

220801154

EX.NO: 01

NUMPY

DATE: 16/02/2024

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:

1. Euclidean distance

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

$$d = \sqrt{(Q_1 - P_1)^2 + (Q_2 - P_2)^2}$$

PROGRAM:

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```
#CALCULATE EUCLIDEAN DISTANCE

import math

a = [9]
b = [1]
print (math.dist(a,b))

a = [3, 7]
b = [6, 12]
print (math.dist(a, b))
```

OUTPUT:

5.8309518948453

2. Dot Product

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

product is

$$\begin{aligned} u \cdot v &= u_1 \times v_1 + u_2 \times v_2 \\ &= 5 \times 8 + 12 \times 6 \\ &= 112 \end{aligned}$$

Cot

PROGRAM:

```

# DOTPRODUCT OF TWO V
import numpy as np

a1 = 3
b1 = 5
A = np.dot(a1,b1)
print(A)

p = [[2, 1], [0, 3]]
q = [[1, 1], [3, 2]]
print(np.dot(p, q))

a2 = 4 + 5j
b2 = 8 + 6j
print(np.dot(a2, b2))

a3 = [[5, 3], [0, 3]]
b3 = [[1, 7], [3, 6]]
print(np.dot(b, a))

```

VECTORS

OUTPUT:

15

102

3. 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,

-1

and B is the column vector of solutions. To solve for X , we can use: $X=A^{-1}B$ assuming A is invertible.

PROGRAM:

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```
#SOLVING LINEAR EQUATIONS

import numpy as np

a = np.array([[1,1,1],[0,2,5],[2,5,-1]])
b = np.array([[6],[-4],[27]])
x = np.dot(np.linalg.inv(a),b)
print(x)
```

OUTPUT:

```
[[ 5.]
 [ 3.]
 [-2.]]
```