[1]:
```python
#task 7 part 1
#install necessary libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.decomposition import PCA
from sklearn.datasets import load_iris

#load the Iris dataset(high-dimensional dataset)
iris_data=load_iris()
df=pd.DataFrame(iris_data.data,columns=iris_data.feature_names)

#display first few rows
print("Dataset Sample:")
print(df.head())

#check dataset dimensions
print("\nDataset Dimensions:",df.shape)

#apply PCA to reduce dataset from 4D to 2D
pca=PCA(n_components=2)
df_pca=pca.fit_transform(df)

#convert to DataFrame for visualization
df_pca=pd.DataFrame(df_pca,columns=['PC1','PC2'])
df_pca['Target']=iris_data.target #add labels

print("\nReduced Dataset:")
print(df_pca.head())

#plot PCA_transformed data
```

```
#plot PCA_transformed data
plt.figure(figsize=(8,6))
sns.scatterplot(x=df_pca['PC1'],y=df_pca['PC2'],hue=df_pca['Target'],palette='viridis')
plt.xlabel('Principal Component 1')
plt.ylabel('Principal Component 2')
plt.title('PCA - 2D Projection of Iris Dataset')
plt.legend(title="Species")
plt.show()

#task 7 part 2
#install necessary libraries if not already installed
#!pip install statsmodels
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from statsmodels.tsa.arima.model import ARIMA

#load stock prices dataset
df=pd.read_csv("stock_prices.csv",parse_dates=['Date'],index_col='Date')
df.index = pd.to_datetime(df.index)
df = df.asfreq('D')

#display first few rows
print("Stock Data Sample:")
print(df.head())

#check for missing values
print("\nMissing Values:")
print(df.isnull().sum())

plt.figure(figsize=(10,5))
```

```
plt.plot(df.index,df['Close'],label="Close Price",color='blue')
plt.xlabel("Date")
plt.ylabel("Stock Price")
plt.title("Stock Closing Price Trend")
plt.legend()
plt.show()

df['Prev_Close']=df['Close'].shift(1)

#drop missing values(first row)
df.dropna(inplace=True)

print("\nDataset with Lag Features:")
print(df.head())

#Define ARIMA Model (p=2,d=1,q=2)
model=ARIMA(df['Close'],order=(1,1,0))
model_fit=model.fit()

#forecast next 10 days
forecast=model_fit.forecast(steps=10)
print("\nForecasted Prices:")
print(forecast)

plt.figure(figsize=(10,5))
plt.plot(df.index,df['Close'],label="Actual Prices",color='blue')
plt.plot(pd.date_range(start=df.index[-1],periods=11,freq='D')[1:],forecast,label="Forecast",color='red')
plt.xlabel("Date")
plt.ylabel("Stock Price")
plt.title("Stock Price Forecast using ARIMA")
plt.legend()
plt.show()
```

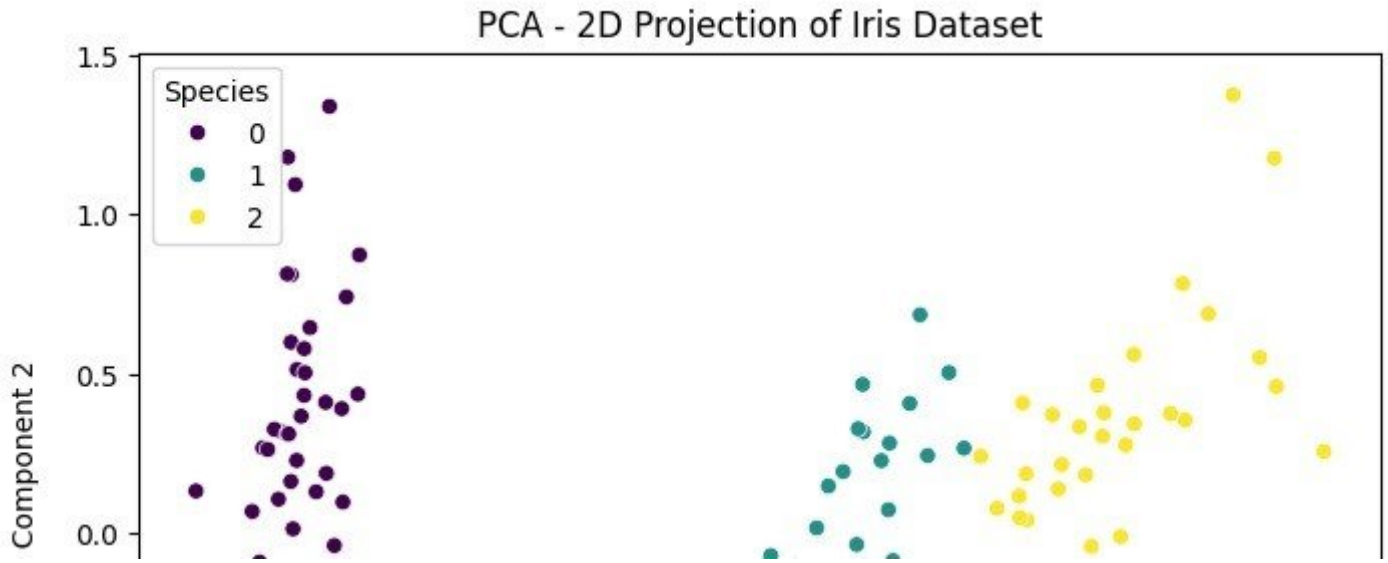
Dataset Sample:

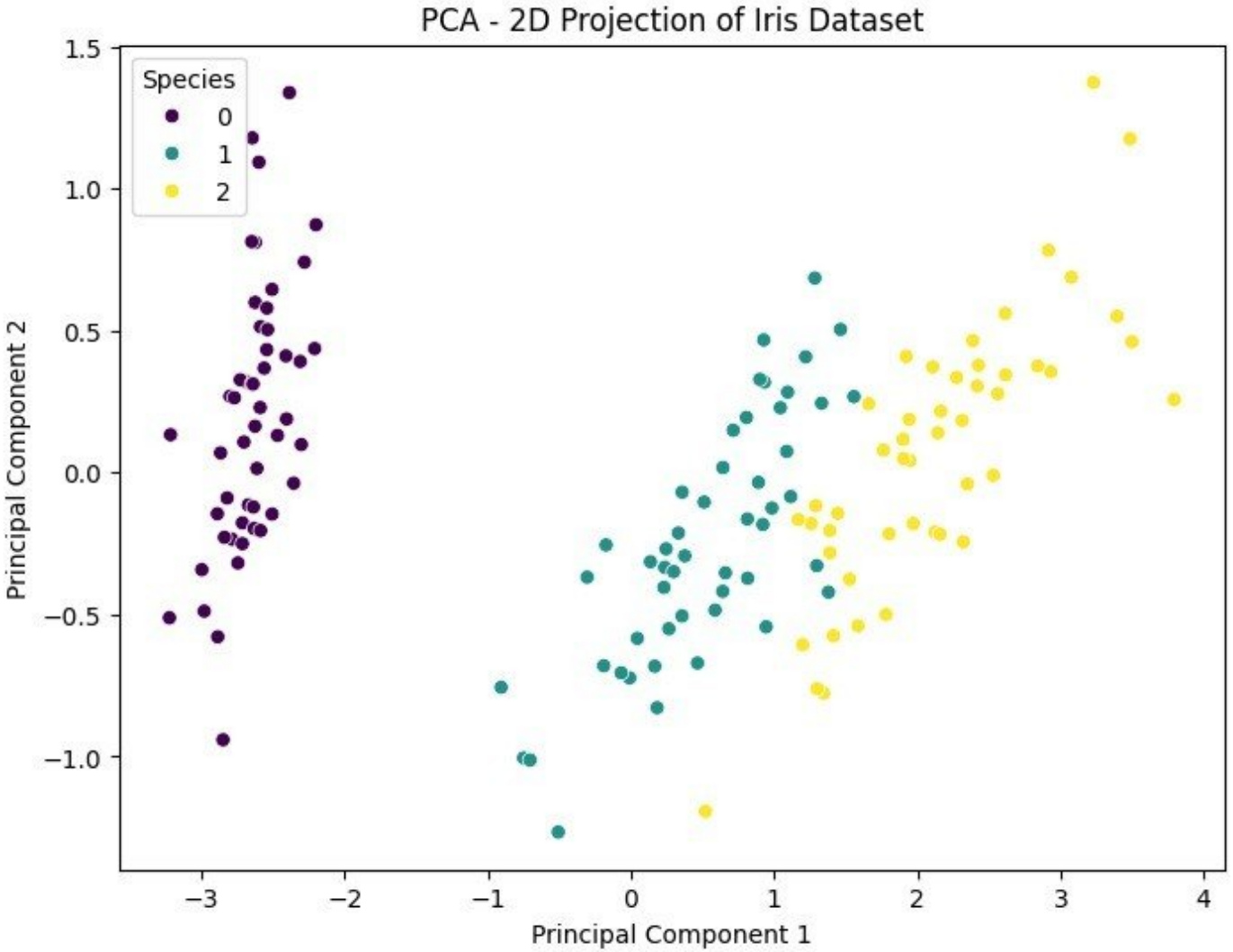
	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)
0	5.1	3.5	1.4	0.2
1	4.9	3.0	1.4	0.2
2	4.7	3.2	1.3	0.2
3	4.6	3.1	1.5	0.2
4	5.0	3.6	1.4	0.2

Dataset Dimensions: (150, 4)

Reduced Dataset:

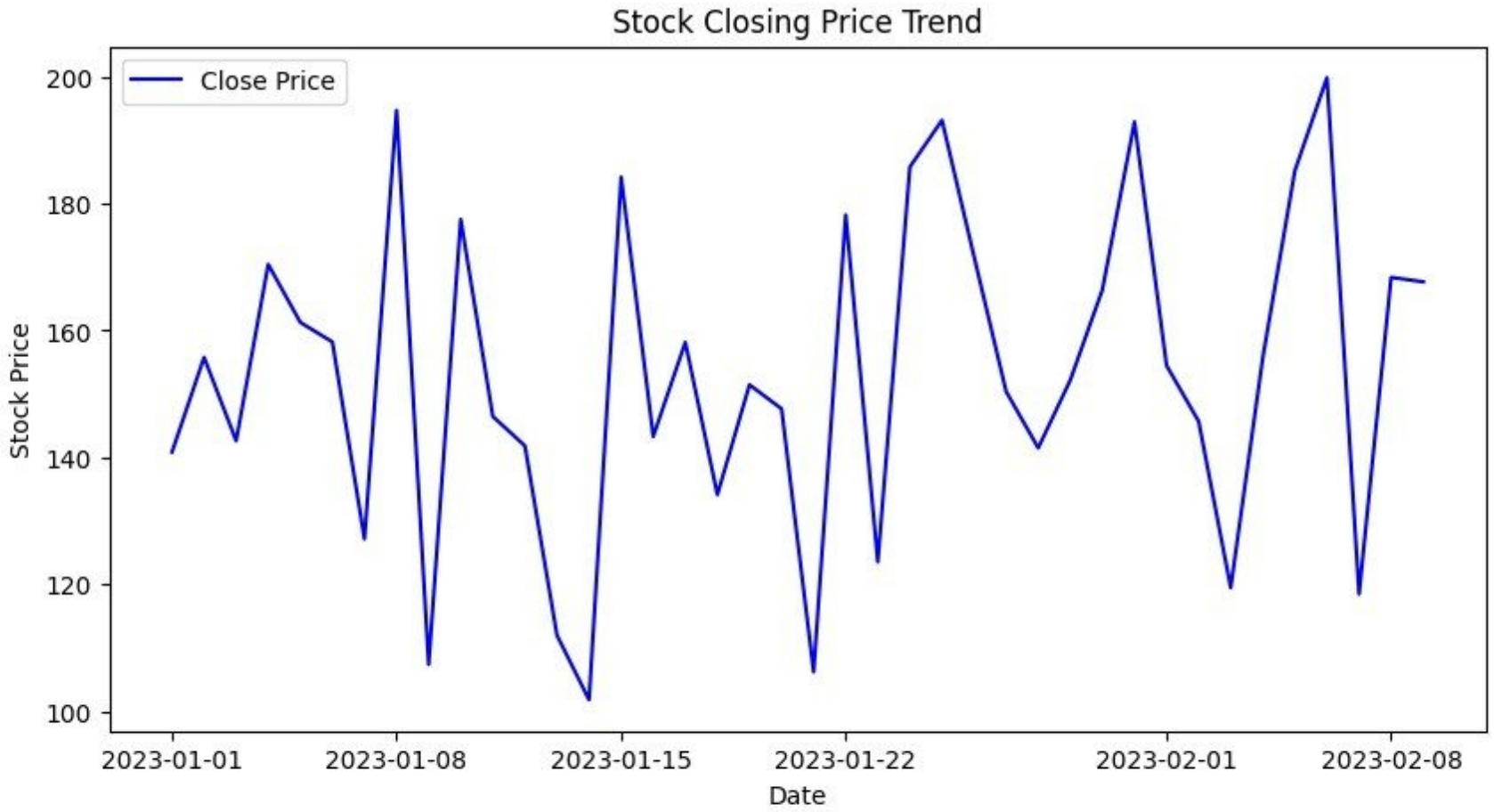
	PC1	PC2	Target
0	-2.684126	0.319397	0
1	-2.714142	-0.177001	0
2	-2.888991	-0.144949	0
3	-2.745343	-0.318299	0
4	-2.728717	0.326755	0




PCA - 2D Projection of Iris Dataset
Species
0
1
2
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

```
Stock Data Sample:
              Open   Close  Volume
Date
2023-01-01  120.35  140.85    1315
2023-01-02  174.88  155.78    2576
2023-01-03  144.57  142.63    2610
2023-01-04  174.18  170.44    3389
2023-01-05  141.30  161.30    2047

Missing Values:
Open      0
Close     0
Volume    0
dtype: int64
```

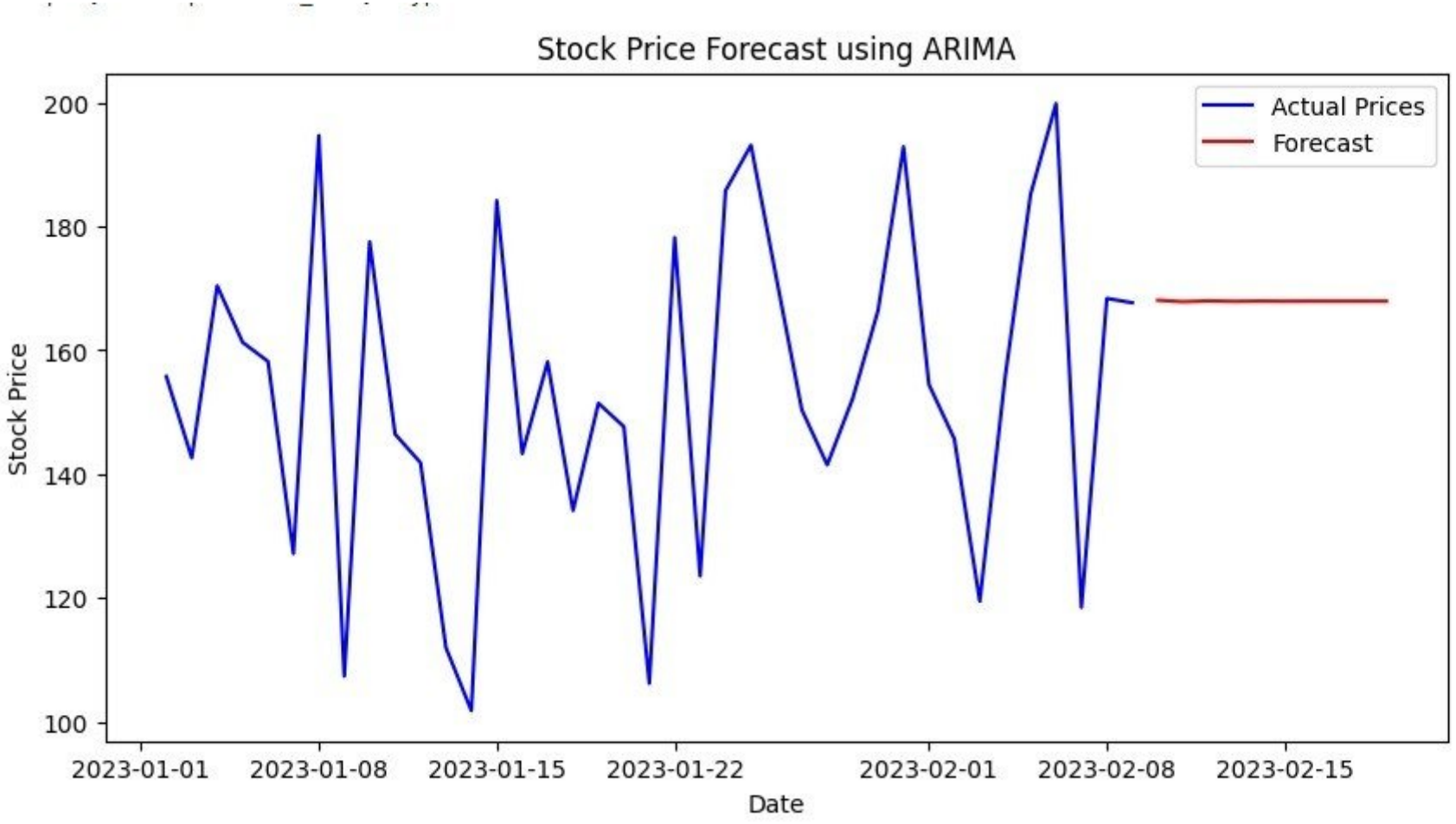


Dataset with Lag Features:

Date	Open	Close	Volume	Prev_Close
2023-01-02	174.88	155.78	2576	140.85
2023-01-03	144.57	142.63	2610	155.78

```
Dataset with Lag Features:
              Open   Close  Volume  Prev_Close
Date
2023-01-02  174.88  155.78    2576      140.85
2023-01-03  144.57  142.63    2610      155.78
2023-01-04  174.18  170.44    3389      142.63
2023-01-05  141.30  161.30    2047      170.44
2023-01-06  132.02  158.21    3764      161.30

Forecasted Prices:
2023-02-10    168.097116
2023-02-11    167.860340
2023-02-12    167.998047
2023-02-13    167.917957
2023-02-14    167.964537
2023-02-15    167.937447
2023-02-16    167.953202
2023-02-17    167.944039
2023-02-18    167.949368
2023-02-19    167.946269
Freq: D, Name: predicted_mean, dtype: float64
```


Stock Price Forecast using ARIMA
Actual Prices
Forecast
Stock Price
200
180
160
140
120
100
2023-01-01
2023-01-08
2023-01-15
2023-01-22
2023-02-01
2023-02-08
2023-02-15
Date