Matrix Operations

Ahmed Ali

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1 Introduction

1.1 Addition

The Sum of two Matrices A and B is given by:

$$C_{ij} = A_{ij} + B_{ij}$$

1.1.1 Example

Addition of A and B:

$$A = \begin{bmatrix} A_{1.1} & A_{1.2} \\ A_{2.1} & A_{2.2} \end{bmatrix} \quad B = \begin{bmatrix} B_{1.1} & B_{1.2} \\ B_{2.1} & B_{2.2} \end{bmatrix}$$

$$A + B = C$$

$$C = \begin{bmatrix} A_{1.1} + B_{1.1} & A_{1.2} + B_{1.2} \\ A_{2.1} + B_{2.1} & A_{2.2} + B_{2.2} \end{bmatrix}$$

1.2 Subtraction

The Difference of two Matrices A and B is given by:

$$C_{ij} = A_{ij} - B_{ij}$$

1.2.1 Example

Subtraction of A and B:

$$A = \begin{bmatrix} A_{1.1} & A_{1.2} \\ A_{2.1} & A_{2.2} \end{bmatrix} \quad B = \begin{bmatrix} B_{1.1} & B_{1.2} \\ B_{2.1} & B_{2.2} \end{bmatrix}$$

$$A - B = C$$

$$C = \begin{bmatrix} A_{1.1} - B_{1.1} & A_{1.2} - B_{1.2} \\ A_{2.1} - B_{2.1} & A_{2.2} - B_{2.2} \end{bmatrix}$$

1.3 Multiplication

The Product of two Matrices A and B is given by:

$$C_{ij} = \sum_k A_{ik} \cdot B_{kj}$$

1.3.1 Example

Multiplication of A and B:

$$A = \begin{bmatrix} A_{1.1} & A_{1.2} \\ A_{2.1} & A_{2.2} \end{bmatrix} \quad B = \begin{bmatrix} B_{1.1} & B_{1.2} \\ B_{2.1} & B_{2.2} \end{bmatrix}$$

$$A \cdot B = C$$

$$C_{1.1} = A_{1.1} \cdot B_{1.1} + A_{1.2} \cdot B_{2.1}$$
$$C_{1.2} = A_{1.1} \cdot B_{1.2} + A_{1.2} \cdot B_{2.2}$$
$$C_{2.1} = A_{2.1} \cdot B_{1.1} + A_{2.2} \cdot B_{2.1}$$
$$C_{2.2} = A_{2.1} \cdot B_{1.2} + A_{2.2} \cdot B_{2.2}$$

$$C = \begin{bmatrix} C_{1.1} & C_{1.2} \\ C_{2.1} & C_{2.2} \end{bmatrix}$$