deeplearning.ai

Multi-class classification

Softmax regression

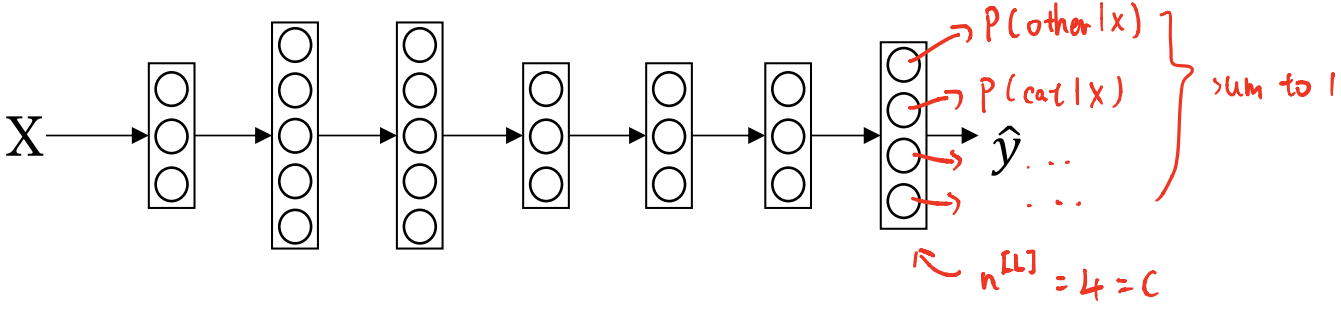
Recognizing cats, dogs, and baby chicks

others

1 2 3 0

3 1 2 0 3 2 0 1

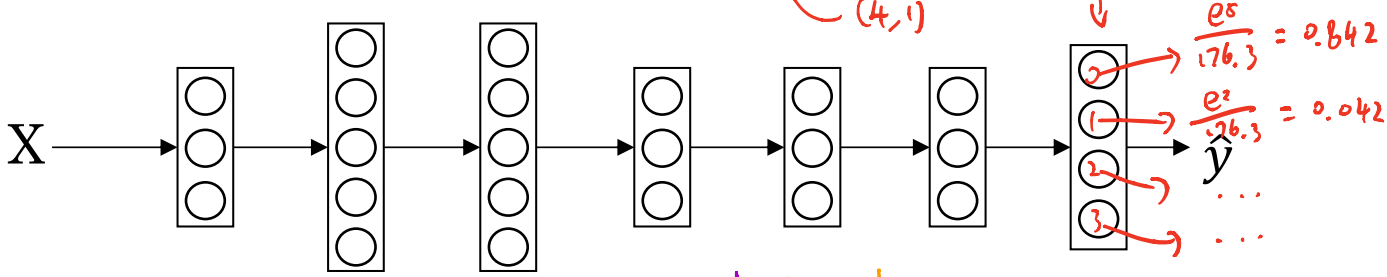
C = #classes = 4 $(0, \ldots, 3)$



Softmax layer

$a^{[L]} = g^{[L]}(z^{[L]})$ (4, 1)

layer L



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

Activation function: (softmax)

① $t = e^{(z^{[L]})}$ (4, 1)

② $a^{[L]} = \frac{e^{(z^{[L]})}}{\sum_{i=1}^{4} t_i}$, $a_i^{[L]} = \frac{t_i}{\sum_{i=1}^{4} t_i}$ (4, 1)

example:

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

$\sum_{i=1}^{4} t_i = 176.3$

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

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

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Softmax examples (no hidden layers)