BECOME A MEMBER

ON STEADY

The Bright Side of
Mathematics

Linear Algebra – Part 14

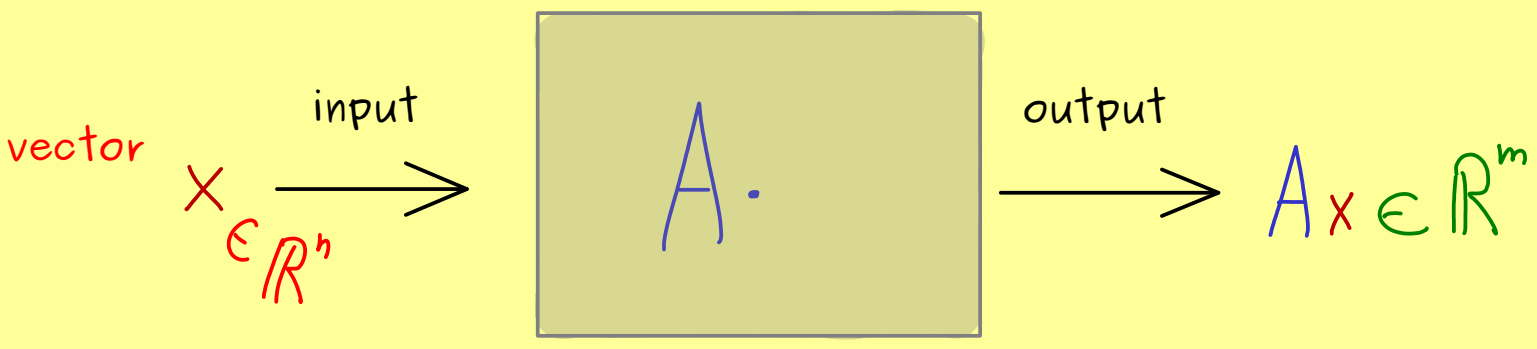
Column picture: $A \in \mathbb{R}^{m \times n}$

$$A = \begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{pmatrix} = \begin{pmatrix} | & | & & | \\ a_1 & a_2 & \cdots & a_n \\ | & | & & | \end{pmatrix}, \quad a_i := \begin{pmatrix} a_{1i} \\ a_{2i} \\ \vdots \\ a_{mi} \end{pmatrix}$$

Matrix-vector product:

$$Ax = \begin{pmatrix} | & | & & | \\ a_1 & a_2 & \cdots & a_n \\ | & | & & | \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{pmatrix}$$

$$= x_1 \cdot \begin{pmatrix} | \\ a_1 \\ | \end{pmatrix} + x_2 \cdot \begin{pmatrix} | \\ a_2 \\ | \end{pmatrix} + \cdots + x_n \cdot \begin{pmatrix} | \\ a_n \\ | \end{pmatrix}$$



Definition: $f_A : \mathbb{R}^n \longrightarrow \mathbb{R}^m, \quad x \longmapsto Ax$

linear map