**53.Case study2**

**TO find frequent flyer program based on their total miles of travel.**

**Objective:**

* To find frequent flyer in New Zealand airlines to provide special service to their customers and improve their revenues also.

**Process:**

* Read the data set.
* Check the missing values.
* Take descriptive statistics.
* Select the feature variables.
* Use PCA for dimension reduction.
* Scaling the variable.
* Initialize k-means object.
* Fit X variable in to the clustering object.
* Plot the result.

**Input:**

* Sample data(Excel file).

**Output:**

* Corresponding clusters for the frequent flyer in the New Zealand airlines.

**Source code:**

#importing libraries

import pandas as pd

import pylab as pl

from sklearn.cluster import KMeans

from sklearn.decomposition import PCA

#Read the data set

data=pd.read\_excel('/home/soft23/soft23/Sathish/

Pythonfiles/flyer.xlsx')

#checking missing values

print("Checking missing values\n")

print(data.isnull().sum())

#calculate descriptive statistics

print("Descriptive statistics\n")

print(data.describe())

#selecting feature variable

Y = data[['FFP#']]

X = data[['FlyingReturnsMiles','FlightTrans']]

#To know possible clusters for target variable

Nc = range(1,5)

kmeans = [KMeans(n\_clusters=i) for i in Nc]

score = [kmeans[i].fit(Y).score(Y) for i in range(len(kmeans))]

#Plot elbow curve

pl.plot(Nc,score,marker='o')

pl.xlabel('Number of Clusters')

pl.ylabel('Score')

pl.title('Elbow Curve')

pl.show()

#Scaling the data

pca = PCA(n\_components=1).fit(X)

pca\_d = pca.transform(Y)

pca\_c = pca.transform(X)

print("After transform\n",pca\_d)

print("After transform\n",pca\_c)

#Build Kmeans clustering with 4 cluster

kmeans=KMeans(n\_clusters=4)

kmeansoutput=kmeans.fit(X)

print(kmeansoutput)

pl.figure('4 Cluster K-Means')

#Scatter plot

pl.scatter(pca\_d[:, 0], pca\_c[:, 0], c=kmeansoutput.labels\_,s=200)

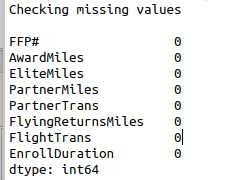
pl.xlabel('FlyingReturnsMiles & FlightTrans')

pl.ylabel('FFP#')

pl.title('4 Cluster K-Means')

pl.show()

**Screen shots:**

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