MATRIX

Scale

Rotation

Translation

행(ROW)X열(COL)

3x2 행렬

$$M = \begin{bmatrix} m_{11} & m_{12} \\ m_{21} & m_{22} \\ m_{31} & m_{31} \end{bmatrix}$$

2x2 행렬

$$\mathrm{A} = \begin{bmatrix} 1 & 1 \\ 4 & 2 \end{bmatrix}$$

상수 곱하기

$$M= \begin{bmatrix} m_{11} & m_{12} \\ m_{21} & m_{22} \end{bmatrix} \qquad k \cdot M= \begin{bmatrix} km_{11} & km_{12} \\ km_{21} & km_{22} \end{bmatrix}$$

$$A= \begin{bmatrix} 1 & 1 \\ 4 & 2 \end{bmatrix} \qquad A= \begin{bmatrix} 1 & 1 \\ 4 & 2 \end{bmatrix}$$

더하고 빼기

$$A = \begin{bmatrix} 1 & 1 \\ 4 & 2 \end{bmatrix} \qquad B = \begin{bmatrix} 0 & 2 \\ 1 & 3 \end{bmatrix}$$

$$\begin{cases} A + B = \begin{bmatrix} 1 & 1 \\ 4 & 2 \end{bmatrix} + \begin{bmatrix} 0 & 2 \\ 1 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 3 \\ 5 & 5 \end{bmatrix} \\ A + B = \begin{bmatrix} 1 & 1 \\ 4 & 2 \end{bmatrix} + \begin{bmatrix} 0 & 2 \\ 1 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 3 \\ 5 & 5 \end{bmatrix} \end{cases}$$

행렬의 곱

$$A=\begin{bmatrix} & \cdots & \\ \vdots & \ddots & \vdots \\ & \cdots & \end{bmatrix} \qquad B=\begin{bmatrix} & \cdots & \\ \vdots & \ddots & \vdots \\ & \cdots & \end{bmatrix}$$

$$m \times n \longleftrightarrow n \times p$$

$$m \times p$$

행렬의 곱

$$A = \begin{bmatrix} 1 & 1 \\ 4 & 2 \end{bmatrix} \qquad B = \begin{bmatrix} 0 & 2 \\ 1 & 3 \end{bmatrix}$$

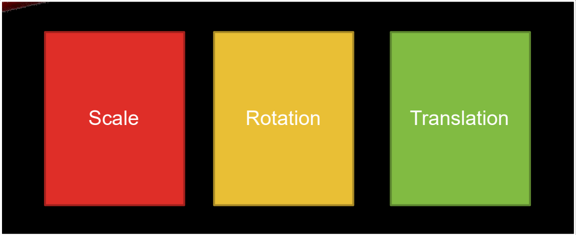
$$A \times B = \begin{bmatrix} 0+1 & 2+3 \\ 0+2 & 8+6 \end{bmatrix} = \begin{bmatrix} 1 & 5 \\ 2 & 14 \end{bmatrix}$$

$$\boxed{C_{\mathrm{ij}} = \sum_{k=1}^{n} a_{\mathrm{ik}} b_{\mathrm{kj}} = a_{\mathrm{i1}} b_{\mathrm{1j}} + a_{\mathrm{i2}} b_{\mathrm{2j}} + \ldots + a_{\mathrm{in}} b_{\mathrm{nj}}}$$

교환 법칙, 결합 법칙

$$A \times B \neq B \times A$$

$$(A \times B) \times C = A \times (B \times C)$$



$$(A \times B) \times C = A \times (B \times C)$$

항등 행렬 (IDENTITY)

$$B = \begin{bmatrix} & \cdots & \\ \vdots & \ddots & \vdots \\ & \cdots & \end{bmatrix}$$

항등 행렬 (IDENTITY)

$$\mathrm{A} = \begin{bmatrix} 1 & 1 \\ 4 & 2 \end{bmatrix} \qquad B = \begin{bmatrix} 0 & 2 \\ 1 & 3 \end{bmatrix}$$

$$\left\{ \begin{array}{l} \mathrm{A} \times I = \begin{bmatrix} 1 & 1 \\ 4 & 2 \end{bmatrix} \\[1em] \mathrm{A} \times I = \begin{bmatrix} 1 & 1 \\ 4 & 2 \end{bmatrix} \end{array} \right.$$

역행렬

$$AB = I$$

$$M\boxed{AB} = M(AB) = MI = M$$

$$\boxed{AA^{-1} = I}$$

$$AB = I$$

역행렬

$$\boxed{AA^{-1} = A^{-1}A = I}$$

$$A(\underline{A^{-1}A}) = (AA^{-1})A = IA = A$$

역행렬

$$M = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

$$\boxed{D = ad - bc \neq 0}$$

$$\boxed{M^{-1} = \frac{1}{D}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}}$$

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

$$M^{-1} = \frac{1}{-2}\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix} = \begin{bmatrix} -2 & 1 \\ \frac{3}{2} & -\frac{1}{2} \end{bmatrix}$$

전치 행렬

$$A = \begin{bmatrix} & \cdots & \\ \vdots & \ddots & \vdots \\ & \cdots & \end{bmatrix}$$

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

$$\begin{cases} (M^T)^T = M \\ (MN)^T = N^T\ M^T \end{cases}$$

직교 행렬

$$M = \begin{array}{c} \begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} \end{array} \begin{array}{l} \overrightarrow{v_1} \\ \overrightarrow{v_2} \\ \overrightarrow{v_3} \end{array}$$

$$\begin{cases} \overrightarrow{v_1} \cdot \overrightarrow{v_2} = 0 \\ \overrightarrow{v_2} \cdot \overrightarrow{v_3} = 0 \\ \overrightarrow{v_3} \cdot \overrightarrow{v_1} = 0 \end{cases}$$

$$\boxed{AB = I}$$

직교 행렬의 역행렬

$$A = \begin{bmatrix} & \cdots & \\ \vdots & \ddots & \vdots \\ & \cdots & \end{bmatrix}$$

$$\boxed{M^T = M^{-1}} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}$$

벡터와 행렬

$$\vec{v} = [x \quad y \quad z \quad 1] \qquad \mathrm{M} = \begin{bmatrix} & & & \\ & & & \\ & & & \\ & & & \end{bmatrix}$$

$$1 \times 4 \qquad\qquad 4 \times 4$$

벡터와 행렬

$$\vec{v} = [x \quad y \quad z \quad 1]$$

$$M = \begin{bmatrix} m_{11} & m_{12} & m_{13} & m_{14} \\ m_{21} & m_{22} & m_{23} & m_{24} \\ m_{31} & m_{32} & m_{33} & m_{34} \\ m_{41} & m_{42} & m_{43} & m_{44} \end{bmatrix}$$

$$\begin{cases} X = xm_{11} + ym_{21} + zm_{31} + m_{41} \\ Y = xm_{12} + ym_{22} + zm_{32} + m_{42} \\ Z = xm_{13} + ym_{23} + zm_{33} + m_{43} \end{cases}$$