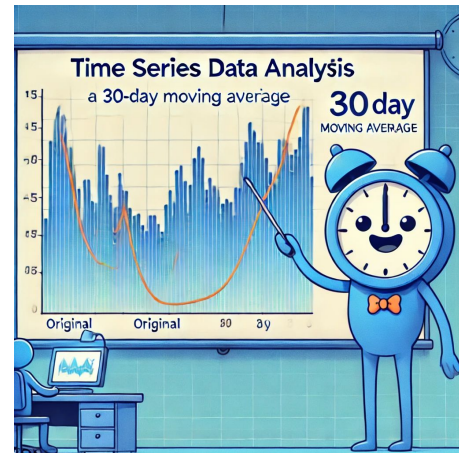




Lab Time & Quizzes

24.09.19

Week 3



Outline

- Time Series Regression Part 1
 - Decomposing Apple's stock time series data
 - Trend Analysis Using Australian Visitor Data
 - [★ TimeSeries-Week3 Practice](#)
- Lab-time Activity
 - Create and Visualize time series data
 - Decomposing time series data
 - [★ Time Series-Week3 Assignment](#)

Lab-time Activity

Jupyter Notebook File : [★ TimeSeries-Week3 Assignment](#)

Please go to the colab jupyter file, then make a copy of that jupyter file. After that solve all the questions and upload it to the LMS assignment page with the name “TimeSeries-Week#_StudentID/Name”.

Jupyter file name to submit : TimeSeries-Week3_2024000000신승용.ipynb

Lab-time Activity

- **yfinance** is a Python library that simplifies access to this kind of financial data directly from Yahoo Finance. It allows users to download historical market data and work with it seamlessly within Python.
- With just a few lines of code, you can fetch historical stock prices (open, high, low, close, adjusted close, and volume) over a specified date range. This data is time-indexed, making it perfect for time series analysis.
- **Decomposition** is a powerful technique used to break down a time series into its fundamental components, helping analysts uncover hidden patterns and better understand the data.
- Time series decomposition refers to the process of splitting a time series into three main components:
 - *Trend*: The long-term movement or direction of the data.
 - *Seasonality*: Regular, repeating patterns within the data that occur at fixed intervals (e.g., daily, monthly, or yearly).
 - *Residual (Noise)*: The random, irregular variations in the data that cannot be attributed to either trend or seasonality.

Lab-time Activity

Decomposition is important because:

- *Clarifies Patterns:* By splitting the data into trend, seasonality, and noise, decomposition makes it easier to identify patterns that might be hidden in the raw data.
- *Improves Forecasting:* Understanding the trend and seasonal components allows for more accurate predictions, as these patterns can be projected into the future.
- *Removes Seasonality:* Decomposition helps remove seasonal effects from the data, enabling better comparison across different time periods.
- *Identifies Anomalies:* By isolating noise, it becomes easier to detect unusual events, such as sudden spikes or drops in the data, which might signal important changes or anomalies.

LA1 : Decomposing Stock Time Series Data

1.1. Using yfinance to Collect 3 Years of Data

Output:

	Open	High	Low	Close	Adj Close	Volume
Date						
2020-01-02	74.059998	75.150002	73.797501	75.087502	72.876114	135480400
2020-01-03	74.287498	75.144997	74.125000	74.357498	72.167603	146322800
2020-01-06	73.447502	74.989998	73.187500	74.949997	72.742653	118387200
2020-01-07	74.959999	75.224998	74.370003	74.597504	72.400551	108872000
2020-01-08	74.290001	76.110001	74.290001	75.797501	73.565178	132079200

1.2. Visualize Raw Stock Time Series Data

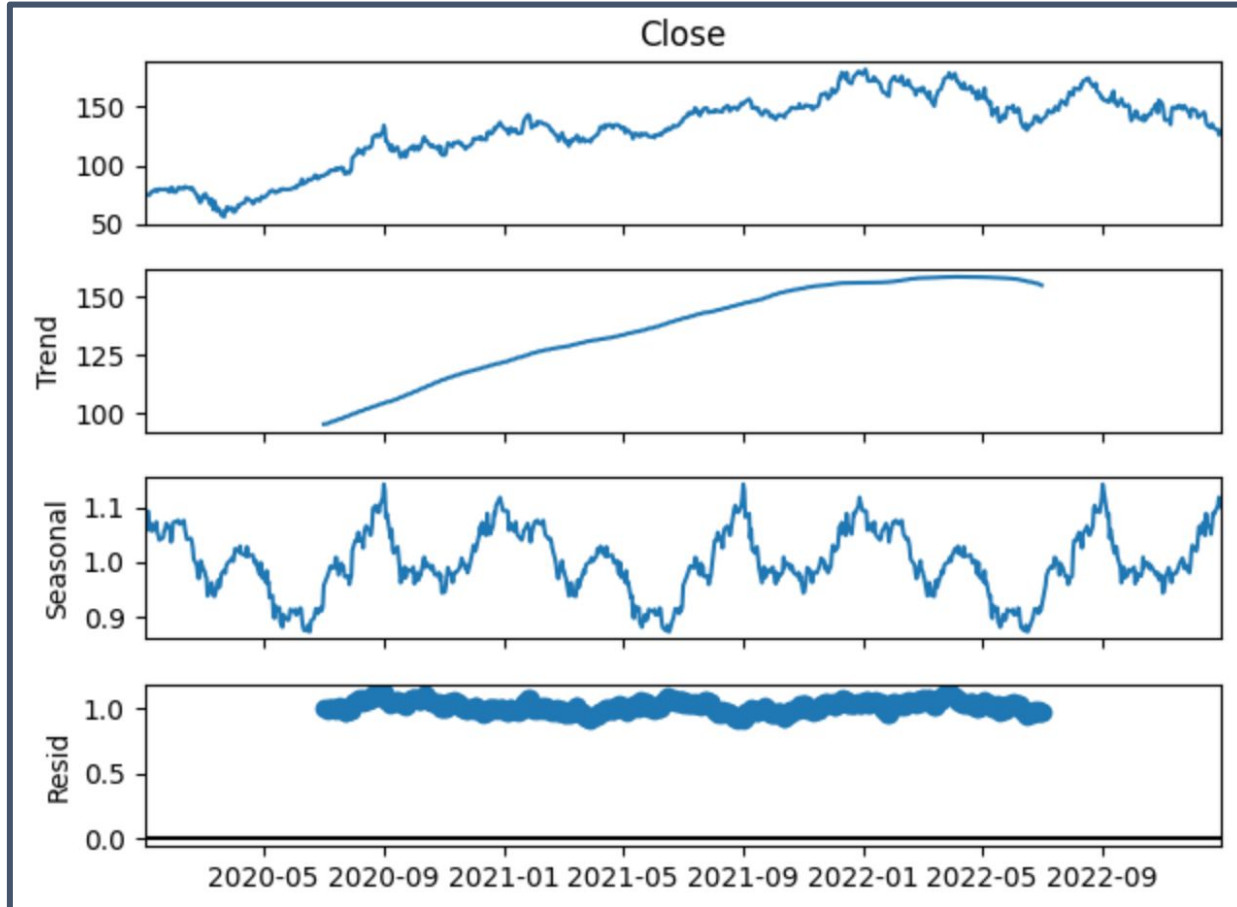
Output:



LA1 : Decomposing Stock Time Series Data

1.3. Decompose the Raw Time Series Data

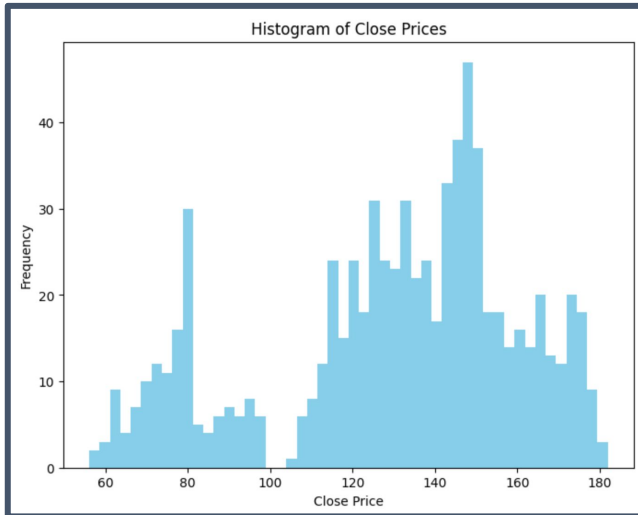
Output:



LA2 : Trend Analysis Using Data

2.1. Decompose the Raw Time Series Data

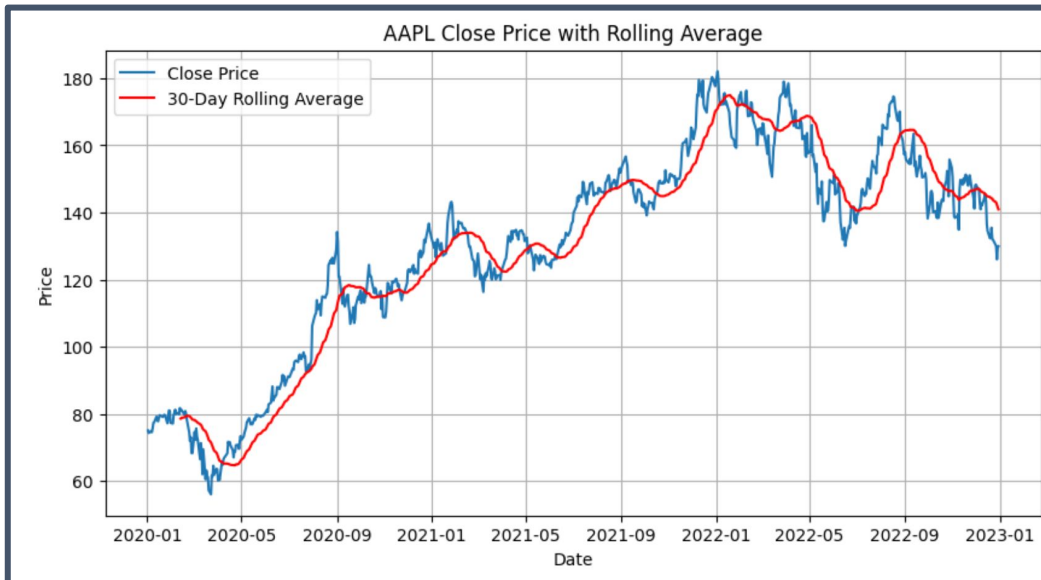
Output:



Mean Close: 130.31

Median Close: 135.38

Standard Deviation Close: 30.57



LA2 : Trend Analysis Using Data

2.2. Predict Using a Linear Model

2.3. Predict Using a Quadratic Model

2.4. Model Estimation Using Error Metrics

Output:

MAE Linear: 14.22

MSE Linear: 300.69

MAE Quadratic: 9.6

MSE Quadratic: 128.52