NAVODAYA INSTITUTE OF TECHNOLOGY

MACHINE LEARNING LAB (BCSL606)

Program 3

3. Develop a program to implement Principal Component Analysis (PCA) for reducing the dimensionality of the Iris dataset from 4 features to 2.

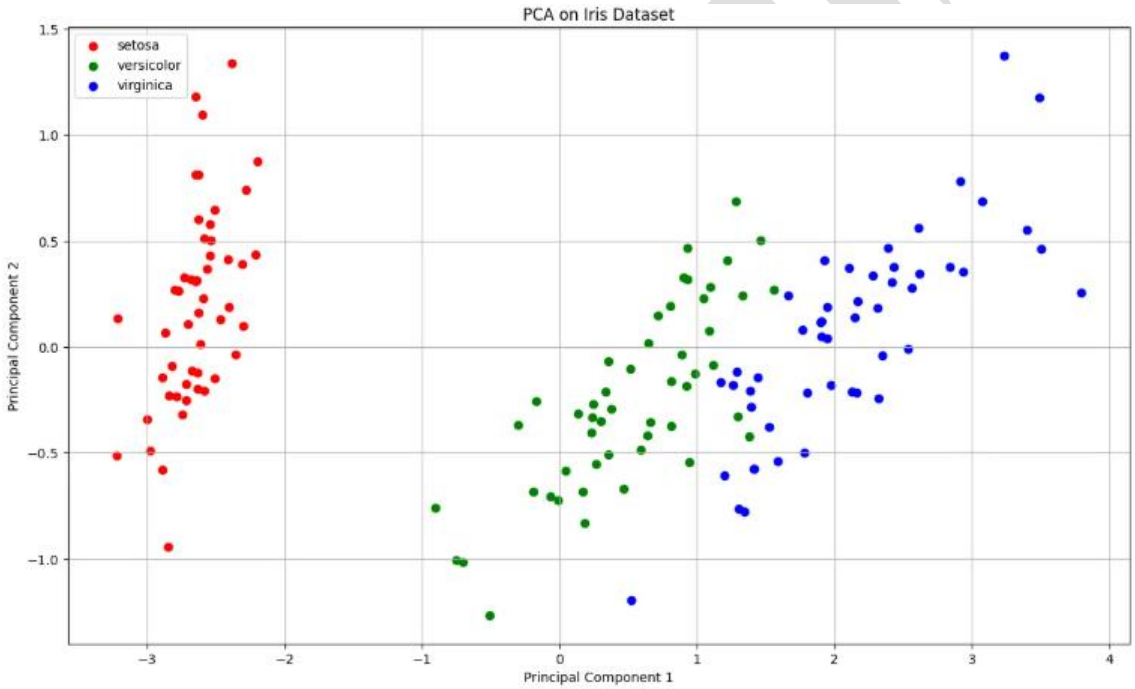
PROGRAM:

```
import numpy as np

import pandas as pd

from sklearn.datasets import load_iris

from sklearn.decomposition import PCA

import matplotlib.pyplot as plt


# Load the Iris dataset

iris = load_iris()

data = iris.data

labels = iris.target

label_names = iris.target_names
```

```
# Convert to a DataFrame for better visualization

iris_df = pd.DataFrame(data, columns=iris.feature_names)



# Perform PCA to reduce dimensionality to 2

pca = PCA(n_components=2)

data_reduced = pca.fit_transform(data)



# Create a DataFrame for the reduced data

reduced_df = pd.DataFrame(data_reduced, columns=['Principal Component 1', 'Principal Component 2'])

reduced_df['Label'] = labels



# Plot the reduced data

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

colors = ['r', 'g', 'b']

for i, label in enumerate(np.unique(labels)):

    plt.scatter(

        reduced_df[reduced_df['Label'] == label]['Principal Component 1'],

        reduced_df[reduced_df['Label'] == label]['Principal Component 2'],

        label=label_names[label],

        color=colors[i]
```

```
)


plt.title('PCA on Iris Dataset')

plt.xlabel('Principal Component 1')

plt.ylabel('Principal Component 2')

plt.legend()

plt.grid()

plt.show()
```

OUTPUT:


PCA on Iris Dataset
setosa
versicolor
virginica
Principal Component 2
Principal Component 1
1.5
1.0
0.5
0.0
−0.5
−1.0
−3
−2
−1
0
1
2
3
4