Q5. PCA program

```
[1]: import pandas as pd
     import numpy
     #loading the animals dataset
     realvalues = numpy.loadtxt("predicate-matrix-continuous.txt")
```

```
[2]: #loading the animal names in a dataframe
     import pandas
     animalnames = pandas.read_csv("classes.txt",sep="\t",names=["index","animal"])
     animalnames.drop("index", axis=1, inplace=True)
     animalnames_Arr = animalnames.to_numpy()
```

```
[3]: from sklearn.decomposition import PCA
     #creating PCA object with 2 components
     pca = PCA(n_components=2)

     #Dimansionality reduction to 2-d
     reduced_X = pca.fit_transform(realvalues)
```

```
[4]: import numpy as np
     #Stacking the animals array and 50x2 2-d projected matrix for scatter plot
     final_animals_2d_arr = np.column_stack((animalnames_Arr, reduced_X))
```

```
[5]: import numpy as np
     import matplotlib.pyplot as plt

     np.random.seed(20)

     #x-axis
     X=final_animals_2d_arr[:, 1]

     #y-axis
     Y=final_animals_2d_arr[:,2]

     #list of animals to annotate
     annotations=final_animals_2d_arr[:,0]

     plt.figure(figsize=(15,15))
     plt.scatter(X,Y,s=50,color="red")
     plt.xlabel("X")
     plt.ylabel("Y")
     plt.title("Animal Scatter Plot of 2-d features",fontsize=10)
     for i, label in enumerate(annotations):
         plt.annotate(label, (X[i], Y[i]))

     plt.show()
```

Animal Scatter Plot of 2-d features