EX:No.6 221501046

Implement program to apply moving average smoothing for data preparation and time series forecasting.

Aim:

Write a program to apply moving average smoothing for data preparation and time series forecasting.

Algorithm:

1. Import Required Libraries

- Load pandas, numpy, matplotlib.pyplot, and sklearn.metrics.

2. Load Dataset

- Read the CSV file and parse 'Date' as a datetime index.

3. Select Target Column

- Choose a time series column for smoothing (e.g., Price).

4. Apply Moving Average Smoothing

- Calculate the 7-day rolling average of the target column.

5. Forecast Future Values

- Use the last value of the moving average as the forecast for the next 10 days (simple static forecast).
- Create future dates and build a forecast

DataFrame. 6.Visualization

- Plot:
- Original time series.
- Smoothed series.
- Forecast for the next 10 days.
- Add labels, title, and legend for clarity.

7.Evaluate the Smoothing (Optional)

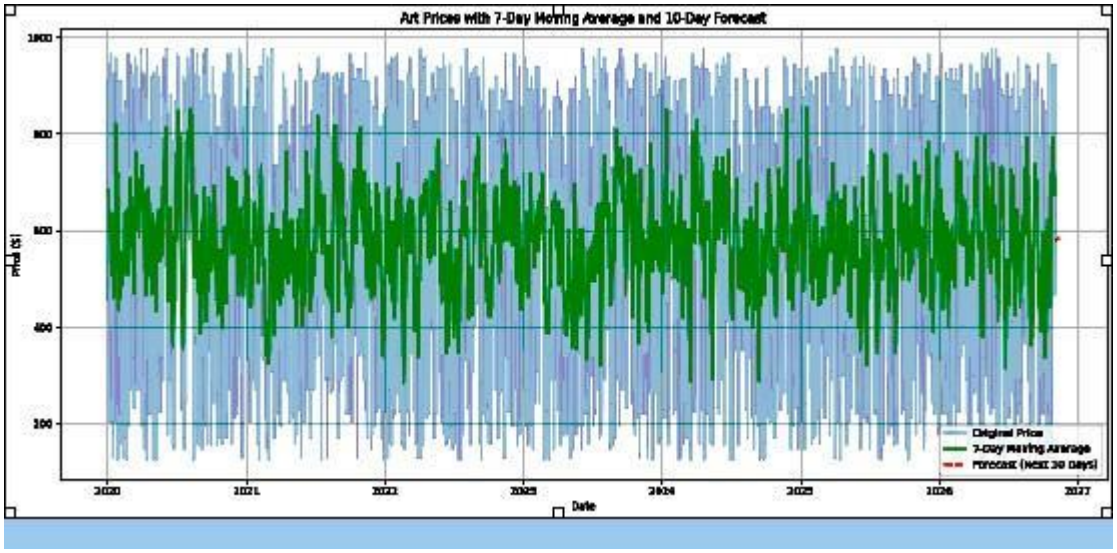
- Compute RMSE between original and smoothed values (excluding initial NaN values).

Code:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.metrics import mean_squared_error
uploaded = files.upload()
```

```
df = pd.read_csv("artmarket_with_dates.csv")

df['Date'] = pd.to_datetime(df['Date'])

df = df.sort_values('Date')

df['Moving Average'] = df['Price ($)'].rolling(window=7, center=True).mean()

ts = df.set_index('Date')['Price ($)']

model = ExponentialSmoothing(ts, trend="add", seasonal=None)

fitted_model = model.fit()

last_date = df['Date'].max()

future_dates = [last_date + timedelta(days=i) for i in range(1, 11)]

forecast = fitted_model.forecast(10)

forecast_df = pd.DataFrame({'Date': future_dates, 'Forecast': forecast.values})

plt.figure(figsize=(15, 7))

plt.plot(df['Date'], df['Price ($)'], label='Original Price', alpha=0.5)

plt.plot(df['Date'], df['Moving Average'], label='7-Day Moving Average', linewidth=2,
color='green')

plt.plot(forecast_df['Date'], forecast_df['Forecast'], label='Forecast (Next 10
Days)', linestyle='--', color='red', linewidth=2)

plt.title('Art Prices with 7-Day Moving Average and 10-Day Forecast')

plt.xlabel('Date')

plt.ylabel('Price

($)') plt.legend()

plt.grid(True)

plt.tight_layout()

plt.show()
```

Output:



Result:

Thus, the program to apply moving average smoothing for data preparation and time series forecasting was done.