Adamson University
College of Engineering
Computer Engineering Department

Linear Algebra

Laboratory Activity No. 5

# Multidimensional vectors

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# I. Objectives

laboratory sctivity aims to implement the principles and techniques of representing linear combinations in the 3-dimensional plane, Visualize vectors in the three dimensions and Perform vector reshaping using Python programming.

# II. Methods

This Laboratory activity are to be acclimated with speaking to the linear combination utilizing the multi-dimensional vectors. This Laboratory shows us how to actualize dimensional vectors. This Laboratory goal are to achieve the craving yield of every cell and perform vectors reshaping utilizing the python. I accomplish the possible result by reviewing the past exercises and investigating the multi-dimentional vectors on the trusty programming site.

For this Laboratory The first function that I utilized is np.array to change over the vectors into a array . The np.arange will make or restore the components of the np.array in a given limit. To make a limit and plot the lines in the chart, I utilized the plt.xlim and plt.ylim to restrict axis to and the plt.plot to put the lines on the diagram. The utilization of fig.gca is to make a figure with the axis to restore thos with the projection of 3D. The a.shape is utilized to demonstrate the state of the array. Lastly the plt.show is used to display the outcome of the whole program.

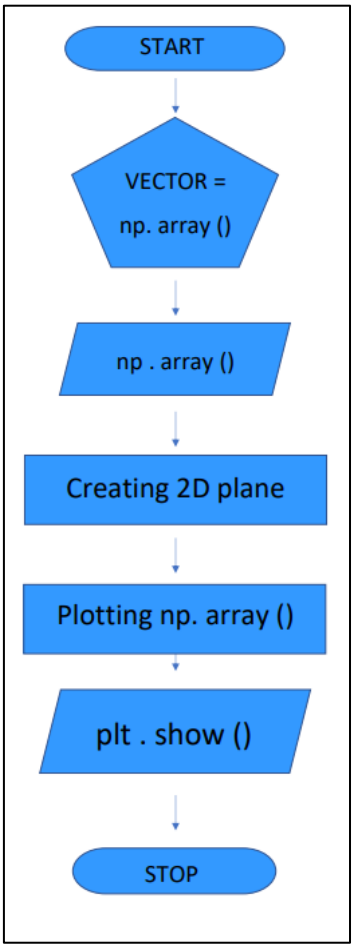


Figure 1 : Task 1 Flow Chart

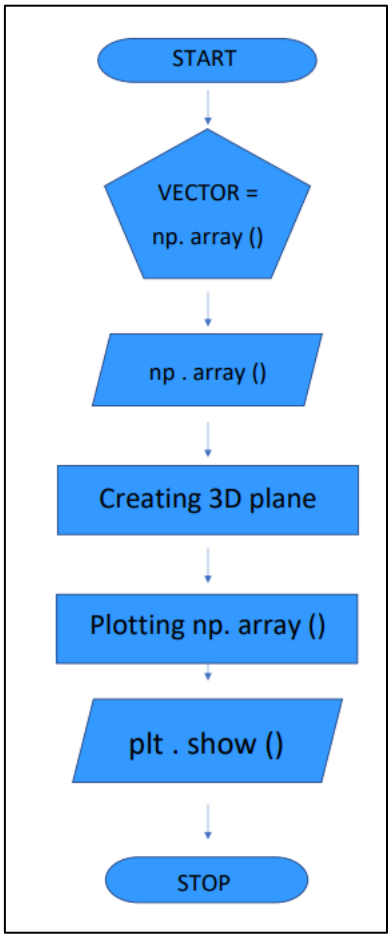


Figure 2 : Task  2 Flow Chart

# III. Results

```
A =np.array([[5,20]])
c = np.arange(0,100)
plt.xlim(0,150)
plt.ylim(0,150)

plt.plot(c*A[0,0], c*A[0,1], color='violet')


plt.show()
```

Figure 3 : Task 1 Code

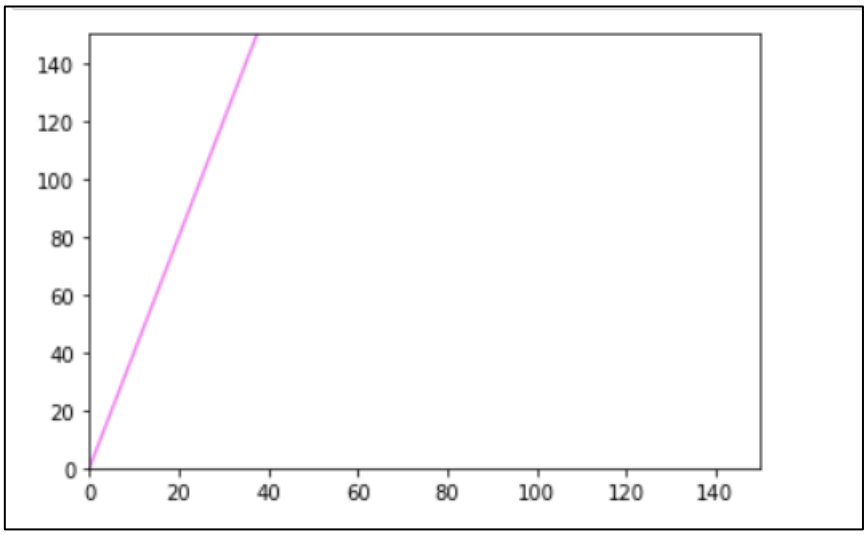


Figure 4 : Task 1 Output

In *Figure 3*, Line 1 it is where the values of the array or the elements that will be plotted in the cartesian plane. Line 2 is where you can arrange your variables depending on what you want to be the outcome to your cartesian plane and the plt.xlim and plt.ylim is is where you assign the limit for both x and y axia. In *Figure 4* it is the outcome of the variables assigned in *Figure 3* where in it is a 2 Dimensional vector.

```
A=np.array([
    [4,24,32],
    [30,2,16]
])
fig = plt.figure()
ax1 = fig.gca(projection='3d')

c = np.arange(0,3)

ax1.set_xlim([0, 150])
ax1.set_ylim([0, 150])
ax1.set_zlim([0, 150])


colors = ['blue','pink','yellow']
for i in range(A.shape[0]):
    ax1.plot(c*A[i,0],c*A[i,1],c*A[i,2], color=colors[i])
plt.show()
```

Figure 5 : Task 2 Code

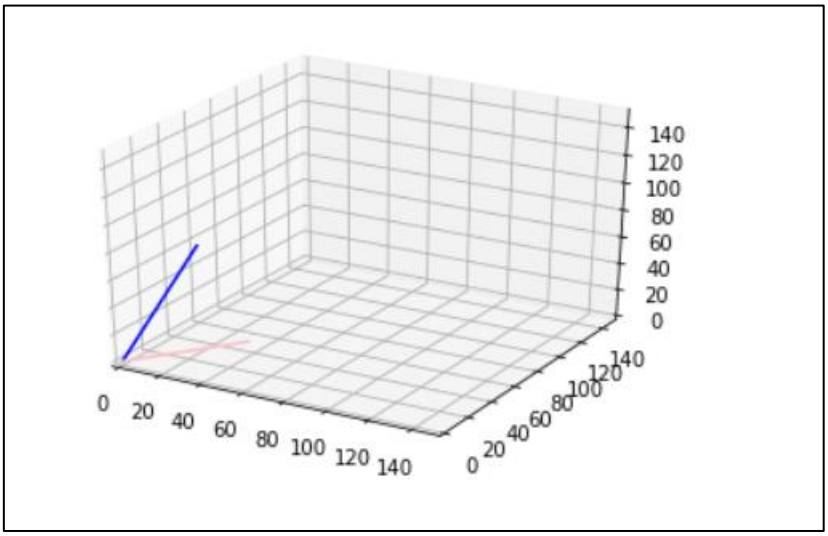


Figure 6: Task 2 Output

In *Figure 5*, Line 1 it is where the values of the array or the elements that will be plotted in the cartesian plane. Line plt.figure is use to change the size of the figure and when we need to add different Axes objects in a solitary figure. In line 5 fig.gca is to make a figure with the axis to restore thos with the projection of 3D. in line 6 fig.gca is use to figure with the axis to restore thos with the projection of 3D.

Append your discussion at the end of the results section of your report just before your conclusion. Try to answer the following questions. Do not forget to cite your sources.

1. What other types of data can be plotted in the 2-D or 3-D plane?
   There are lots of types of data that can be plotted in 2D or 3D plane, for example for 2D there are probability, normal Q-Q, Nyquist and more for 3D there are Scatter which is the outcome of the testing of complex electronic frameworks, for example, The plot normally shows the scope of conditions where the gadget under test will work. And many more.
2. Is it possible for data to have more than 3 dimensions? If no, why not? If so how can they be visualized? Justify your answer.
   -Yes, There are a total of 10 dimensions where in from the $10^{th}$ dimensions perspective you can see everything that can be seen and imagine is plotted or covered..

# IV. Conclusion

I conclude that this activity is not just for a specific gathering of data but it can be use to campare the present and the future outcome of each possible projects, data gathering. This also help to make our work more easy and to be more organize in gathering different kinds of data that we are dealing to our true to life events.

# References

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

[2] M. Williams about “A universe of 10 dimensions” (December 11, 2014) available on https://phys.org/news/2014-12-universe-dimensions.html .