Project 5: Time-Series Decomposition

CS 5473: Data Mining Fall 2022

Instructor: Dr. Mohammad Imran Chowdhury

Total Points: 50

Due: 11/17/2022 11:59 PM

In this project, I invite you to do the following:

1. Import and prepare the dataset `EuStockMarkets.csv`.
2. Plot the data.
3. Conduct an additive decomposition analysis on the data.
4. Conduct a multiplicative decomposition analysis on the data.

Task 1: Import and prepare the dataset `EuStockMarkets.csv` **(10 points)**

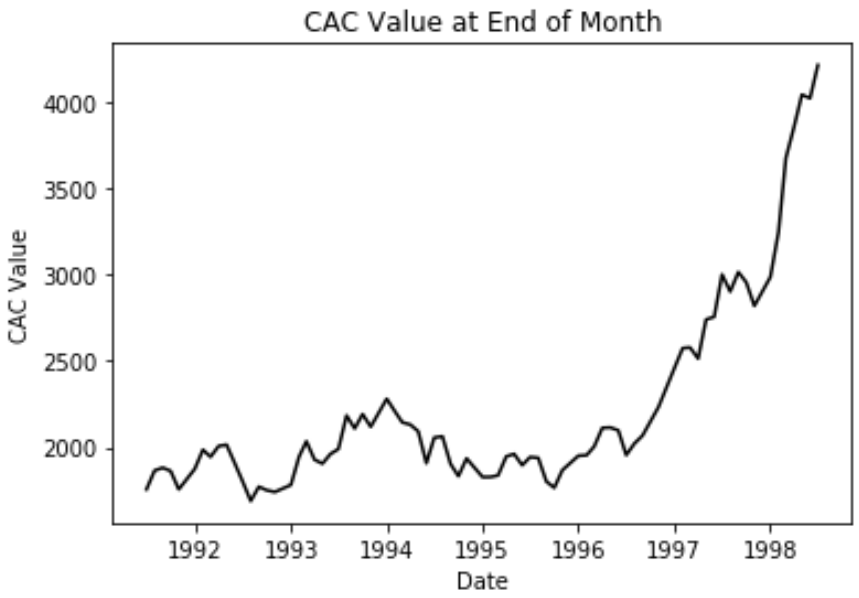
Load the dataset `EuStockMarkets.csv` provided to you as **'data/EuStockMarkets.csv'** file into the Jupyter Notebook. For the data preparation part, your code should open the dataset and parse_dates column by ``Month" and index_col by ``Month". Your output should match with mine when showing the part five rows of the prepared dataset.

Out[2]:

Month	CAC
1991-07-01	1754.7
1991-08-01	1864.3
1991-09-01	1880.6
1991-10-01	1861.8
1991-11-01	1754.9

Task 2: Plot the data. **(10 points)**

The output should be as follows:

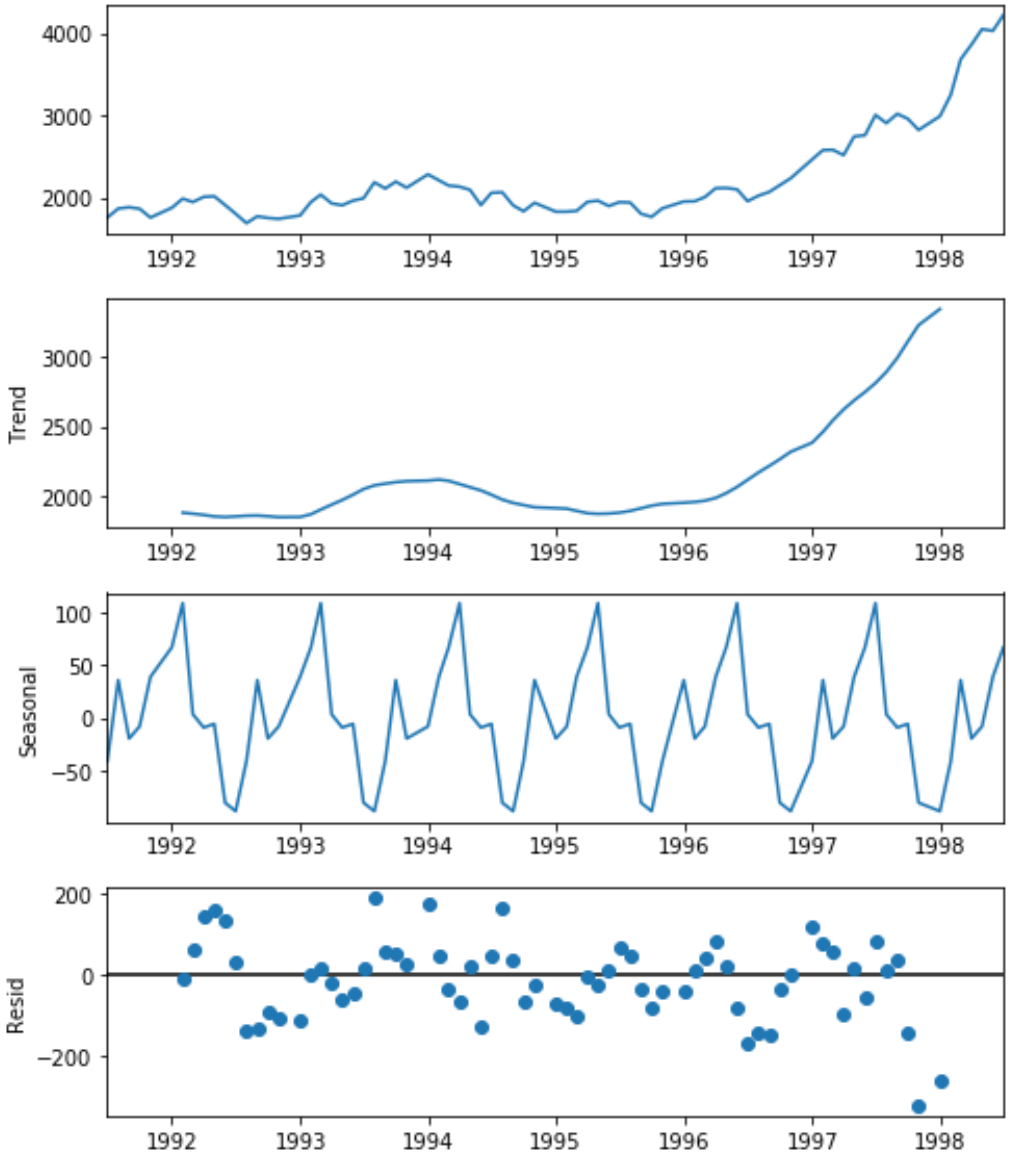


Task 3: Conduct an additive decomposition analysis on the data. **(15 points)**

In the task do the following:

- Decompose the time series into three components: trend, seasonal, and residuals or noise.
- This commands also plots the components.
- The argument `period` specifies that there are 12 observations (i.e., months) in the cycle.
- By default, `seasonal_decompose` performs an additive (as opposed to multiplicative) decomposition.

The output should be as follows:

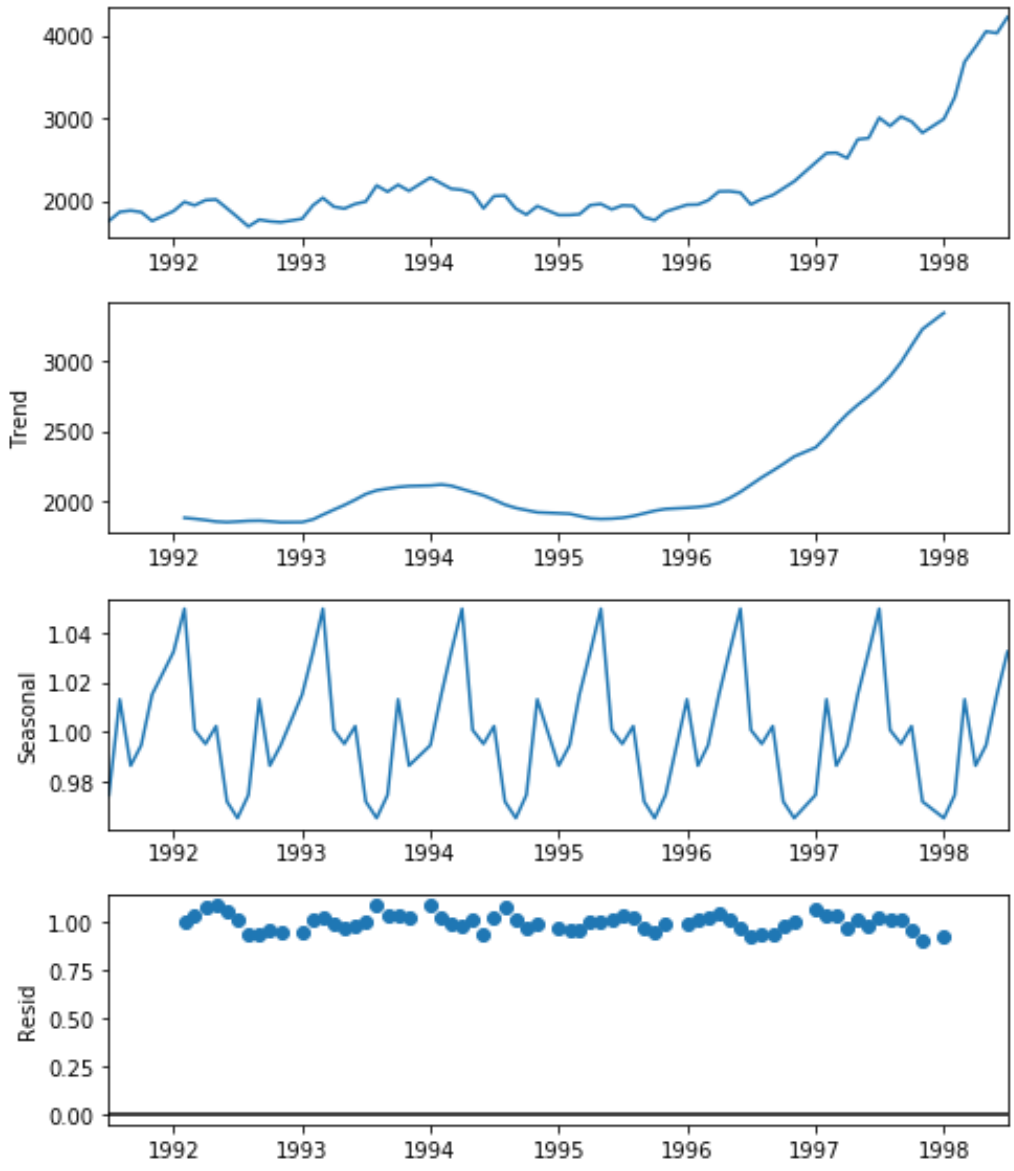


Task 4: Conduct a multiplicative decomposition analysis on the data. **(15 points)**

In the task you have to keep in mind the following steps:

- For growth over time, it may be more appropriate to use a multiplicative trend.
- The approach can show consistent changes by percentage.
- In this approach, the residuals should be centered on 1 instead of 0.

The output should be as follows:



The submission grading rubric is as follows (points out of 50 total):

Project element	**Points**
Task 1	10
Task 2	10
Task 3	15
Task 4	15

Submission Instructions: Create a compressed file (.zip or .tar.gz files are accepted) with your all source files such as .ipynb files and data files. Generally speaking to complete Task1 through Task4, you just need one .ipynb file. But it's better to submit everything as a compressed file. Submit the compressed file to Blackboard.

Late submission policy: As described in the syllabus, any late submission will the penalized with 10% off after each 24 hours late. For example, an assignment worth 100 points turned in 2 days late will receive a 20 point penalty. Assignments turned in 5 or more days after the due date will receive a grade of 0.