

Introduction to Time Series Analysis
(Assignment for IITP –BSE Course)

(Total: 50 Points)

Download the datasets (monthly-car-sales.csv, monthly-sunspots.csv, daily-total-female-births.csv) from github repository (iitpbse) for assignment:

- i. The ‘monthly car sales’ dataset summarizes the monthly car sales in Quebec, Canada between 1960 and 1968.
- ii. monthly-sunspots is univariate time series dataset describes a monthly count of the number of observed sunspots for just over 230 years (1749-1983).
The units are a count and there are 2,820 observations
- iii. daily-total-female-births dataset describes the number of daily female births in California in 1959. The units are a count and there are 365 observations. The source of the dataset is credited to Newton (1988).

Points for each question are written against them.

1. Make separate python file (.ipynb) for each dataset and read the datasets in each file using pandas and store in dataframe, print first 5 rows of data including the header row. (5)
2. Plot all three dataset to analyse the series. (5)
3. Set “Date” column of the dataset as index. Please take the correct name of the column. (2)
4. Try fetching the data using index i.e. for a specific date, specific month and specific year. (3)
5. Plot the boxplot using daily data for daily-total-female-births dataset and monthly data for monthly-car-sales.csv, monthly-sunspots.csv, daily-total-female-births datasets. (10)
6. Plot the boxplot using yearly data for (i) and (ii). (5)
7. Calculate moving average of the data and test stationarity (rolling mean, standrad deviation) (5)
8. Plot autocorrelation and partial autocorrelation and interpret the results of ACF and PACF plots to find the order of AR, MA, ARMA, ARIMA models (5)
9. Apply AR,MA,ARMA,ARIMA models. Use the order obtained from correlation wherever needed. (15)
10. Now, using the minimum AIC or BIC criteria, try to find the optimized order of ARIMA model and check the accuracy. (10)
11. Plot the original versus predicted graph for each of the model prediction. (5)
12. Apply Prophet model, calculate the error matrices & plot the original versus predicted. (5)
13. Apply LSTM (Vanilla, stack, bidirectional) model, calculate the error matrices & plot the original versus predicted. (15)

14. Calculate RMSE & MAPE matrices on the prediction of each model and compare all the results in tabular format.

(10)

	monthly car sales		monthly-sunspots		daily-total-female-births	
Models	RMSE	MAPE	RMSE	MAPE	RMSE	MAPE
AR						
MA						
ARMA						
ARIMA						
ARIMA (Min AIC) Prophet LSTM (Vanilla)						
LSTM (Stacked)						
LSTM (Bidirectional)						

Your Lab Assignment (50 points) – **Due on 30th September 2020, 11PM.**
Submit here:

<https://u.pcloud.com/#page=puplink&code=ltl7Z9RVhL7T9T7HkdsUWtow2XbmE3WRk>

upload a single zip file (collab file(s) and a document (doc/pdf) with graphs/results to Question 1-14) . Please use file name: your_rollno_YourName.zip

If you have questions call us : 7983822385 /8987379924