Q9. Implement K-Means Clustering on given (Sonar Dataset) dataset, calculate the number of data-points miss-grouped and plot a 2D graph by taking any two features as x-axis and y-axis.

(Dataset Link: <https://github.com/selva86/datasets/blob/master/Sonar.csv>)

import pandas as pd

import numpy as np

import matplotlib.pyplot as plt

from sklearn.cluster import KMeans

from sklearn.preprocessing import StandardScaler

from sklearn.metrics import confusion\_matrix

df = pd.read\_csv('Sonar(1).csv')

print(df)

X = df.iloc[:, :-1].values

y = df.iloc[:, -1].values

y\_encoded = np.where(y == 'R', 0, 1)

scaler = StandardScaler()

X\_scaled = scaler.fit\_transform(X)

kmeans = KMeans(n\_clusters=2, random\_state=42)

y\_pred = kmeans.fit\_predict(X\_scaled)

cm = confusion\_matrix(y\_encoded, y\_pred)

misclassified\_count = cm[0, 1] + cm[1, 0]

print(f'Misclassified Data Points: {misclassified\_count}')

plt.figure(figsize=(8, 6))

plt.scatter(X\_scaled[:, 0], X\_scaled[:, 1], c=y\_pred, cmap='viridis', marker='o')

plt.title('K-Means Clustering on Sonar Dataset')

plt.xlabel('Feature 1')

plt.ylabel('Feature 2')

plt.colorbar(label='Cluster Label')

plt.show()



