Ex.No-1 NUMPY

AIM:

To calculate the values for the mathematical formulas using NumPy library

INTEGRATED DEVELOPMENT ENVIRONMENT (IDE) REQUIRED:

JUPYTER NOTEBOOK

REQUIRED LIBRARIES FOR PYTHON:

Numpy

PROCEDURE:

A) Euclidean distance

The mathematical formula for calculating the Euclidean distance between 2 points in 2D space:

$$d(p,q) = \sqrt[2]{(q_1-p_1)^2+(q_2-p_2)^2}$$

B) Dot Product

$$u = \begin{bmatrix} 5 \\ 12 \end{bmatrix}, \quad v = \begin{bmatrix} 8 \\ 6 \end{bmatrix}$$

Dot product is
$$u \cdot v = u_1 \times v_1 + u_2 \times v_2$$

$$= 5 \times 8 + 12 \times 6$$

$$= 112$$

C) Solving a System of Linear Equations

A system of linear equations can be represented in matrix form as AX=B, where A is the matrix of coefficients, X is the column vector of variables, and B is the column vector of solutions. To solve for \mathbf{X} , we can use: $\mathbf{X} = \mathbf{A}^{-1} \mathbf{B}$ assuming A is invertible.

PROGRAM:

A) Calculating the Euclidean Distance Between Two Points

importnumpy as np

defeuclidean_distance(p, q):

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returnnp.sqrt(np.sum((q - p) ** 2))
# Example usage
p = np.array([1, 2])
q = np.array([4, 6])
distance = euclidean_distance(p, q)
print("Output for Calculating the Euclidean Distance Between Two Points is: ",distance)
B) Calculating the Dot Product of Two Vectors
importnumpy as np
A = np.array([1, 3, -5])
B = np.array([4, -2, -1])
dot_product = np.dot(A, B)
print("Output for dot product of two vectors A and B is ",dot product)
C) Solving a System of Linear Equations
importnumpy as np
# Coefficients matrix A and result vector b
A = np.array([[3, 1], [1, 2]])
b = np.array([9, 8])
# Solve for x
x = np.linalg.solve(A, b)
print("Output solution of System of Linear Equations is ",x)
Output:
A)Output for Calculating the Euclidean Distance between Two Points is: 5.0. Exercise 2 –B)Output for
dot product of two vectors A and B is 3
C)Output solution of System of Linear Equations is [2. 3.]
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Result:

The programs were run successfully