



Definition

The *matrix-vector product* between an $m \times n$ -matrix and an n -vector is the result of the linear combination of the columns of the matrix with the sequence of scalars in the vector. So the matrix-vector product is an m -vector.

Notation

Let C be a nonempty set. Let $A \in C^{m \times n}$ and let $x \in C^n$. As usual, we denote the matrix-vector product of A with x by Ax , read “A x,” and defined by

$$b_i = \sum_{j=1}^n a_{ij}x_j$$

for $i \in \{1, 2, \dots, m\}$. Let

$$A = \begin{bmatrix} a_1^\top \\ a_2^\top \\ \vdots \\ a_m^\top \end{bmatrix}$$

Or, if a_i^\top is the i th row of A , then

$$b_i = a_i^\top x$$

for $i \in \{1, 2, \dots, m\}$.

