Norms concept in ML/DL

that refers to a function that measures the length of a vector.

L1 Norm: Sum of the absolute values of the components.

$$\|x\|_1 = |x_1| + |x_2| + \cdots + |x_n|$$

Manhattan Distance:

$$d(x,y) = |x_1 - y_1| + |x_2 - y_2| + \cdots + |x_n - y_n|$$

L2 Norm: Square root of the sum of the squared components.

$$\|x\|_2 = \sqrt{x_1^2 + x_2^2 + \cdots + x_n^2}$$

Euclidean Distance:

$$d(x,y) = \sqrt{(x_1 - y_1)^2 + (x_2 - y_2)^2 + \cdots + (x_n - y_n)^2}$$

Infinity Norm (max norm): Maximum absolute value of the components.

$$\|x\|_\infty = \max(|x_1|, |x_2|, \cdots |x_n|)$$

$$a = (3, -7, 2)$$

$$\|a\|_\infty = \max(|3|, |-7|, |2|)$$
$$= \max(3, 7, 2) = 7$$