2019-10-06

- Matrix expression

$$X = [c_1 \quad c_2 \quad \cdots \quad c_M] = \begin{bmatrix} r_1^T \\ r_2^T \\ \vdots \\ r_N^T \end{bmatrix}$$

$X \in R^{N \times M}$

$c_i \in R^{N \times 1} \quad (i = 1, \cdots, M)$

$r_j^T \in R^{1 \times M} \quad (j = 1, \cdots, N)$

$$X = \begin{bmatrix} | & | & & | \\ c_1 & c_2 & \cdots & c_M \\ | & | & & | \end{bmatrix} = \begin{bmatrix} - & r_1^T & - \\ - & r_2^T & - \\ & \vdots & \\ - & r_N^T & - \end{bmatrix}$$

example)

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

$$c_1 = \begin{bmatrix} 1 \\ 4 \end{bmatrix} \quad c_2 = \begin{bmatrix} 2 \\ 5 \end{bmatrix} \quad c_3 = \begin{bmatrix} 3 \\ 6 \end{bmatrix}$$

$$r_1 = [1, 2, 3]^T, \quad r_2 = [4, 5, 6]^T$$

- Special vector and Matrix

i) Zeros-vector

$$0_N = \mathbf{0} = 0 = \begin{bmatrix} 0 \\ 0 \\ \vdots \\ 0 \end{bmatrix}$$

$0 \in R^{N \times 1}$

np.zeros((3,1))

ii) ones-vector

$$1_N = \mathbf{1} = 1 = \begin{bmatrix} 1 \\ 1 \\ \vdots \\ 1 \end{bmatrix}$$

$1 \in R^{N \times 1}$

np.ones((3,1))

iii) Square Matrix

: Numbers of row and column are same.

$R^{N \times N}$