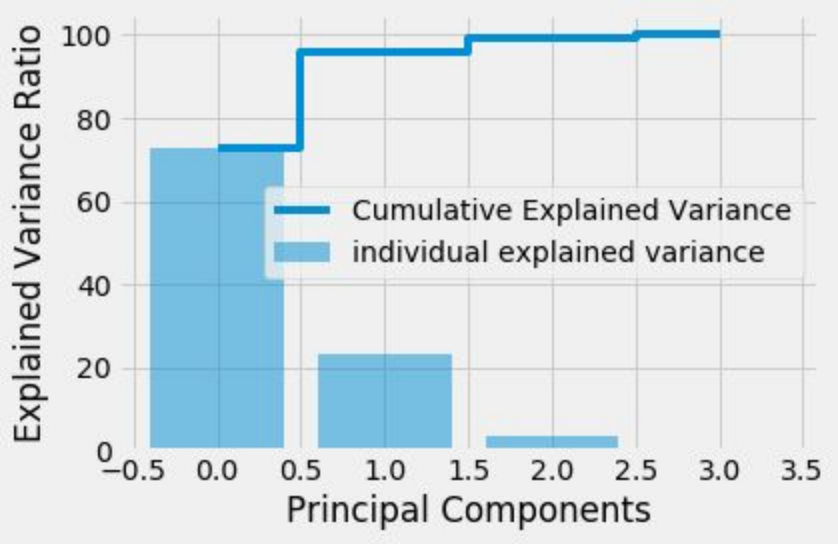
For Iris Dataset:

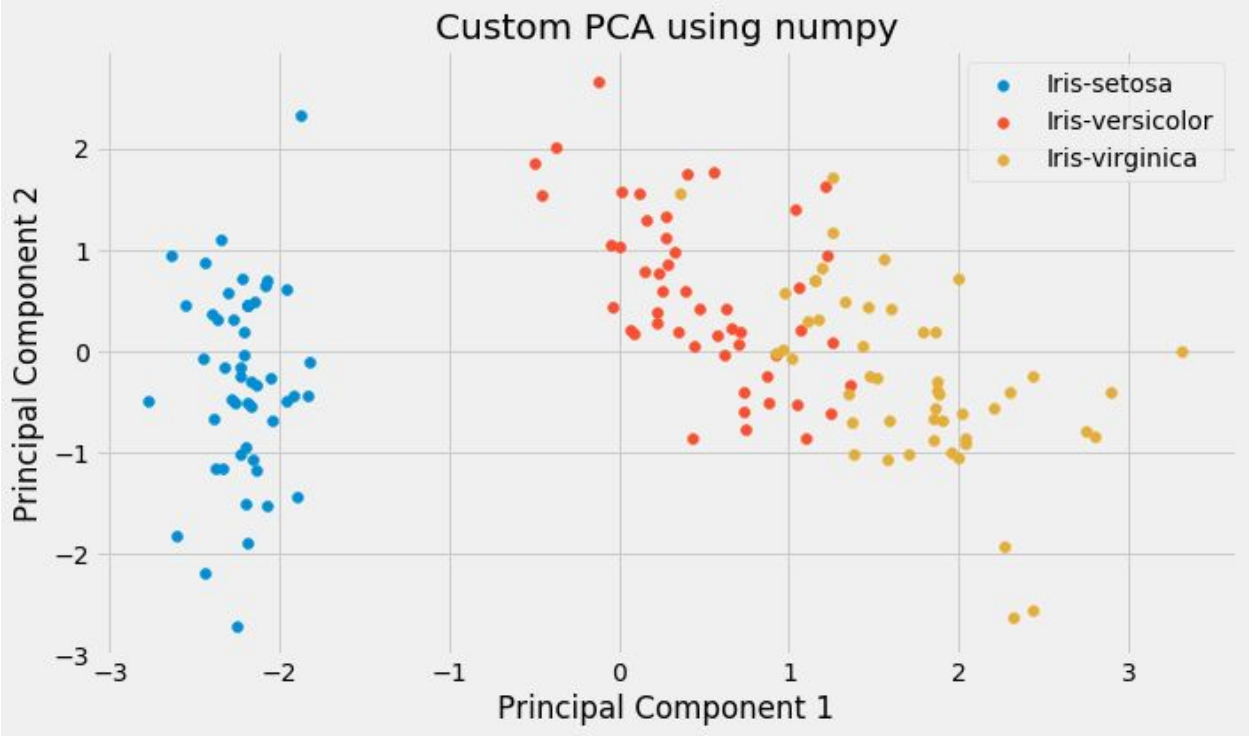
With Numpy

Explained Variance



From the above plot we observe that the first two principal component has more explained variance combined (i.e., around 95.80097536148199) and last two has negligible explained variance of 4.199024638518024.

PCA Plot:

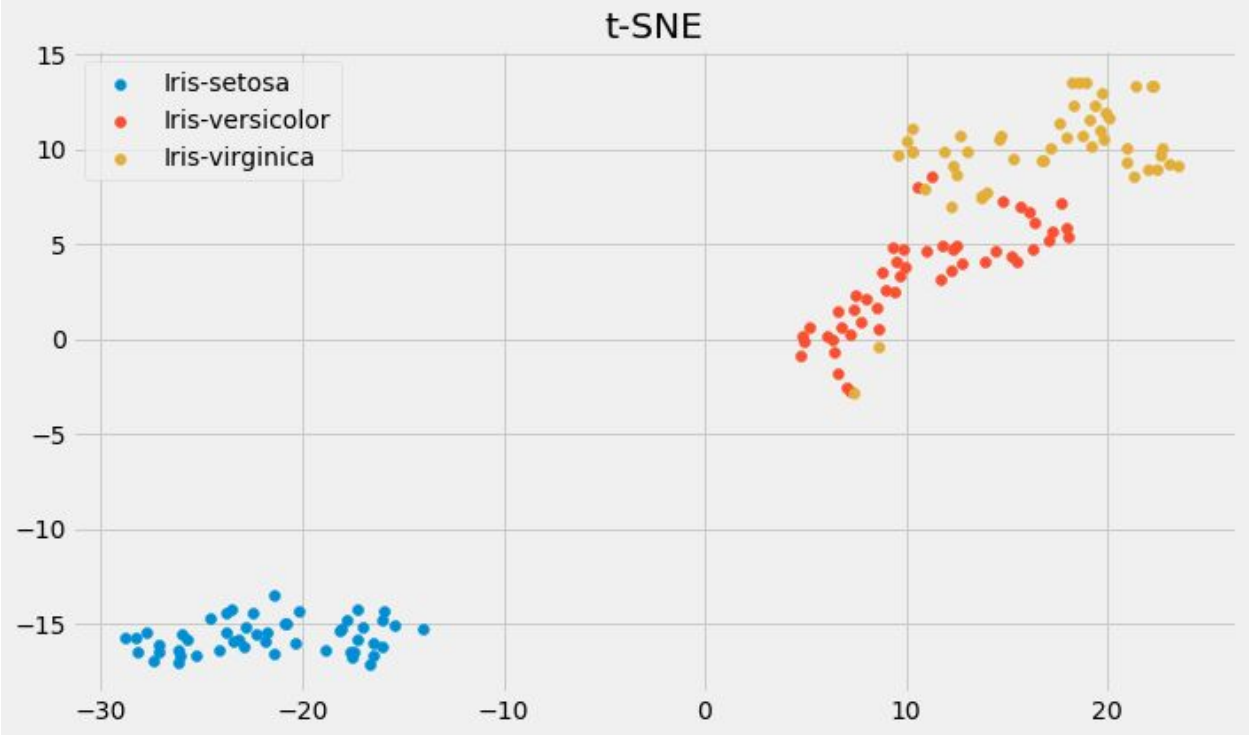


Observation:

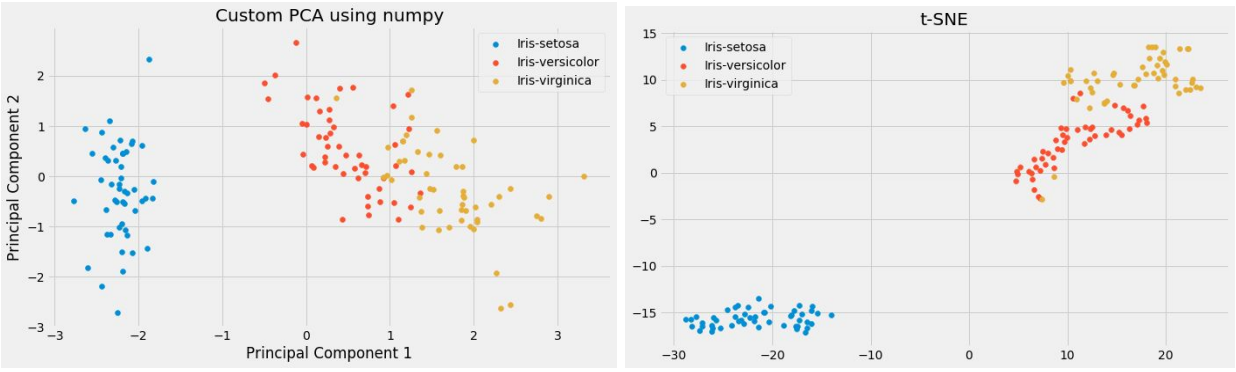
We observe that after applying PCA the dataset has two principal components thus transforming to 2 dimensional subspace from 3 dimensional subspace.

With t-SNE

Plot:



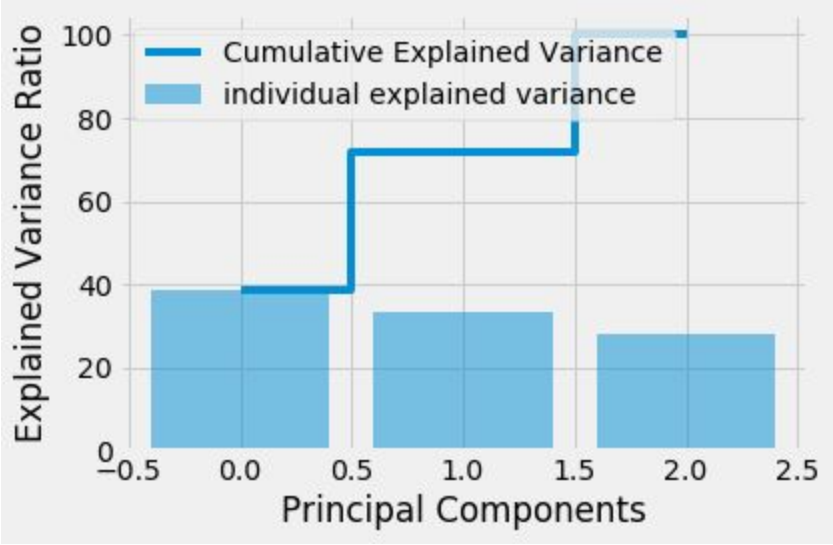
Comparison:



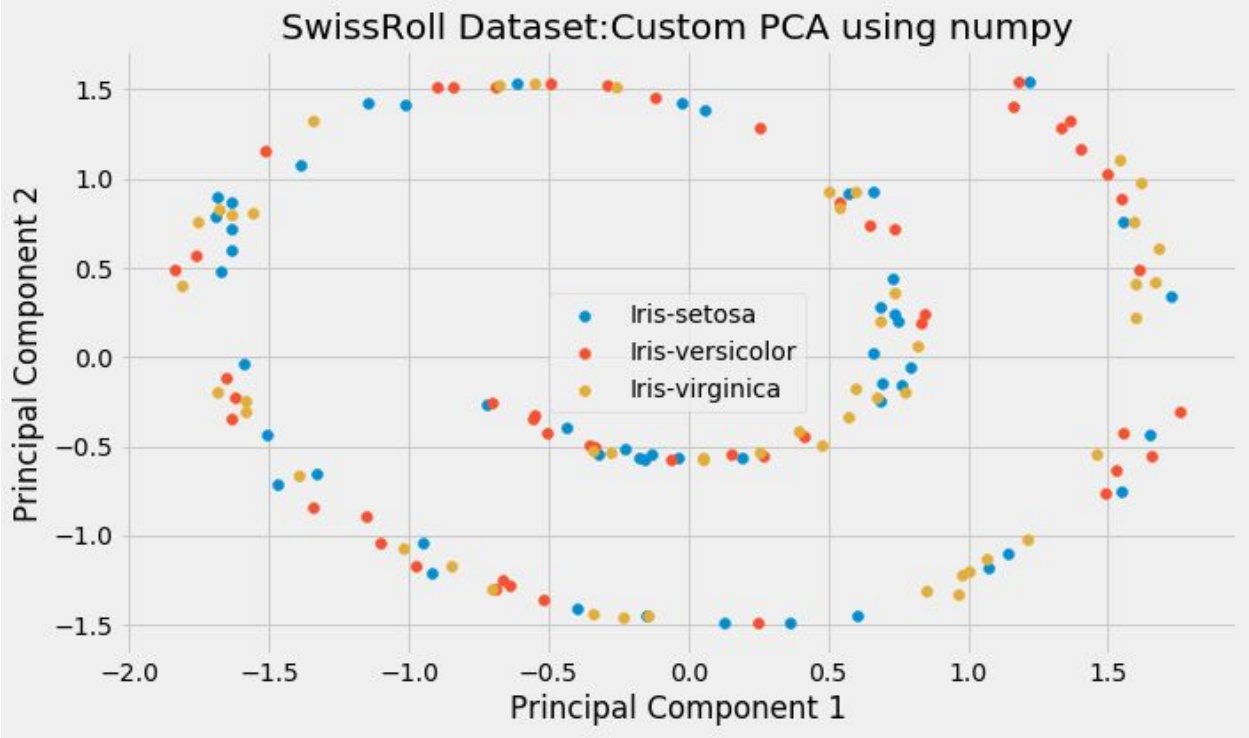
Observation and Inference:

From the above plots we observe that the PCA using numpy library with custom implementation and with t-SNE look more or less similar except the range of vectorized features differ ranging from -3 to +3 in Custom PCA approach, whereas in PCA with t-SNE the range is from -20 to +20 with perplexity of 20

For Swiss Roll Dataset:

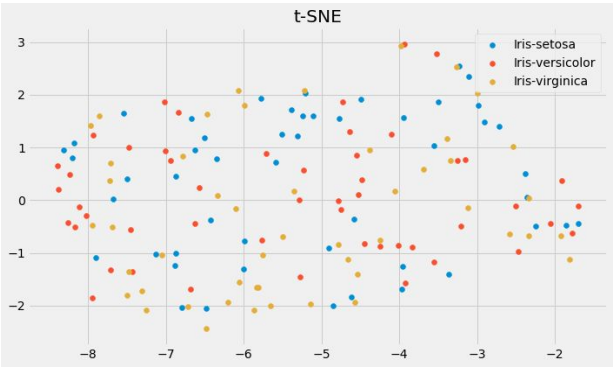


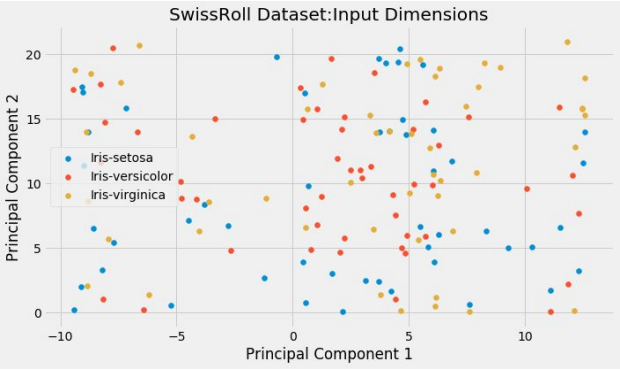
PCA:



t-SNE:

Plot:





Observations and Inference:

From the PCA plot and t-SNE plots of Swiss roll dataset it is evident that the manifold dataset cannot be further decomposed to lesser dimensions given 3 input features in the dataset.

Also it is evident that from the t-SNE plot and Swiss Roll Dataset : input Dimensions plot we see that the dimensions cannot be reduced to a further level.