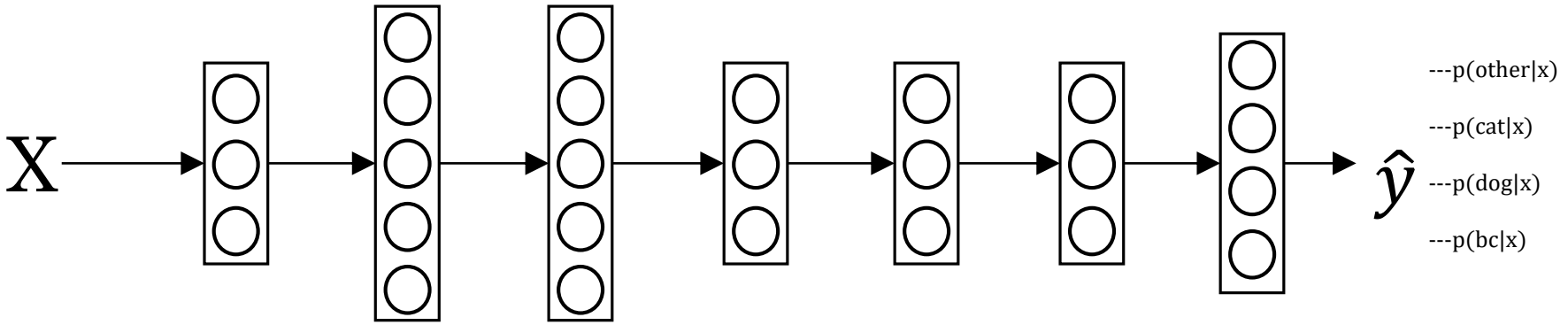
Softmax regression

There's a generalization of logistic regression called Softmax regression that lets you make predictions where you're trying to recognize one of C or one of multiple classed, rather than just recognize two classes.

Recognizing cats, dogs, and baby chicks

3 1 2 0 3 2 0 1

c = #classes = 4 (0,...,3)



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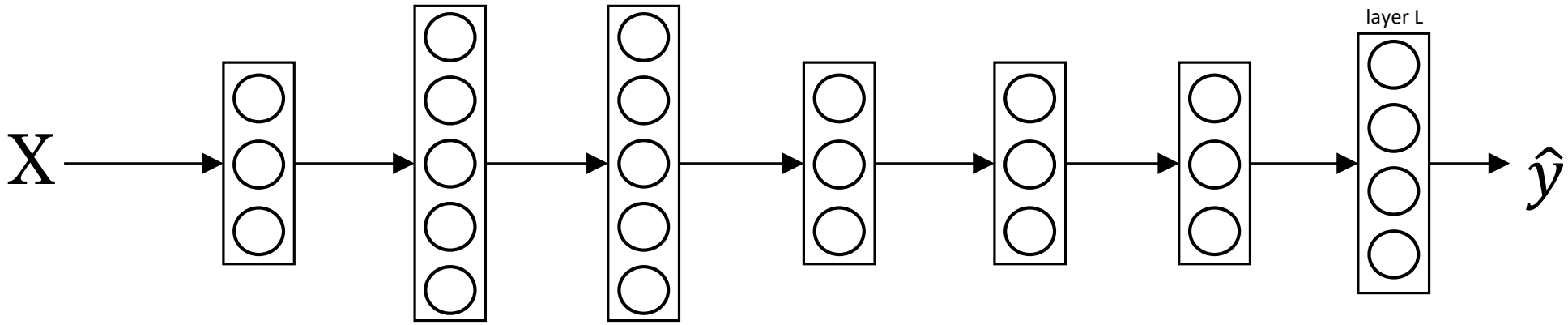
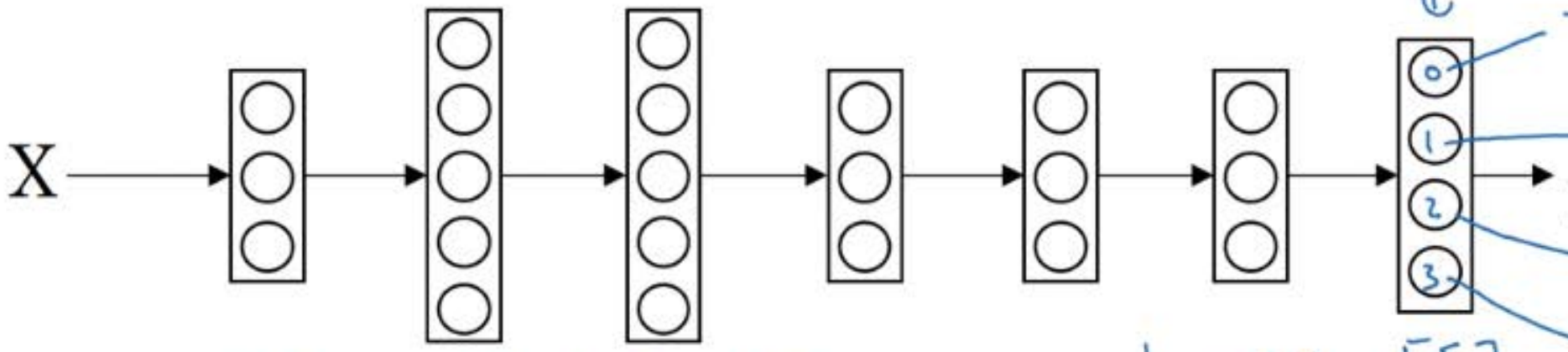
Softmax layer



Softmax layer



layer L

$z^{[L]} = W^{[L]} a^{[L-1]} + b^{[L]}$ (4,1)

$z^{[L]} = \begin{bmatrix} 5 \\ 2 \\ -1 \\ 3 \end{bmatrix}$

Activation function:

$t = e^{(z^{[L]})}$ element wise (4,1)

$t = \begin{bmatrix} e^5 \\ e^2 \\ e^{-1} \\ e^3 \end{bmatrix} = \begin{bmatrix} 148.4 \\ 7.4 \\ 0.4 \\ 20.1 \end{bmatrix}$ $\sum_{j=1}^{4} t_j = 176.3$

$a^{[L]} = \frac{e^{z^{[L]}}}{\sum_{j=1}^{4} t_i}$, $a_i^{[L]} = \frac{t_i}{\sum_{j=1}^{4} t_i}$

$a^{[L]} = \frac{t}{176.3}$

(4,1) $\hat{y}$

$\frac{e^5}{176.3} = 0.842$

$\frac{e^2}{176.3} = 0.042$

$\frac{e^{-1}}{176.3} = 0.002$

$\frac{e^3}{176.3} = 0.114$

整个计算过程 从计算幂

this whole computation--computing exponentiation to

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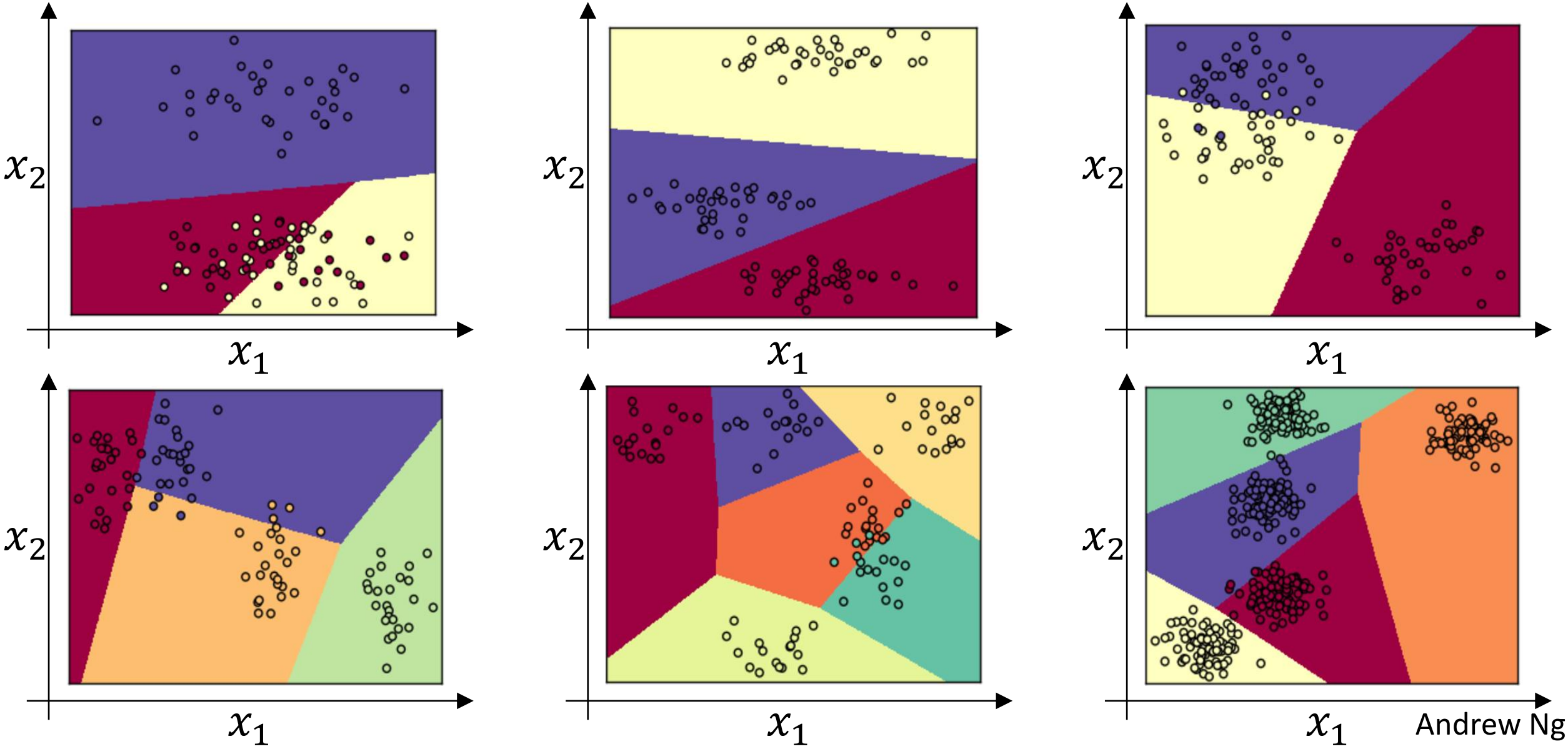
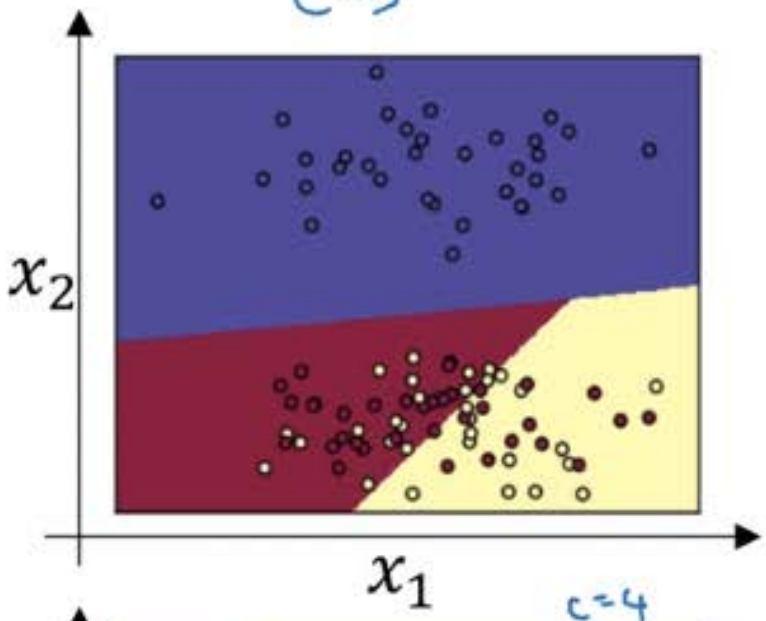
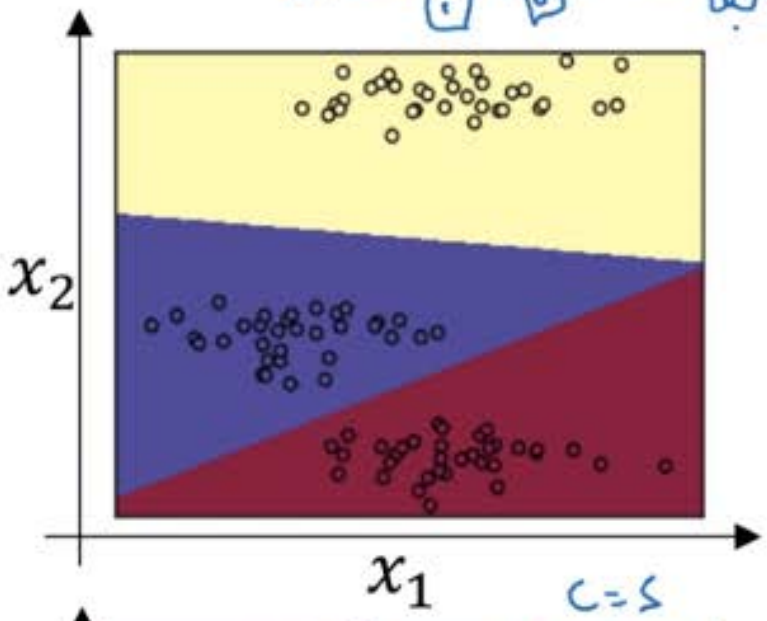
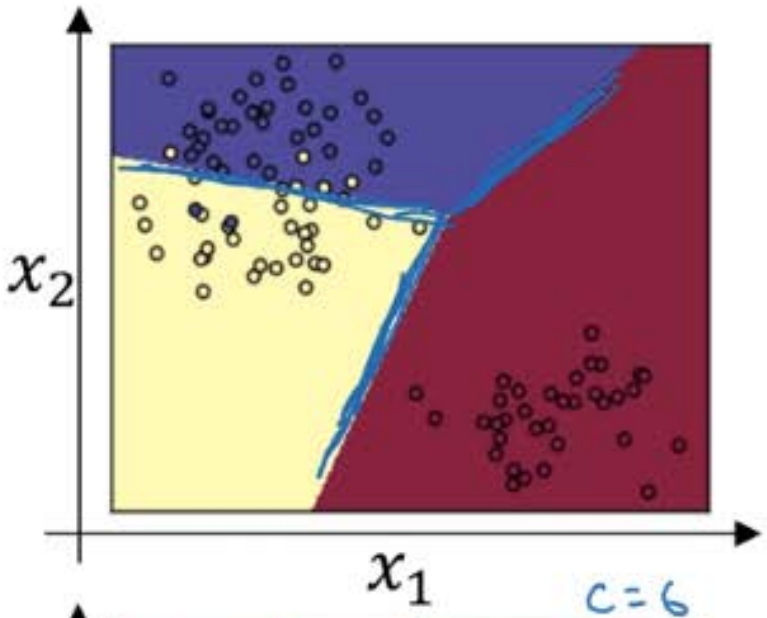
Softmax examples

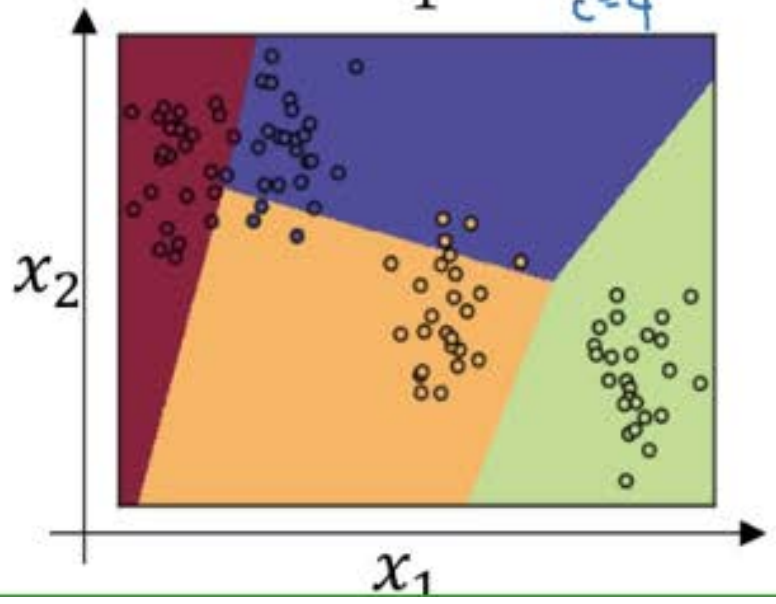


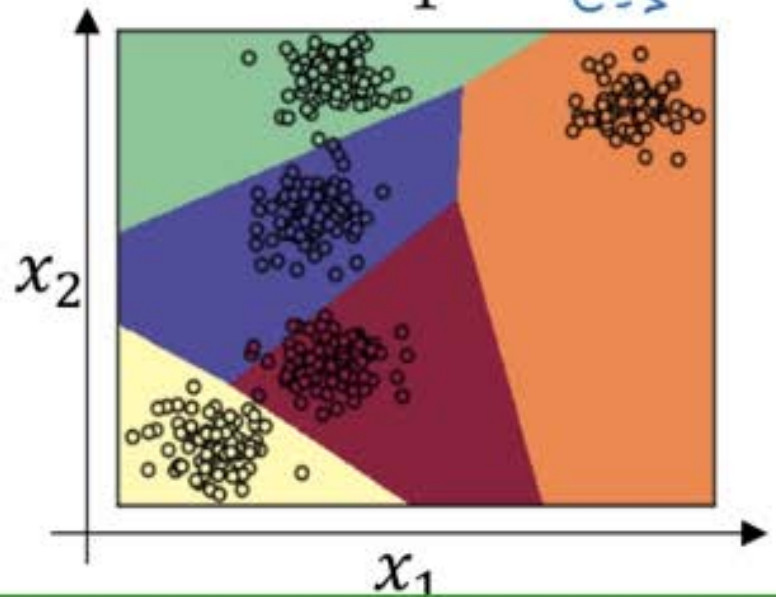
Softmax examples

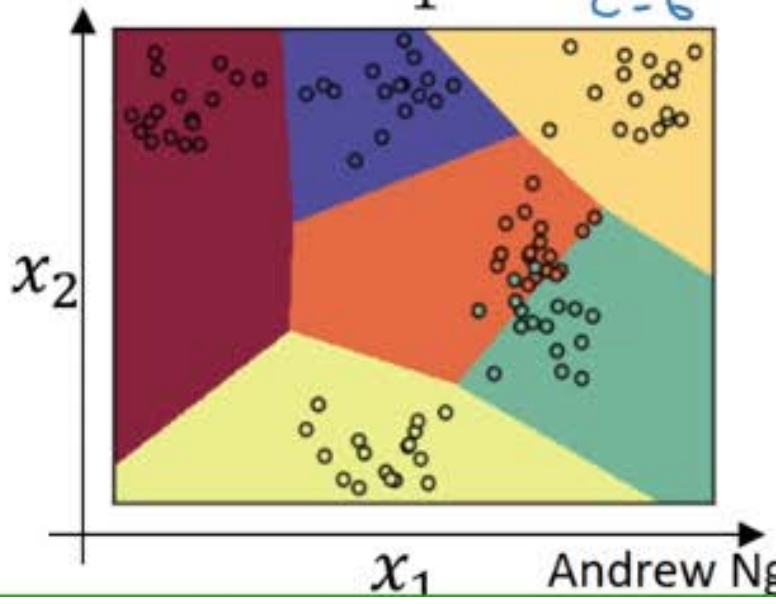












Andrew Ng