Data Analytics Assignment 2

Dimensionality Reduction Using Principle Component Analysis (PCA)

Code Snippet:

```
fig = plt.figure(1, figsize=(8, 5))
plt.clf()
ax = Axes3D(fig, rect=[0, 0, .95, 1], elev=48, azim=134)
plt.cla()
pca = decomposition.PCA(n_components=3)
pca.fit(X)
X = pca.transform(X)
for name, label in [('Setosa', 0), ('Versicolour', 1), ('Virginica', 2)]:
    ax.text3D(X[y == label, 0].mean(),
              X[y == label, 1].mean() + 1.5,
              X[y == label, 2].mean(), name,
              horizontalalignment='center',
              bbox=dict(alpha=.5, edgecolor='w', facecolor='w'))
y = np.choose(y, [1, 2, 0]).astype(np.float)
ax.scatter(X[:, 0], X[:, 1], X[:, 2], c=y, cmap='viridis',
           edgecolor='k',s=(10*72./fig.dpi)**2)

ax.w_xaxis.set_ticklabels([])
ax.w_yaxis.set_ticklabels([])
ax.w_zaxis.set_ticklabels([])

ax.set_facecolor('xkcd:salmon')
plt.show()
```

Results:

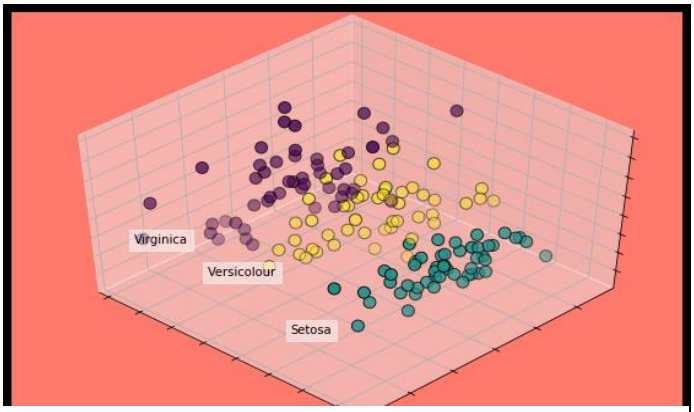

Figure 1-3D plot visualizing 3 principle components

Vector Components of the principle eigen vectors:

```
In [59]: X
```

```
Out[59]: array([[-2.68412563,  0.31939725, -0.02791483],
                [-2.71414169, -0.17700123, -0.21046427],
                [-2.88899057, -0.14494943,  0.01790026],
                [-2.74534286, -0.31829898,  0.03155937],
                [-2.72871654,  0.32675451,  0.09007924],
                [-2.28085963,  0.74133045,  0.16867766],
                [-2.82053775, -0.08946138,  0.25789216],
                [-2.62614497,  0.16338496, -0.02187932],
                [-2.88638273, -0.57831175,  0.02075957],
                [-2.6727558 , -0.11377425, -0.19763272],
                [-2.50694709,  0.6450689 , -0.07531801],
                [-2.61275523,  0.01472994,  0.10215026],
                [-2.78610927, -0.235112  , -0.20684443],
                [-3.22380374, -0.51139459,  0.06129967],
                [-2.64475039,  1.17876464, -0.15162752],
                [-2.38603903,  1.33806233,  0.2777769 ],
                [-2.62352788,  0.81067951,  0.13818323],
                [-2.64829671,  0.31184914,  0.02666832],
                [-2.19982032,  0.87283904, -0.12030552],
                [-2.5879864 ,  0.51356031,  0.21366517],
                [-2.31025622,  0.39134594, -0.23944404],
                [-2.54370523,  0.43299606,  0.20845723],
                [-3.21593942,  0.13346807,  0.29239675],
                [-2.30273318,  0.09870885,  0.03912326],
                [-2.35575405, -0.03728186,  0.12502108],
                [-2.50666891, -0.14601688, -0.25342004],
                [-2.46882007,  0.13095149,  0.09491058],
                [-2.56231991,  0.36771886, -0.07849421],
                [-2.63953472,  0.31203998, -0.1459089 ],
                [-2.63198939, -0.19696122,  0.04077108],
                [-2.58739848, -0.20431849, -0.07722299],
                [-2.4099325 ,  0.41092426, -0.14552497],
                [-2.64886233,  0.81336382,  0.22566915],
                [-2.59873675,  1.09314576,  0.15781081],
                [-2.63692688, -0.12132235, -0.14304958],
                [-2.86624165,  0.06936447, -0.16433231],
                [-2.62523805,  0.59937002, -0.26835038],
                [-2.80068412,  0.26864374,  0.09369908],
                [-2.98050204, -0.48795834,  0.07292705],
                [-2.59000631,  0.22904384, -0.0800823 ],
                [-2.77010243,  0.26352753,  0.07724769],
                [-2.84936871, -0.94096057, -0.34923038],
```