

# Numpy

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Numerical analysis with Numpy computing package

Mathematical objects of linear algebra

Scalars : 6  $\rightarrow$  0D

Vectors :  $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$   $[1 \ 2 \ 3]$   $\rightarrow$  1D rows or columns of value  
 $\uparrow$  vectors  
 $\uparrow$  columns

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

2D  
 $\rightarrow$  array of rows and columns of values

Tensor :

(1,1,1)	(1,2,1)	(1,3,1)	(1,4,1)
(2,1,1)	(2,2,1)	(2,3,1)	(2,4,1)
(3,1,1)	(3,2,1)	(3,3,1)	(3,4,1)
(4,1,1)	(4,2,1)	(4,3,1)	(4,4,1)
(1,1,2)	(1,2,2)	(1,3,2)	(1,4,2)
(2,1,2)	(2,2,2)	(2,3,2)	(2,4,2)
(3,1,2)	(3,2,2)	(3,3,2)	(3,4,2)
(4,1,2)	(4,2,2)	(4,3,2)	(4,4,2)
(1,1,3)	(1,2,3)	(1,3,3)	(1,4,3)
(2,1,3)	(2,2,3)	(2,3,3)	(2,4,3)
(3,1,3)	(3,2,3)	(3,3,3)	(3,4,3)
(4,1,3)	(4,2,3)	(4,3,3)	(4,4,3)
(1,1,4)	(1,2,4)	(1,3,4)	(1,4,4)
(2,1,4)	(2,2,4)	(2,3,4)	(2,4,4)
(3,1,4)	(3,2,4)	(3,3,4)	(3,4,4)
(4,1,4)	(4,2,4)	(4,3,4)	(4,4,4)

3D  
arrays of rows and columns with 3 dimensions