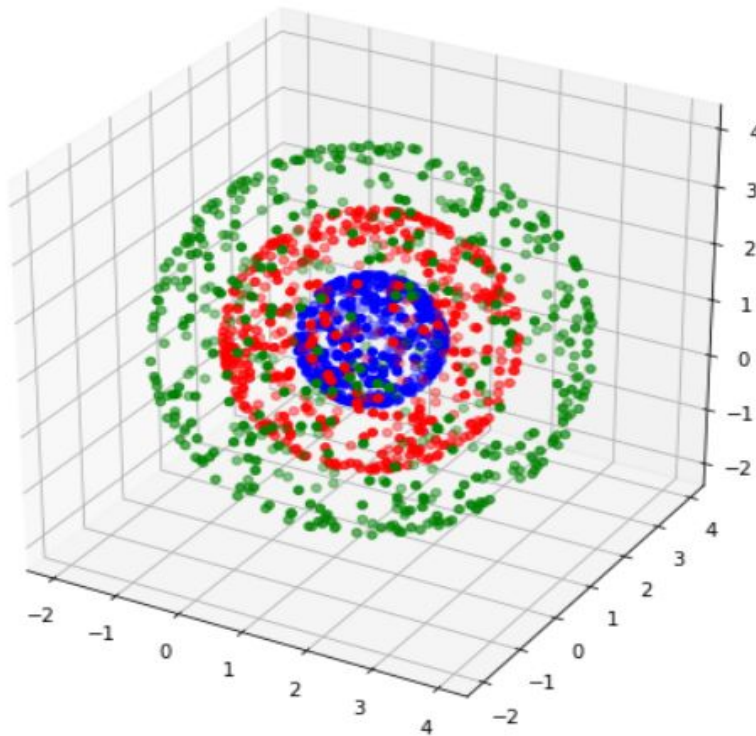


## Assignment-2 (Report)

### Task1 :

Generated random points which lie on the surfaces of the three concentric spheres. Each sphere is centered at  $(1,1,1)$  and they are having a radius of 1,2 and 3 respectively.

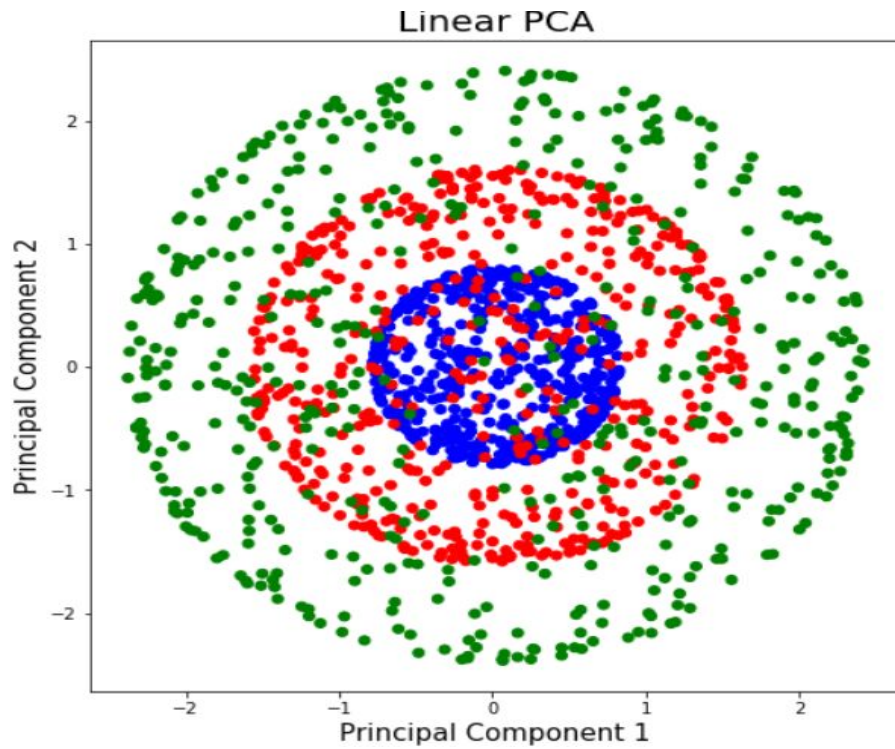


Scatter plot of the random points generated.

### Task 2:

#### Linear PCA :

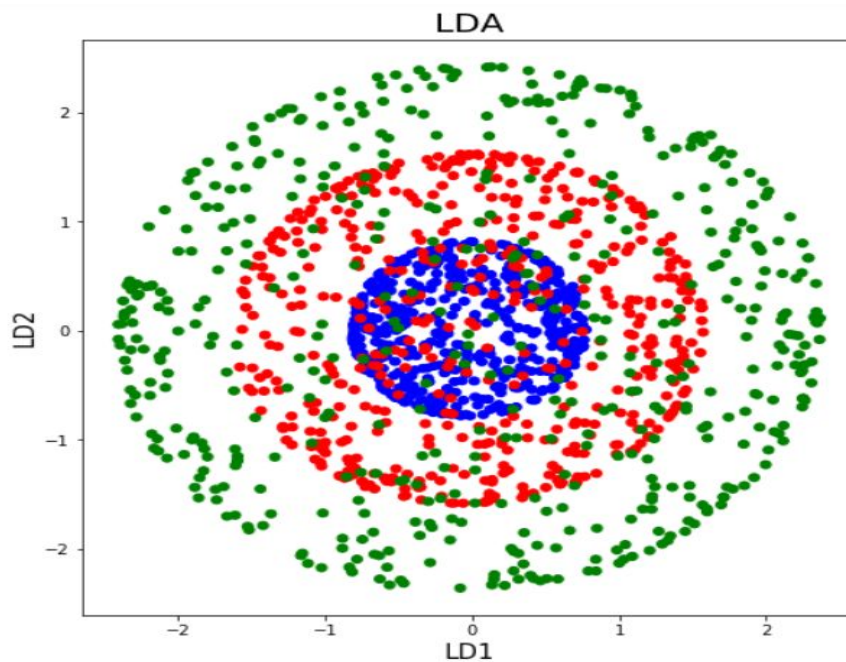
Calculated PCA values using the sklearn library. Plotted the points obtained and linear PCA has done considerably well in grouping points. Three concentric circles were observed in the plot



Scatter Plot of PCA points obtained.

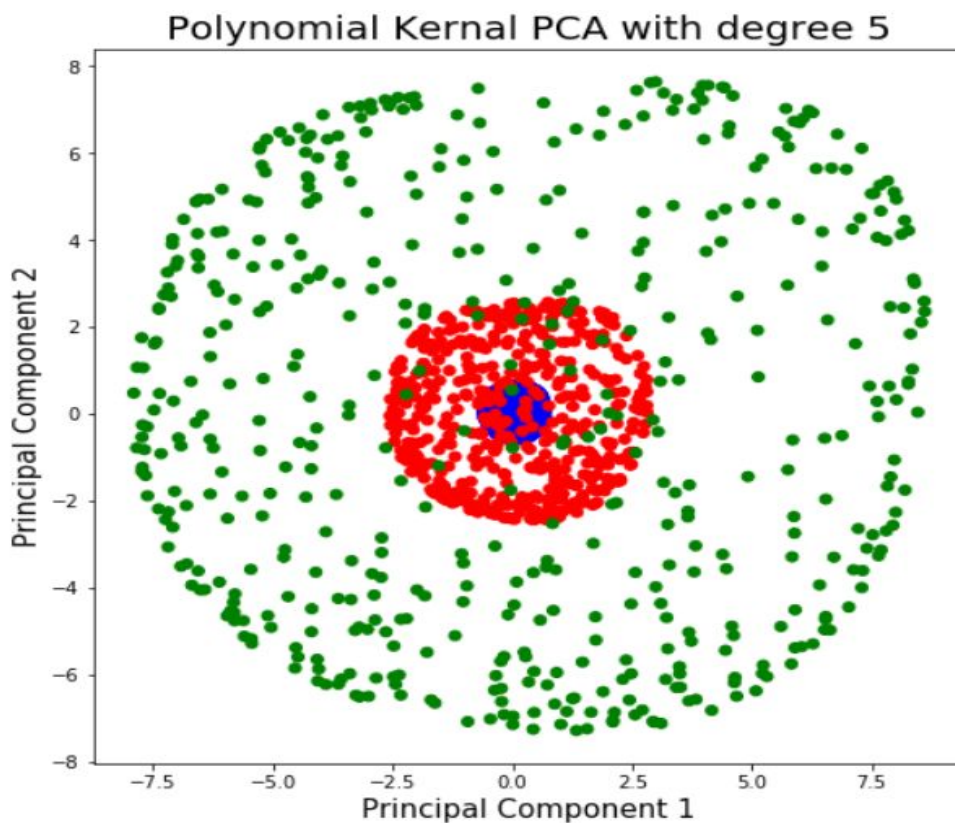
**FDA(Fischer Discriminant Analysis):**

Calculated FDA values using the sklearn library. Plotted the points obtained and the FDA has done considerably well in classifying points. Three concentric circles were observed in the plot similar to the PCA plot



## **PCA with a polynomial kernel of degree 5 :**

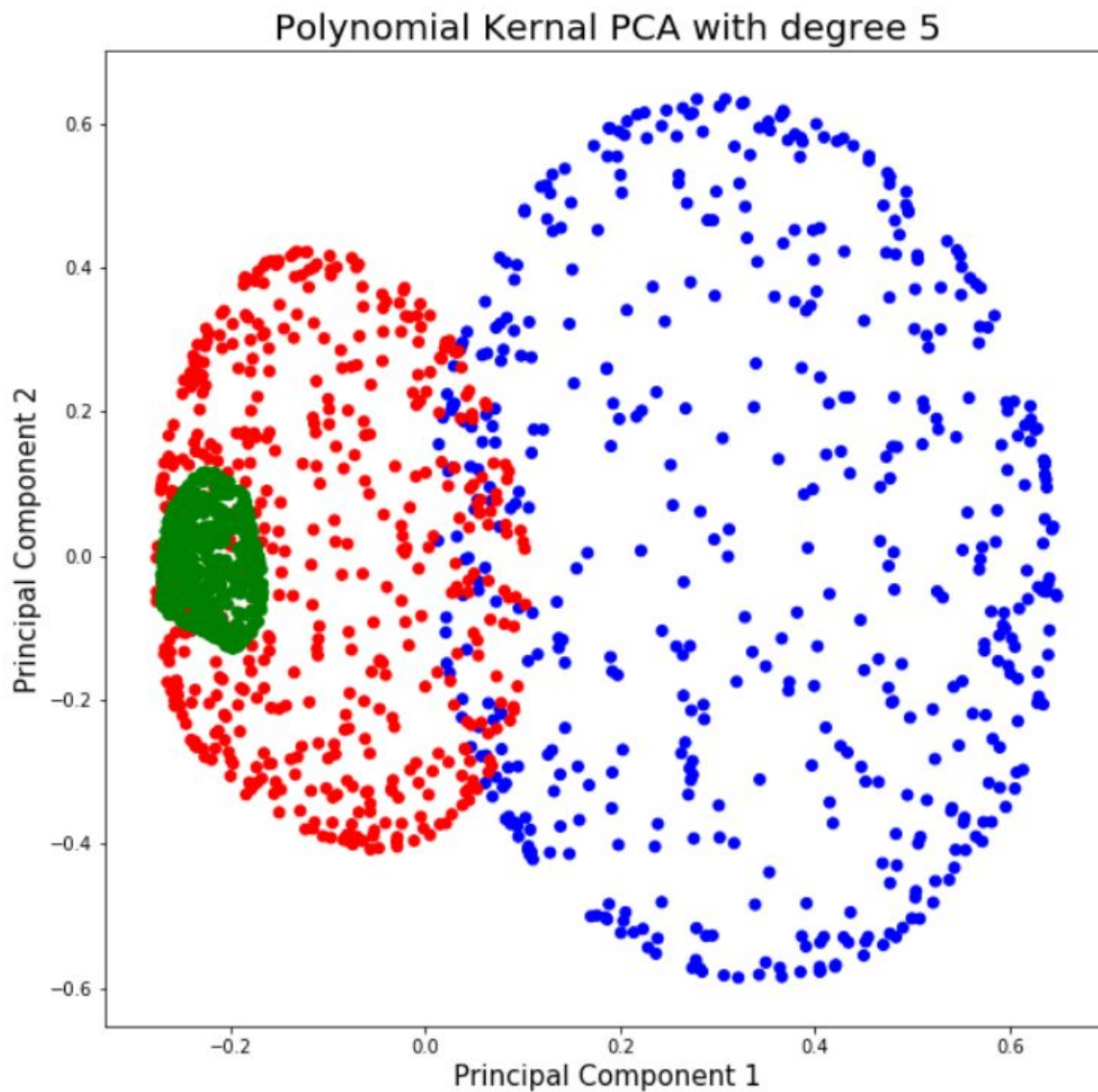
Calculated PCA values in the polynomial kernel of degree 5 using the sklearn library. Plotted the points obtained and it has done better job in separating than linear PCA and FDA. Three concentric circles were observed in the plot but this time points of similar groups are closer



**Scatter Plot of PCA with a polynomial kernel of degree 5**

## **PCA with Gaussian kernel**

Calculated PCA with Gaussian kernel values using the sklearn library. Plotted the points obtained and it has done a better job in separating than all the above ones. The gamma value was adjusted such that it was separating points well. The best gamma value obtained was 1.1 after testing with several values.



Scatter Plot of PCA with a gaussian kernel.

Finally to summarise PCA with Gaussian kernel has performed well in separating the points with similar class