Norms

In machine learning, we usually measure the size of vectors using a function called a **norm**. Formally, the L^p norm is given by

$$||\boldsymbol{x}||_p = \left(\sum_i |x_i|^p \right)^{\frac{1}{p}}$$

L^1 norm:

$$||\boldsymbol{x}||_1 = \sum_i |x_i|.$$

L^2 norm, with p = 2, is known as the Euclidean norm.

Max norm: the max absolute value of element in the vector:

$$||\boldsymbol{x}||_\infty = \max_i |x_i|.$$

Frobenius norm measures the size of a matrix:

$$||A||_F = \sqrt{\sum_{i,j} A_{i,j}^2}$$