

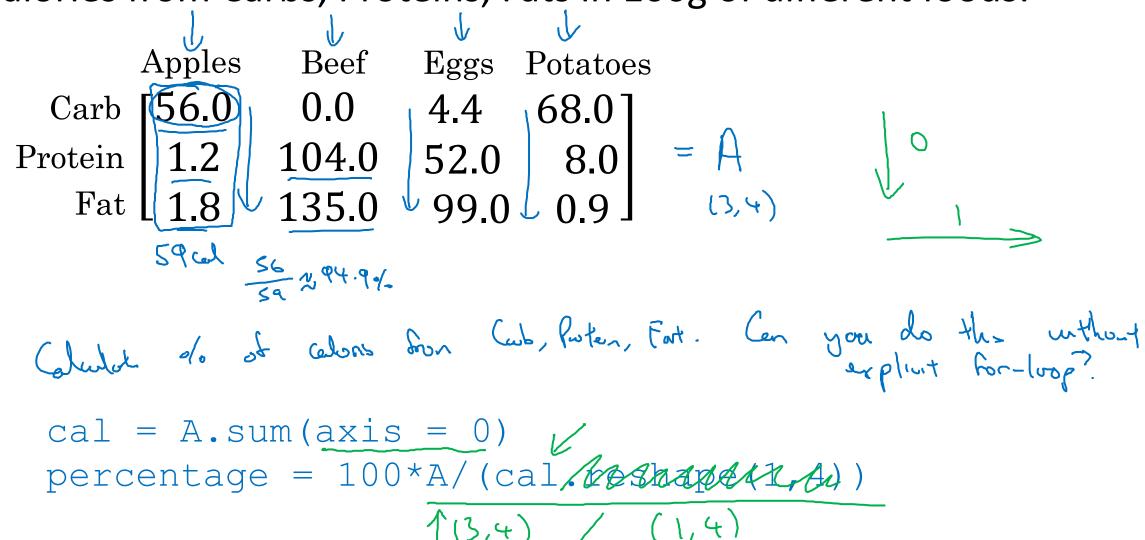
## Basics of Neural Network Programming

deeplearning.ai

# Broadcasting in Python

#### Broadcasting example

Calories from Carbs, Proteins, Fats in 100g of different foods:



### Broadcasting example

$$\begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} + \begin{bmatrix} 100 \\ 100 \\ 100 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} + \begin{bmatrix} 100 & 200 & 300 \\ 100 & 200 & 300 \end{bmatrix}$$

$$(m,n) (2)3)$$

$$\begin{bmatrix}
1 & 2 & 3 \\
4 & 5 & 6
\end{bmatrix} + 
\begin{bmatrix}
100 & 60 & 60 \\
200 & 200
\end{bmatrix} = 
\begin{pmatrix}
m, 1 \\
m, n
\end{pmatrix}$$

#### General Principle

$$(M, 1) \qquad + \qquad (M, 1) \qquad modrix \qquad + \qquad (M, 1) \qquad modrix \qquad + \qquad (M, 1) \qquad + \qquad R$$

$$\begin{bmatrix} M, 1 \\ 2 \\ 1 \end{bmatrix} \qquad + \qquad 100 \qquad = \qquad \begin{bmatrix} 101 \\ 102 \\ 103 \end{bmatrix} \qquad + \qquad 100 \qquad = \qquad \begin{bmatrix} 101 \\ 102 \\ 103 \end{bmatrix}$$

$$[1 \ 23] \qquad + \qquad 100 \qquad = \qquad \begin{bmatrix} 101 \\ 102 \\ 103 \end{bmatrix}$$

Mostlab/Octave: bsxfun