Semester : VI | Subject :Machine Learning | Academic Year: 2023 - 2024

Vector Norms

Example.

find L1, L2, and ∞ norms for the following

$$x = \begin{bmatrix} 2 \\ 5 \\ -3 \end{bmatrix}$$

Solution:-

→ P=1: The L1 Norm

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

$$= 2 + 5 + 3$$

$$\|x\|_1 = 10$$

→ P=2: The L2 - norms or Euclidean norm

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

$$= \sqrt{x^T x}$$

$$= \sqrt{4 + 25 + 9}$$

$$\approx 6.1644$$

→ P = ∞: The L∞ - norm

$$\|x\|_\infty = \max_{1 \le i \le n} |x_i|$$

$$\|x\|_\infty = 5$$