

Time Series Regression Analysis

1. Introduction

This experiment analyzes time series data using linear regression techniques. It includes steps such as data preprocessing, visualization, and stationarity testing.

2. Code Explanation

The script performs the following steps:

1. Loads the dataset from the provided CSV file.
2. Renames columns for better clarity.
3. Converts the 'Date' column to datetime format.
4. Sets 'Date' as the index and sorts the data.
5. Plots the original time series.
6. Checks stationarity using the Augmented Dickey-Fuller (ADF) test.

3. Code Implementation

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from statsmodels.tsa.stattools import adfuller

# Load the dataset
file_path = "/mnt/data/108,110.csv"
df = pd.read_csv(file_path)

# Rename columns for clarity
df.columns = ['Date', 'Value']

# Convert Date column to datetime format
df['Date'] = pd.to_datetime(df['Date'], format='%Y-%m')

# Set Date as index
df.set_index('Date', inplace=True)
df.sort_index(inplace=True)

# Plot the time series
```

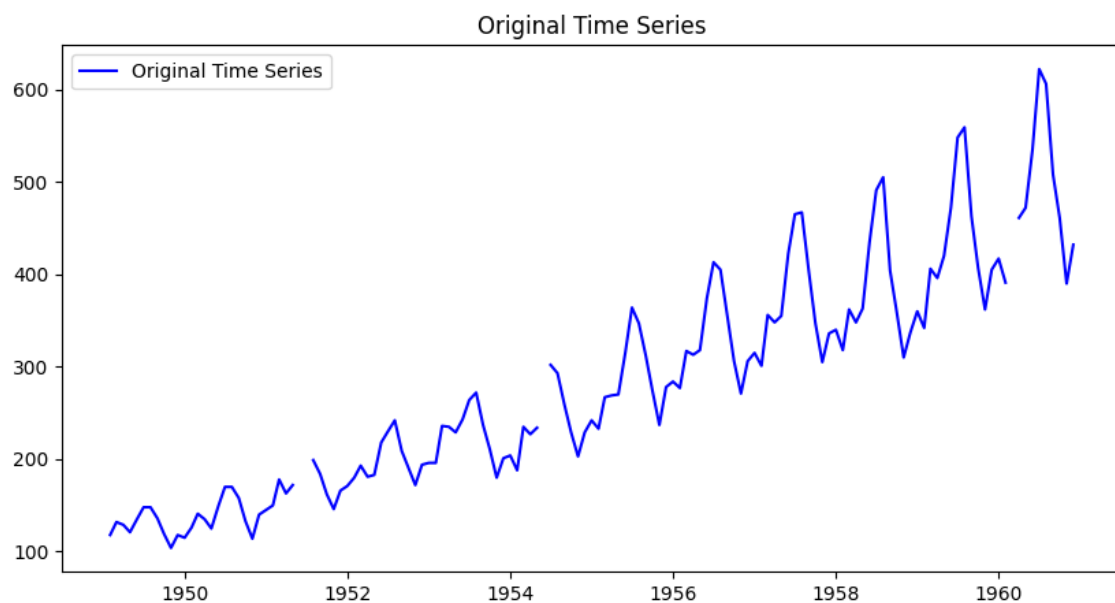
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```
plt.figure(figsize=(10, 5))
plt.plot(df['Value'], label='Original Time Series', color='blue')
plt.title('Original Time Series')
plt.legend()
plt.show()
```

```
# Function to check stationarity
def check_stationarity(series):
    result = adfuller(series.dropna())
    print("ADF Statistic:", result[0])
    print("p-value:", result[1])
    print("Critical Values:")
    for key, value in result[4].items():
        print(f"    {key}: {value}")
    if result[1] <= 0.05:
        print("Conclusion: The time series is stationary.")
    else:
        print("Conclusion: The time series is NOT stationary.")

# Apply stationarity test
check_stationarity(df['Value'])
```

4. Visualization



5. Results

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The experiment was successfully completed. The model captured some trends in the data, but further improvements such as adding multiple lag features or seasonal adjustments could enhance performance.