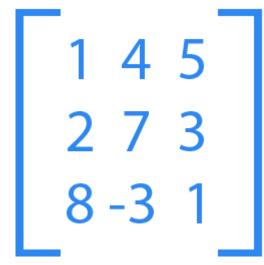
Siddhardhan

Matrix – Basics (Linear Algebra)

Math for Machine Learning

Matrix - Basics

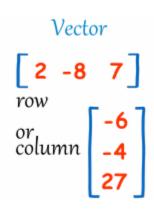
- 1. Scalars; Vectors; Matrix
- 2. Shape of a Matrix
- 3. Different Types of Matrix
- 4. Transpose of a Matrix
- 5. Role of Matrix in Machine Learning



Scalars; Vectors; Matrix

Scalar

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Matrix

Shape of a Matrix

 $\begin{bmatrix} 2 & 5 \\ 4 & 8 \end{bmatrix}$

2 x 2 Matrix

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

3 x 3 Matrix

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

3 x 2 Matrix

General Matrix Notation:

m x n Matrix

 $\mathsf{a}_{\mathsf{ii}} \longrightarrow \mathsf{Matrix} \, \mathsf{element}$

i — Row number

j ── Column number

Different Types of Matrices

Null Matrix or Zero Matrix:

$$\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

2 x 2

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

3 x 3

Identity Matrix:

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

2 x 2

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

3 x 3

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

4 x 4

Transpose of a Matrix

Transpose of a matrix is formed by turning all the rows of a given matrix into columns and vice-versa

$$A = \begin{bmatrix} 2 & 5 \\ 4 & 8 \end{bmatrix}$$

$$A^{\mathsf{T}} = \begin{bmatrix} 2 & 4 \\ 5 & 8 \end{bmatrix}$$

$$B = \begin{bmatrix} 8 & 6 & 1 \\ 2 & 9 & 2 \\ 3 & 4 & 3 \end{bmatrix}$$

$$B^{\mathsf{T}} = \begin{bmatrix} 8 & 2 & 3 \\ 6 & 9 & 4 \\ 1 & 2 & 3 \end{bmatrix}$$

Matrix in Machine Learning

House Price Dataset

crim	zn	indus	chas	nox	rm	age	dis	rad	tax	ptratio	b	Istat	price
0.00632	18	2.31	0	0.538	6.575	65.2	4.09	1	296	15.3	396.9	4.98	24
0.02731	0	7.07	0	0.469	6.421	78.9	4.9671	2	242	17.8	396.9	9.14	21.6
0.02729	0	7.07	0	0.469	7.185	61.1	4.9671	2	242	17.8	392.83	4.03	34.7
0.03237	0	2.18	0	0.458	6.998	45.8	6.0622	3	222	18.7	394.63	2.94	33.4

4 x 14 Matrix