

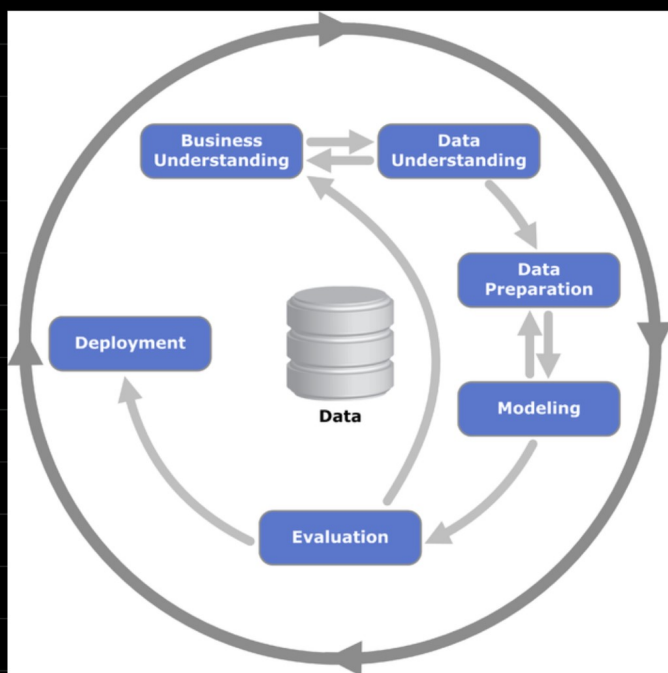
## Data toolkit

- Numpy
- Pandas
- Matplotlib
- Seaborn
- Plotly
- Bokeh.

## \* Data science process

\* CRISP-DM Framework  $\Rightarrow$  Cross-Industry process for data mining.

$\Downarrow$  getting insights from data.



### ① Business Understanding.

Problem statement :-

\* To Predict price of House.

- ① Area of house
- ② No. of rooms.

### ② Data Understanding

✓ \* How area of house decides the price of house

{ Area of House  $\uparrow$  Price of Houses  $\uparrow$   
No. of rooms  $\uparrow$  Price  $\uparrow$   
No. of rooms  $\uparrow$  Area  $\uparrow$

$\rightarrow$  Exploratory data Analysis (EDA)

### ③ Data preparation

### ④ Modelling

### ⑤ Evaluation

### ⑥ Deployment

\* library  $\rightarrow$  A library is a collection of pre-written code, that is used to perform common task.

basic Calculations

{ addition  
subtraction  
multiplication }

modules

<sup>LA</sup>  
{ Linear  
Algebra }

module

<sup>C</sup>  
{ Calculus }

module

$\rightarrow$  All of these modules kept together is called as package

Analogy

→ Multiple package together is called as library and packages.

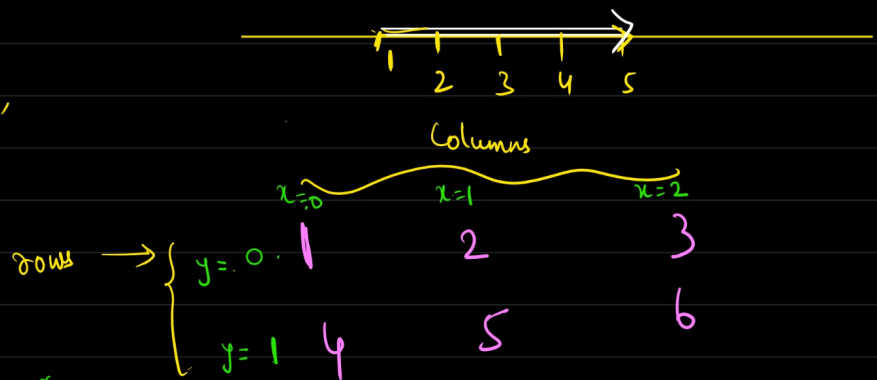
Library (multiple books) → Packages

↓  
Lessons/chapters ⇒ modules.

↓  
Paragraphs ⇒ functions.

\*  $arr = [1, 2, 3, 4, 5] = \underline{\text{only rows}}$

\*  $arr = \begin{bmatrix} 1, & 2, & 3 \\ 4, & 5, & 6 \end{bmatrix}$



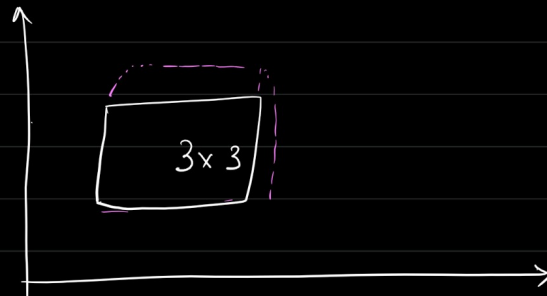
$np.fromfunction(\text{lambda } i, j : \underline{i == j} \quad (3, 3))$

	$j \rightarrow$	0	1	2
$i = \text{row}$ $j = \text{col}$	0	$0 == 0$ True	False	False
	1	False	$1 == 1$ True	False
	2	False	False	$2 == 2$ True

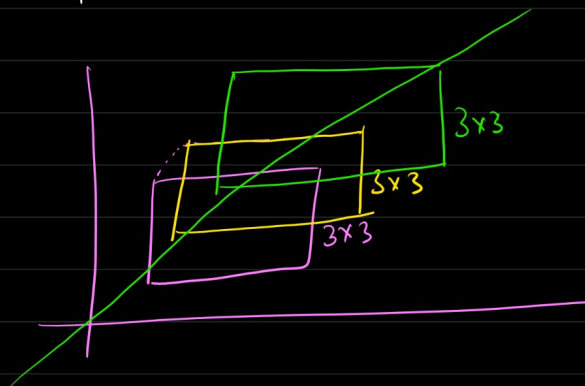
$np.from(\text{lambda } i, j : i \times j, (3, 3))$

i \ j	0	1	2
0	0x0 0	0x1 0	0x2 0
1	1x0 0	1x1 1	1x2 2
2	2x0 0	2x1 2	2x2 4

1, 3, 3



3, (3,3)  
↑



Ans  $\begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} + 5$  (index wise)

$$\begin{bmatrix} 0+5 & 0+5 & 0+5 & 0+5 \\ 0+5 & - & - & 0+5 \\ . & - & - & . \\ 0+5 & - & - & 0+5 \end{bmatrix}$$

$$\begin{bmatrix} 5 \times 2 & 5 \times 2 & 5 \times 2 & 5 \times 2 \\ 5 \times 2 & 5 \times 2 & 5 \times 2 & 5 \\ 5 & 5 & 5 & 5 \end{bmatrix} * 2 = \begin{bmatrix} 10 & 10 & 10 & 10 \\ . & . & . & . \\ . & . & . & . \end{bmatrix}$$

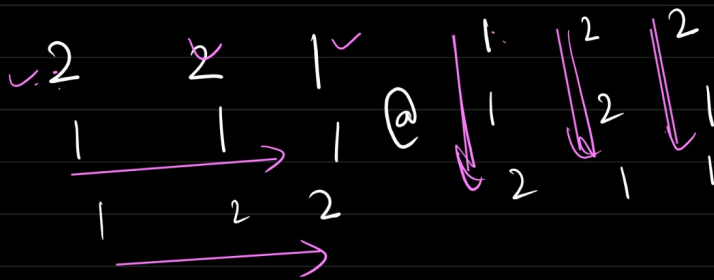
np.eye(3)  $\Rightarrow$  3x3  $\rightarrow$  All diagonal elements = 1 & rest 0.

$$\begin{matrix} \downarrow & \downarrow & \downarrow \\ \rightarrow & 1 & 0 & 0 \\ \rightarrow & 0 & 1 & 0 \\ \rightarrow & 0 & 0 & 1 \end{matrix}$$

index wise multiplication

2d array

Matrix multiplication



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

Condition for matrix multiplication

arr1 @ arr2

3x4

4x3

a x b @ b x c

(no. of columns of A = No. of rows of B)

resulting matrices will be of shape a x c

