Adamson University
College of Engineering
Computer Engineering Department

Linear Algebra

Laboratory Activity No. 10

Linear Transformation

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I. Objectives

This laboratory aims to teach the students to be familiarize on different kinds of matrix operations and as well as the visualizion of it by plotting it through the application of Python Programming

II. Methods

```
[1]  import numpy as np
     import matplotlib.pyplot as plt
     %matplotlib inline

[17] AB = np.array([
        [8,0],
        [0,-6]
     ])

     R = np.arange(0,1,0.20)

     plt.scatter(R*AB[0,0],R*AB[1,0], color = "red")
     plt.scatter(R*AB[0,1],R*AB[1,1], color = "cyan")

     plt.xlim(-10,10)
     plt.ylim(-10,10)
     plt.grid()
     plt.show()
```

Figure 1: Illustration of the Codes used in the Supplementary Activity

Given in the figure above is the illustration of the codes wherein the programmer uses his past knowledge about vectors and applying linear transformations such as transforming vectors in a linear output by using the NumPy Variables or libraries such as its function like the “np.array()” to call out or ransform the vectors needed to be placed in the graph, so that it can be plotted using the matplotlib or plt.pyplot function.

```
[15]  CD = np.array([
        [7,0],
        [ 0,6]
      ])

      R = np.arange(0,1,0.15)

      plt.scatter(R*AB[0,0],R*AB[1,0], color = "red")
      plt.scatter(R*AB[0,1],R*AB[1,1], color = "cyan")

      plt.xlim(-10,10)
      plt.ylim(-10,10)
      plt.grid()
      plt.show()
```

Figure 2: Another Example

Figure 2 simply represents another example of the first given wherein changes occurred in the Vectors meaning to say there will be slight differences in the visualization part in comparison on the first example.

III. Results

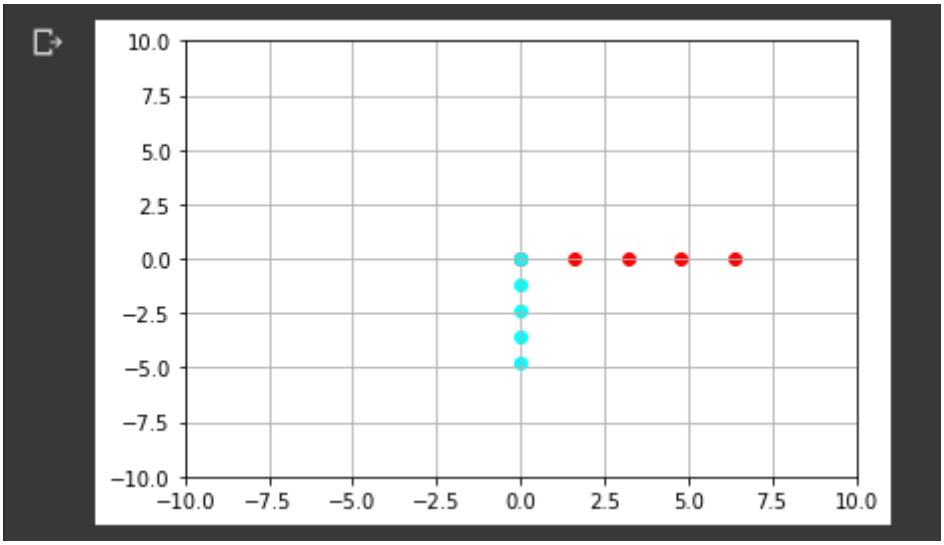

Figure 3: Result Number 1

Figure 3 Representation of the first Result of the supplementary exercise wherein you can immediately see that the plotting of the graph uses the “scatterplot” method wherein the representation of the plot is in a form of dots compare to what we normally use is simply like a straight line, given in the method on how it is done we used the function “plt.scatterplot” function in Python Programming.

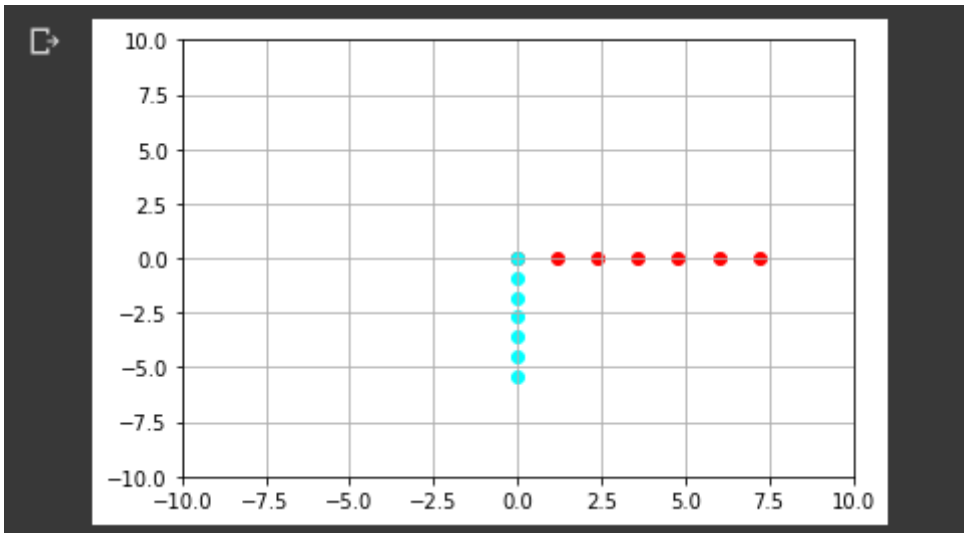

Figure 4: Result of Number 2

Figure 2 represents the visualization or plot of the 2nd example where in the principle of the linear transformation can be observed in the graph varying the different kinds of array vectors.

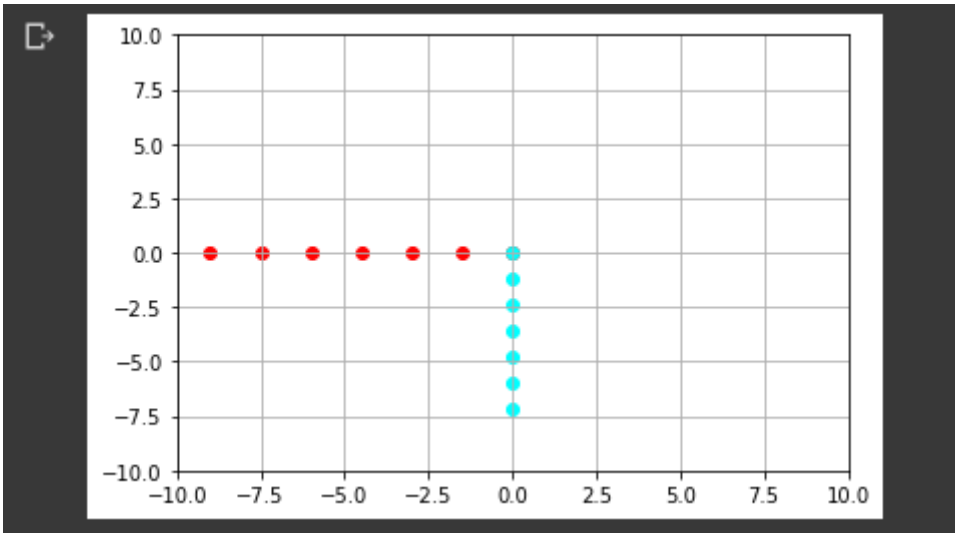

Figure 5: Result with Negative Values

Figure 5 also represents the linear transformation but in this plot the values represent negative values that is why the visualization of the plot is on the 2nd and 3rd quadrant representing the negative values given in the 2d plane.

IV. Conclusion

In conclusion, the activity expands the knowledge about linear algebra a great example is this activity representing linear transformation. The purpose of linear transformation illustrates movements representing the different kinds of vectors, also given in the results are the different varieties of changes in respect to the axes that can be applied in technology in advanced projects etc.

In terms of mechanics, the purpose of linear transformation when it comes to mechanics comes in different kind of varities, an example is motion wherein in linear transformation represents the changes of direction which can be related in motion when it comes to mechanics, direcions, technical aspect of motion or movement. Anoher aspect is machinery wherein there are machines that uses different kinds of linear transformation and serves a specific purpose depending the linear purpose of a specific device or machine.

References

[1] D.J.D. Lopez. “Adamson University Computer Engineering Department Honor Code,” AdU-CpE Departmental Policies, 2020.

Github Repository: https://github.com/Gatchplease/LinAlg-Lab10