deeplearning.ai

Basics of Neural Network Programming

Broadcasting in Python

Broadcasting example

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

	Apples	Beef	Eggs	Potatoes
Carb	56.0	0.0	4.4	68.0
Protein	1.2	104.0	52.0	8.0
Fat	1.8	135.0	99.0	0.9

Apples have $\frac{56}{1.2+1.8+56}$ % carbs, Task → w/o For loop, calculate & store this in the matrix

column

```
cal = A.sum(axis = 0)
percentage = 100*A/(cal.reshape(1,4))
```

Broadcasting example

→ Python Autoexpands the 2nd vector

$$\begin{bmatrix}1\\2\\3\\4\end{bmatrix} + 100 = \begin{bmatrix}1\\2\\3\\4\end{bmatrix} + \begin{bmatrix}100\\100\\100\\100\end{bmatrix} = \begin{bmatrix}101\\102\\103\\104\end{bmatrix}$$

$$\underset{A_{(m\times n)}}{\begin{bmatrix}1 & 2 & 3\\4 & 5 & 6\end{bmatrix}} + \underset{B_{(1\times n)} \rightarrow B_{(m\times n)}}{\begin{bmatrix}100 & 200 & 300\end{bmatrix}} = A + \begin{bmatrix}100 & 200 & 300\\100 & 200 & 300\end{bmatrix} = \begin{bmatrix}101 & 202 & 303\\104 & 205 & 306\end{bmatrix}$$

$$\underset{A_{m\times n}}{\begin{bmatrix}1 & 2 & 3\\4 & 5 & 6\end{bmatrix}} + \underset{B_{m\times 1} \rightarrow B_{m\times n}}{\begin{bmatrix}100\\200\end{bmatrix}} \quad \begin{matrix}100 & 100\\200 & 200\end{matrix}$$

General Principle

$(m \times n)$ $+$ or $-$ or $*$ or $/$

$(1, n) \rightsquigarrow (m, n)$

$(m, 1) \rightsquigarrow (m, n)$