

The diagram illustrates the computation of a single element y_i of the output vector y from a matrix M and an input vector x . It shows the dot product of the i -th row of M with the vector x .

At the bottom, the matrix M is shown as a 4x4 grid of elements:

$$\begin{bmatrix} M_{11} & M_{12} & \dots & M_{1n} \\ M_{21} & M_{22} & \dots & M_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ M_{n1} & M_{n2} & \dots & M_{nn} \end{bmatrix}$$

To the right of the matrix is the output vector y :

$$\begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix}$$

At the top, the input vector x is shown as a column of elements:

$$\begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix}$$

The diagram shows the dot product operation for the i -th row of M (indicated by the i -th row of dots in the matrix) and the input vector x . The operation is represented by a series of terms connected by plus signs:

$$\begin{matrix} \times & \dots & \dots & \dots & \dots \\ \vdots & + & \times & \dots & \dots \\ \vdots & & \vdots & + & \dots \\ & & & & + \\ & & & & \times & \dots \\ & & & & \vdots & \ddots \end{matrix}$$

The final result of this dot product is indicated by an arrow pointing to the i -th element of the output vector y .