



Machine Learning

Linear Algebra review (optional)

Addition and scalar multiplication

Matrix Addition

↓ ↓

→ $\begin{bmatrix} 1 & 0 \\ 2 & 5 \\ 3 & 1 \end{bmatrix}$ + $\begin{bmatrix} 4 & 0.5 \\ 2 & 5 \\ 0 & 1 \end{bmatrix}$ = $\begin{bmatrix} 5 & 0.5 \\ 4 & 10 \\ 3 & 2 \end{bmatrix}$

3×2 matrix

3×2

3×2

mesmas dimensões

→ $\begin{bmatrix} 1 & 0 \\ 2 & 5 \\ 3 & 1 \end{bmatrix}$ + $\begin{bmatrix} 4 & 0.5 \\ 2 & 5 \end{bmatrix}$ = error

3×2

2×2

Scalar Multiplication

← real number

$$3 \times \begin{bmatrix} 1 & 0 \\ 2 & 5 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} 3 & 0 \\ 6 & 15 \\ 9 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 2 & 5 \\ 3 & 1 \end{bmatrix} \times 3$$

3x2 3x2

$$\begin{bmatrix} 4 & 0 \\ 6 & 3 \end{bmatrix} / 4 = \frac{1}{4} \begin{bmatrix} 4 & 0 \\ 6 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ \frac{3}{2} & \frac{3}{4} \end{bmatrix}$$

Combination of Operands

$$\begin{aligned}
 & \text{Scalar multiplication} \rightarrow 3 \times \begin{bmatrix} 1 \\ 4 \\ 2 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 5 \end{bmatrix} - \begin{bmatrix} 3 \\ 0 \\ 2 \end{bmatrix} / 3 \quad \text{Scalar division} \\
 & = \begin{bmatrix} 3 \\ 12 \\ 6 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 5 \end{bmatrix} - \begin{bmatrix} 1 \\ 0 \\ \frac{2}{3} \end{bmatrix} \quad \begin{array}{l} \text{matrix subtraction /} \\ \text{vector subtraction} \end{array} \\
 & = \begin{bmatrix} 2 \\ 12 \\ 10 \frac{1}{3} \end{bmatrix} \quad \begin{array}{l} \text{matrix addition /} \\ \text{vector addition} \end{array} \\
 & \quad \begin{array}{l} 3 \times 1 \text{ matrix} \\ 3\text{-dimensional vector} \end{array}
 \end{aligned}$$