

Agenda

{
+ Vectorization } \Leftarrow depth
+ Broadcasting }

func* → Matrix multiplication
→ logical

}

- meets the condition
- ① np.all → True if all elements meets the condition
 - ② np.any → _____ at least 1 _____
 - ③ np.where → logical operation → If true the "what"
else "what"

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

= Takes time

2×3

3×3

Multiplication

① element wise ✓

② Matrix

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

$$\begin{bmatrix} 2 & 0 \\ 1 & 8 \end{bmatrix}$$

$2 \times 2 @ 2 \times 2$

Some no. of elements are eq.

$$\begin{bmatrix} 1 & 2 & 3 & 4 \\ 1 & 3 & 4 & 5 \end{bmatrix} \rightarrow \begin{bmatrix} 2 & 6 & 12 & 20 \end{bmatrix}$$

$$\begin{bmatrix} 1 & x \\ 1 & x \end{bmatrix}$$

$$\boxed{\begin{bmatrix} 1 \times 2 + 2 \times 1 \\ 1 \times 2 + 2 \times 1 \end{bmatrix}}$$

2×2

∴

$$3 \times 1 @ 1 \times 4 \Rightarrow \underline{\underline{3 \times 4}}$$

Bonus

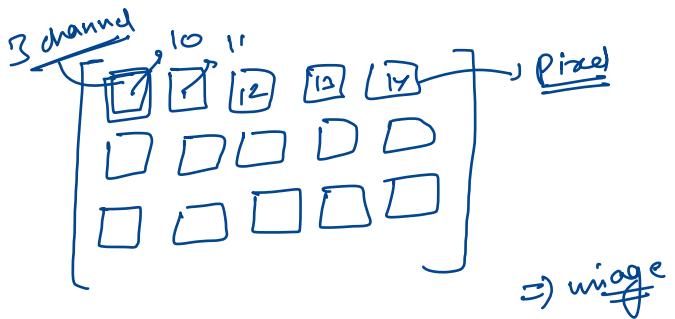
$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}$$

3×2

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 7 & 8 \end{bmatrix}^T \Rightarrow \begin{bmatrix} 1 & 3 & 5 & 7 \\ 2 & 4 & 6 & 8 \end{bmatrix}$$

4×2

$\Rightarrow \underline{\underline{3 \times 4}} \quad \underline{\underline{2 \times 4}}$



20

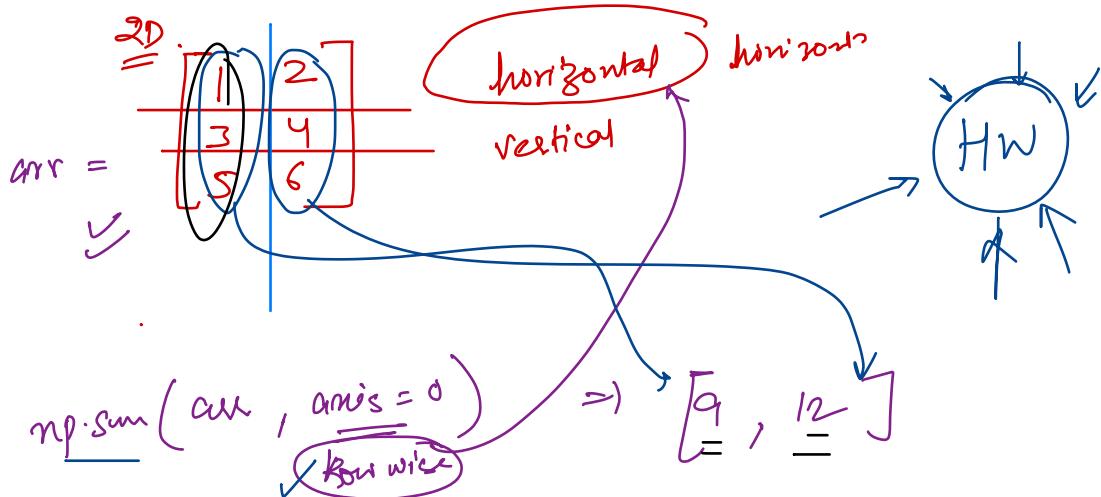
$$\begin{array}{c}
 \text{+} \\
 \begin{array}{|c|c|c|}\hline 0 & 0 & 0 \\ \hline 10 & 10 & 10 \\ \hline 20 & 20 & 20 \\ \hline 30 & 30 & 30 \\ \hline \end{array} + \begin{array}{|c|c|c|}\hline 0 & 1 & 2 \\ \hline \end{array} = \begin{array}{|c|c|c|}\hline 0 & 0 & 0 \\ \hline 10 & 10 & 10 \\ \hline 20 & 20 & 20 \\ \hline 30 & 30 & 30 \\ \hline \end{array} + \begin{array}{|c|c|c|}\hline 0 & 1 & 2 \\ \hline \end{array} = \text{Shapes are same}
 \end{array}$$

$$\begin{array}{c}
 \text{+} \\
 \begin{array}{|c|c|c|}\hline 0 & 0 & 0 \\ \hline 10 & 10 & 10 \\ \hline 20 & 20 & 20 \\ \hline 30 & 30 & 30 \\ \hline \end{array} + \begin{array}{|c|c|c|}\hline 0 & 1 & 2 \\ \hline \end{array} = \begin{array}{|c|c|c|}\hline 0 & 0 & 0 \\ \hline 10 & 10 & 10 \\ \hline 20 & 20 & 20 \\ \hline 30 & 30 & 30 \\ \hline \end{array} + \begin{array}{|c|c|c|}\hline 0 & 1 & 2 \\ \hline \end{array} = \begin{array}{|c|c|c|}\hline 0 & 1 & 2 \\ \hline 10 & 11 & 12 \\ \hline 20 & 21 & 22 \\ \hline 30 & 31 & 32 \\ \hline \end{array}
 \end{array}$$

$$\begin{array}{c}
 \text{+} \\
 \begin{array}{|c|c|c|}\hline 0 & 0 & 0 \\ \hline 10 & 10 & 10 \\ \hline 20 & 20 & 20 \\ \hline 30 & 30 & 30 \\ \hline \end{array} + \begin{array}{|c|c|c|}\hline 0 & 1 & 2 \\ \hline \end{array} = \begin{array}{|c|c|c|}\hline 0 & 0 & 0 \\ \hline 10 & 10 & 10 \\ \hline 20 & 20 & 20 \\ \hline 30 & 30 & 30 \\ \hline \end{array} + \begin{array}{|c|c|c|}\hline 0 & 1 & 2 \\ \hline \end{array} = \dots
 \end{array}$$

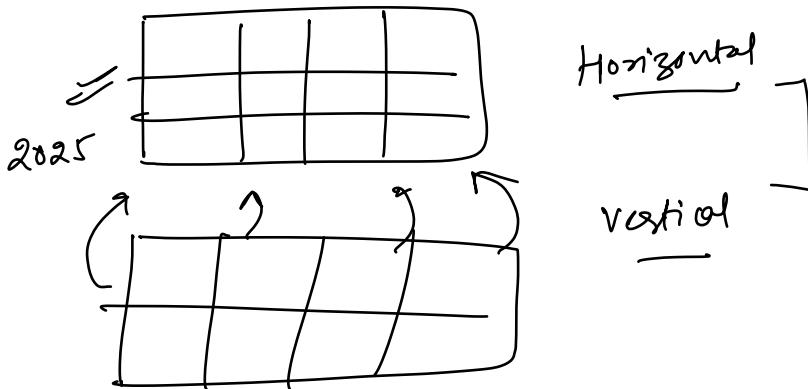
(4,1) (1,4)

<u>1</u>	<u>10 20 30</u>	11 21 31
<u>2</u>	<u>10 20 30</u>	12 22 32
<u>3</u>	<u>10 20 30</u>	13 23 33



mp.hsplit (arr , 2)

Stack



1D ✓

$\text{axis} = 0$ (Rows) ✓
 $\text{axis} = 1$ (columns) ✓

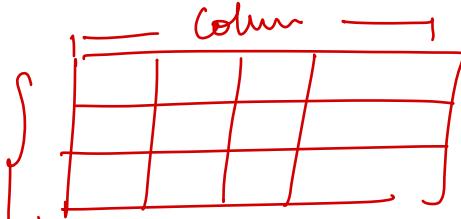
→ [2D]
np.sum

axis = 0
sum all the
rows

(2D) → Sum

2D
Stacking 2D , Concatenab 2D , Splitting (2D)
1D

(2D) → pandas

Rows { Column

Pandas ↴