Matrix Addition

To add one matrix to the other we need to:

- Verify that the matrices are of the same dimensions
- Make sure we add elements in the correct corresponding index.

To put this into context, let's look at an example:

We will focus on the random matrix we saw in *equation 11*:

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} & .. & a_{1n} \\ a_{21} & a_{22} & a_{23} & .. & a_{2n} \\ a_{31} & a_{32} & a_{33} & .. & a_{3n} \\ \vdots & & & & \\ a_{m1} & a_{m2} & a_{m3} & ..... & a_{mn} \end{bmatrix}$$

The dimensions of matrix A are $m \times n$. This means that the matrix has m rows and n columns.

Matrix A can only be added to another matrix with m rows and n columns. For example, matrix B.

$$B = \begin{bmatrix} b_{11} & b_{12} & b_{13} & .. & b_{1n} \\ b_{21} & b_{22} & b_{23} & .. & b_{2n} \\ b_{31} & b_{32} & b_{33} & .. & b_{3n} \\ \vdots & & & & \\ b_{m1} & b_{m2} & b_{m3} & ..... & b_{mn} \end{bmatrix}$$

Equation 12

As long as the dimensions match, the addition is very simple:

Simply add element a_{ij} in A to the corresponding element b_{ij} in B.

$$A + B = \begin{bmatrix} a_{11} & a_{12} & a_{13} & .. & a_{1n} \\ a_{21} & a_{22} & a_{23} & .. & a_{2n} \\ a_{31} & a_{32} & a_{33} & .. & a_{3n} \\ \vdots & & & & \\ a_{m1} & a_{m2} & a_{m3} & ..... & a_{mn} \end{bmatrix} + \begin{bmatrix} b_{11} & b_{12} & b_{13} & .. & b_{1n} \\ b_{21} & b_{22} & b_{23} & .. & b_{2n} \\ b_{31} & b_{32} & b_{33} & .. & b_{3n} \\ \vdots & & & & \\ b_{m1} & b_{m2} & b_{m3} & ..... & b_{mn} \end{bmatrix}$$

$$A + B = \begin{bmatrix} a_{11} + b_{11} & a_{12} + b_{12} & a_{13} + b_{13} & .. & a_{1n} + b_{1n} \\ a_{21} + b_{21} & a_{22} + b_{22} & a_{23} + b_{23} & .. & a_{2n} + b_{2n} \\ a_{31} + b_{31} & a_{32} + b_{32} & a_{33} + b_{33} & .. & a_{3n} + b_{3n} \\ \vdots & & & & \\ a_{m1} + b_{m1} & a_{m2} + b_{m2} & a_{m3} + b_{m3} & ..... & a_{mn} + b_{mn} \end{bmatrix}$$

Equation 12