



Why

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Definition

The *quadratic form* of a square matrix A with a vector x is the value $x^\top Ax$.

Notation

Let \mathbf{F} be a field and $A \in \mathbf{F}^{m \times m}$. For a vector $x \in \mathbf{R}^d$, A quadratic for in A Let $x \in \mathbf{R}^d$. Then $x^\top Ax$ is a quadratic form.

$$x^\top Ax = \sum_{i,j} A_{ij} x_i x_j$$

Under trace

Observe that $\text{tr } x^\top Ax = \text{tr } Axx^\top = \text{tr } xx^\top A$.

¹Future editions will include.

