

Softmax regression



3



1



2



4



3



2

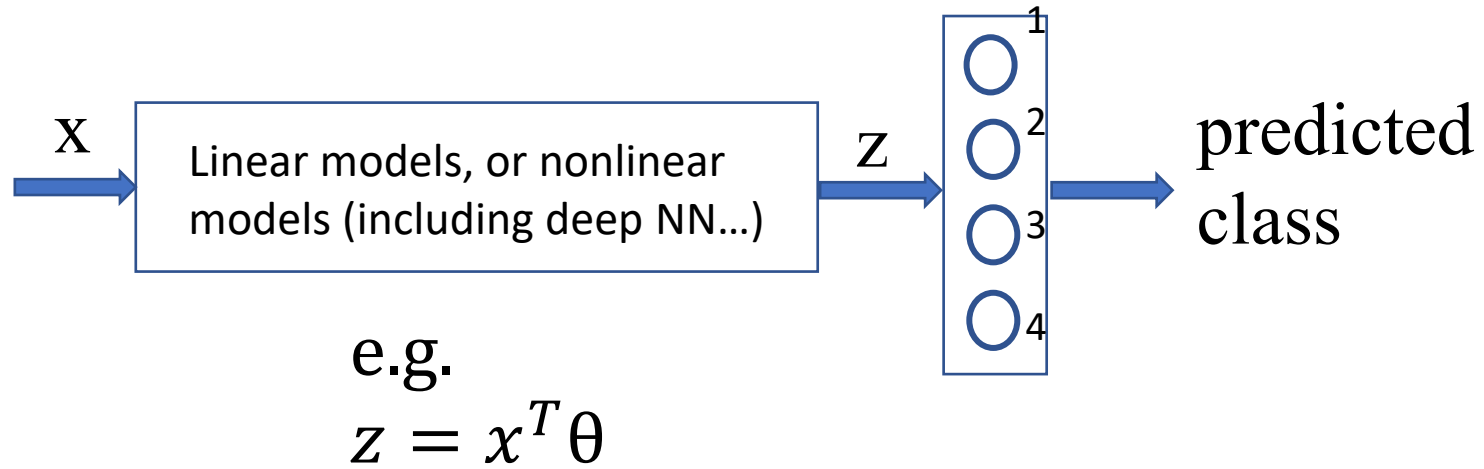


4



1

1: cats, 2: dogs, 3: baby chicks, 4: others



How to compute class labels using softmax function?

$$g(Z)_i = \frac{e^{z_i}}{\sum_{j=1}^K e^{z_j}}$$

Assume we have a model, and we have z given x
($k=4$ in this example)

$$z = \begin{bmatrix} 5 \\ 2 \\ -1 \\ 3 \end{bmatrix} \longrightarrow t = e^z = \begin{bmatrix} e^5 \\ e^2 \\ e^{-1} \\ e^3 \end{bmatrix} = \begin{bmatrix} 148.4 \\ 7.4 \\ 0.4 \\ 20.1 \end{bmatrix} \longrightarrow \begin{bmatrix} e^5/T \\ e^2/T \\ e^{-1}/T \\ e^3/T \end{bmatrix} = \begin{bmatrix} 0.842 \\ 0.042 \\ 0.002 \\ 0.114 \end{bmatrix} \longrightarrow \text{cat}$$

$T = \text{sum of elements in } t = 176.3$