eda-lab-6-b

August 19, 2024

[30]:

```
import numpy as np
import pandas as pd
```

[31]:

```
data = pd.read_csv('Data.csv')
data.head()
```

[31]:

```
         id diagnosis  radius_mean  texture_mean  perimeter_mean  area_mean  \
0    842302         M        17.99         10.38          122.80     1001.0   
1    842517         M        20.57         17.77          132.90     1326.0   
2  84300903         M        19.69         21.25          130.00     1203.0   
3  84348301         M        11.42         20.38           77.58      386.1   
4  84358402         M        20.29         14.34          135.10     1297.0   

   smoothness_mean  compactness_mean  concavity_mean  concave points_mean  \
0          0.11840           0.27760          0.3001              0.14710   
1          0.08474           0.07864          0.0869              0.07017   
2          0.10960           0.15990          0.1974              0.12790   
3          0.14250           0.28390          0.2414              0.10520   
4          0.10030           0.13280          0.1980              0.10430   

   …  texture_worst  perimeter_worst  area_worst  smoothness_worst  \
0  …          17.33           184.60      2019.0            0.1622   
1  …          23.41           158.80      1956.0            0.1238   
2  …          25.53           152.50      1709.0            0.1444   
3  …          26.50            98.87       567.7            0.2098   
4  …          16.67           152.20      1575.0            0.1374   

   compactness_worst  concavity_worst  concave points_worst  symmetry_worst  \
0             0.6656           0.7119                0.2654          0.4601   
1             0.1866           0.2416                0.1860          0.2750   
2             0.4245           0.4504                0.2430          0.3613   
3             0.8663           0.6869                0.2575          0.6638   
4             0.2050           0.4000                0.1625          0.2364   

   fractal_dimension_worst  Unnamed: 32  
0                  0.11890          NaN  
1                  0.08902          NaN  
```

```
2                  0.08758          NaN
3                  0.17300          NaN
4                  0.07678          NaN

[5 rows x 33 columns]
```

[32]:

```python
data = data.drop(columns='Unnamed: 32')
```

[33]:

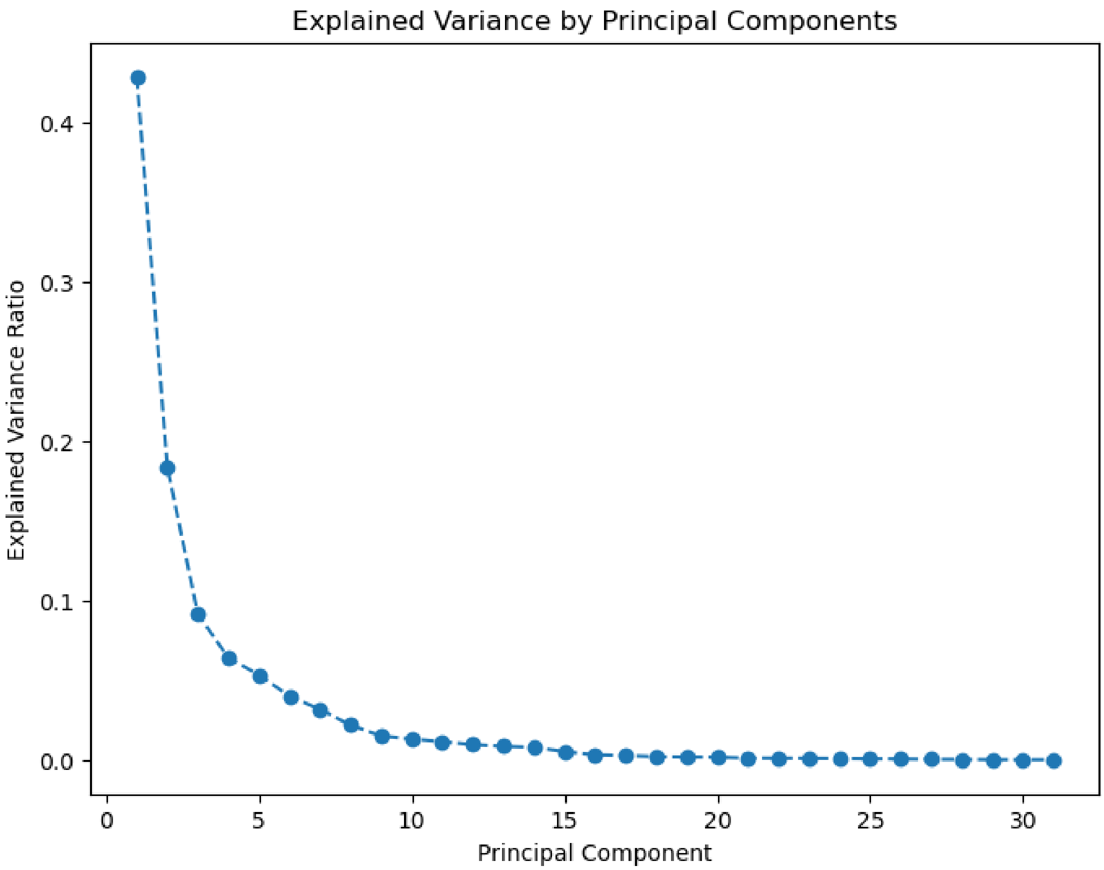
```python
X = data.drop(columns='diagnosis')
y = [0 if row == 'B' else 1 for row in data['diagnosis']]
```

[34]:

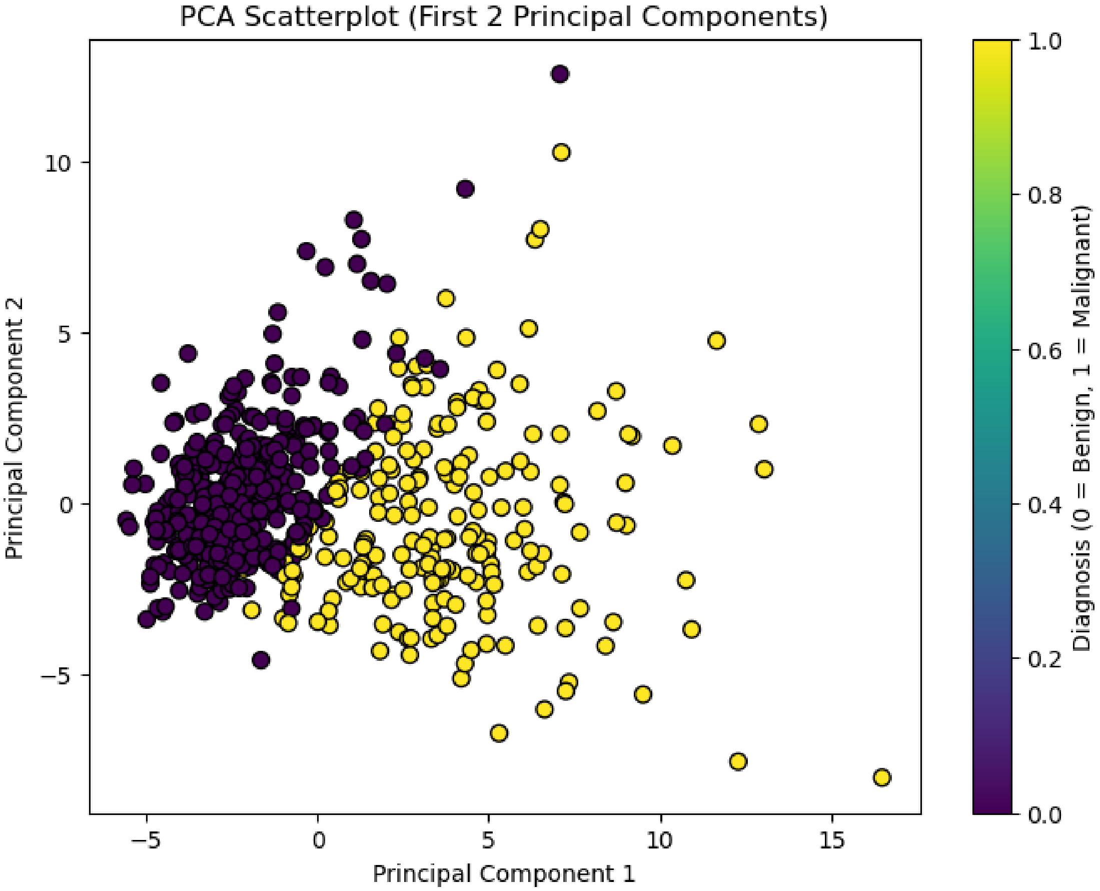
```python
from sklearn.preprocessing import StandardScaler
scaler = StandardScaler()
X_scaled = scaler.fit_transform(X)
```

[35]:

```python
from sklearn.decomposition import PCA
import matplotlib.pyplot as plt

pca = PCA()
X_pca = pca.fit_transform(X_scaled)

explained_variance = pca.explained_variance_ratio_

# Plot the explained variance
plt.figure(figsize=(8, 6))
plt.plot(range(1, len(explained_variance) + 1), explained_variance, marker='o',␣
 ↪linestyle='--')
plt.title('Explained Variance by Principal Components')
plt.xlabel('Principal Component')
plt.ylabel('Explained Variance Ratio')
plt.show()
```



[37]:
```
pca_2 = PCA(n_components=2)
X_pca_2 = pca_2.fit_transform(X_scaled)

plt.figure(figsize=(8, 6))
plt.scatter(X_pca_2[:, 0], X_pca_2[:, 1], c=y, cmap='viridis', edgecolor='k',␣
  ↪s=50)
plt.title('PCA Scatterplot (First 2 Principal Components)')
plt.xlabel('Principal Component 1')
plt.ylabel('Principal Component 2')
plt.colorbar(label='Diagnosis (0 = Benign, 1 = Malignant)')
plt.show()
```


PCA Scatterplot (First 2 Principal Components)
Principal Component 1
Principal Component 2
−5
0
5
10
15
−5
0
5
10
Diagnosis (0 = Benign, 1 = Malignant)
0.0
0.2
0.4
0.6
0.8
1.0