IE 360 Statistical Forecasting and Time Series
Homework 2-3, Due May 7, 2020

Assume that we are interested in a predicting the tomorrow's hourly electricity consumption of Turkey (hourly estimation for each hour for the next 24 hours). The consumption series are made publicly available by EPİAŞ @ https://seffaflik.epias.com.tr/transparency/. Please download the consumption series using the "realized consumption" menu item under the "consumption". That should bring you the following link:

https://seffaflik.epias.com.tr/transparency/tuketim/gerceklesen-tuketim/gercek-zamanlituketim.xhtml

You can use the data from 1st of January, 2016 till the 26th of April, 2020. You can export the date-filtered data using the icon corresponding to "csv" file as a csv file.

The aim of this homework is to understand the properties of the electricity consumption data to build and compare alternative forecasting approaches you have gone over so far. Then you are expected to compare autoregressive models (AR) to moving average (MA) models.

Tasks

1. What are the possible types of seasonality exhibited by hourly electricity consumption? Decompose the consumption series at different levels (hourly, daily, weekly, monthly and etc.) and comment on your findings (both in terms of trend and seasonal component).

2. Suppose you decided that there is a pattern at every 168 hours (24 hours/day x 7 days = 168 hours). In other words, you think both the hour and the day of the observation define the seasonality. Decompose the series based on the given seasonality setting and comment on your findings.

3. Deseasonalize and detrend the series (based on part 2) and apply an appropriate AR model. You can make your selection on the AIC values for alternative lag (p) parameters.

4. Deseasonalize and detrend the series (based on part 2) and apply an appropriate MA model. You can make your selection on the AIC values for alternative window (q) parameters.

5. Compare the resulting models in parts 3 and 4 in terms of AIC values and provide 24 hour ahead forecasts from the selected models and visualize.

Instructions:

Please solve the exercises using R (http://www.r-project.org/) or Python (https://www.python.org/). You are expected to use GitHub Classroom and present your work as an html file (i.e. web page) on your progress journals. There are alternative ways to generate an html page for you work:

- A Jupyter Notebook including your codes and comments. This works for R and Python, to enable using R scripts in notebooks, please check:
    - https://docs.anaconda.com/anaconda/navigator/tutorials/r-lang/
    - https://medium.com/@kyleake/how-to-install-r-in-jupyter-with-irkernel-in-3-steps917519326e41

  Things are little easier if you install Anaconda (https://www.anaconda.com/). Please export your work to an html file. Please provide your *. ipynb file in your repository and a link to this file in your html report will help us a lot.

- A Markdown html document. This can be created using RMarkdown for R and Python. Markdown for Python

Note that html pages are just to describe how you approach to the exercises in the homework. They should include your codes. You are also required to provide your R/Python codes separately in the repository so that anybody can run it with minimal change in the code. This can be presented as the script file itself or your notebook file (the one with *.ipynb file extension).

The last and the most important thing to mention is that academic integrity is expected! Do not share your code (except the one in your progress journals). You are always free to discuss about tasks but your work must be implemented by yourself. As a fundamental principle for any educational institution, academic integrity is highly valued and seriously regarded at Boğaziçi University