Adamson University
College of Engineering
Computer Engineering Department

LINEAR ALGEBRA

Laboratory No. # 2

VECTORS

Score

CRITERIA	Exceeds Expectations	Meets Expectations	Needs Improvement	Unsatisfactory
Functionality (60 points)				
Completeness (20 points)				
Structure (20 points)				

Remarks: _____

Submitted by:
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TTh 7:00 – 10:00 / 58013

Submitted to
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Instructor

Date Performed:
13/09/2023

Date Submitted
13/09/2023

Objective

1. Be familiar with the libraries in Python for numerical and scientific programming.
2. Visualize vectors through Python programming.
3. Perform simple vector operations through code

Algorithm

1. Type the main title of this activity as "Vector Representation using NumPy"
2. On your GitHub, create a repository name Linear Algebra 58019
3. On your Colab, name your activity as Python Exercise 2.ipynb and save a copy to your GitHub repository

Discussion

NumPy

NumPy or Numerical Python, is mainly used for matrix and vector operations. It is capable of declaring computing and representing matrices. Most Python scientific programming libraries uses NumPy as the basic code.

Defining Vectors, Matrices, and Tensors

Vectors, Matrices, and Tensors are the fundamental objects in Linear Algebra programming. We'll be defining each of these objects specifically in the Computer Science/Engineering perspective since it would be much confusing if we consider their Physics and Pure Mathematics definitions.

Coding Activity 2

Scalars

Scalars are numerical entities that are represented by a single value.

```
import numpy as np

x = np.array(-0.5)
x
```

Vectors

Vectors are array of numerical values or scalars that would represent any feature space. Feature spaces or simply dimensions or the parameters of an equation or a function

```
A = np.array([4,3])
B = np.array([2, -5])

print('Vector A is ', A)
print('Vector B is ', B)
```

```
[ ]  #Scalars
     import numpy as np

     x = np.array(-0.5)
     x
     #Vectors

     A = np.array([4, 3])
     B = np.array([2, -5])

     print('Vector A is ', A)
     print('Vector B is ', B)
```

```
Vector A is  [4 3]
Vector B is  [ 2 -5]
```

Describing vectors in NumPy

Describing vectors is very important if we want to perform basic to advanced operations with them. The fundamental ways in describing vectors are knowing their shape, size and dimensions.

```
### Checking shapes
### Shapes tells us how many rows and columns are there
ball1 = np.array([1,2,3])
ball2 = np.array([0,1,-1])
pool = np.array([J,K]) ## Matrix
pool.shape

U = np.array([
   [1, 2],
   [2, 3]
])
```

U.shape

Checking size
Array/Vector sizes tells us many total number of elements are there in the vector

U.size

Checking dimensions
The dimensions or rank of a vector tells us how many dimensions are there for the vector.
A.ndim

pool.ndim

```
ball1 = np.array([1, 2, 3])
ball2 = np.array([0, 1, -1])
pool = np.array([A, B])
pool.shape

U = np.array([
    [1, 2],
    [2, 3]
])
U.shape

A.ndim
pool.ndim
```

```
2
```