ANALYSING AND FORECASTING ELECTRICITY CONSUMPTION OF GHANA TIME SERIES

ECF GROUP

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INTRODUCTION

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Total electricity generation almost doubled from 14,068 GWh in 2011 to 22,051 GWh in 2021, representing an annual average growth rate of 11%.

Total electricity consumption increased from 13,036 GWh in 2017 to 18,067 GWh in 2021 representing an annual average growth rate of 8% (according to energy commission of Ghana).

Description

Min	1st Quatile	Median	Mean	3rd Quatile	Max	Var
86.27	281.04	328.29	322.29	372.99	523.25	6647.897

We ploted the electricity consumption(KWh per capita) data against time of their collection,Thus from 1971 to 2022 as shown in Figure6.

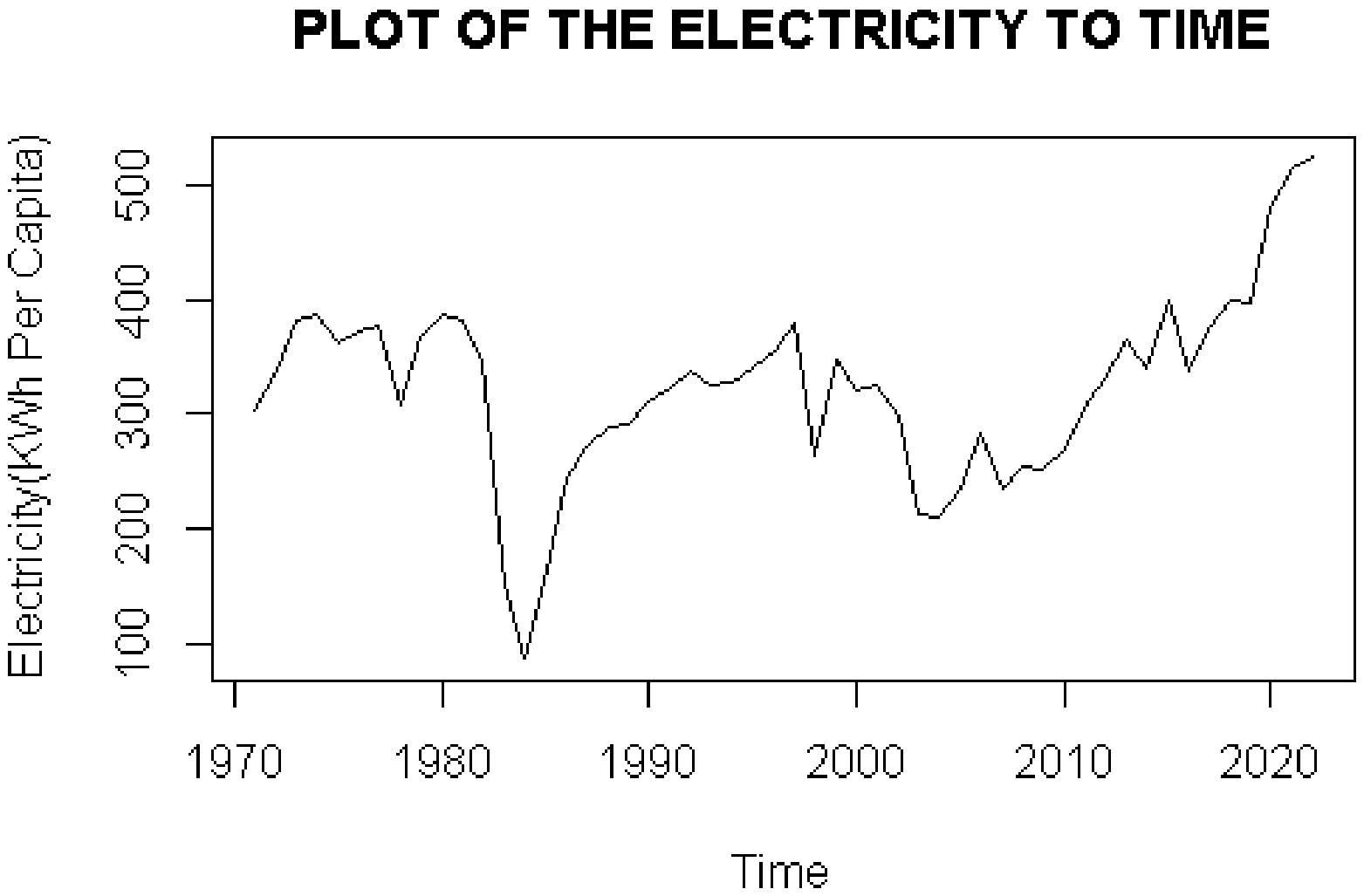


Figure: Plot of Electricity to Time

Testing For Stationarity

There are variety types of stationarity tests but in this paper we are going to use the common ones and they are;

- ADF test with hypothesis
  H0:the series is not stationary
  H1:the series is statrionary.
- KPSS test with hypothesis
  H0:the series is stationary
  H1:the series is not statrionary.
- PP test with hypothesis
  H0:the series is not stationary
  H1:the series is statrionary.

Result After Computation

Augmented Dickey-Fuller Test

data: tsd Dickey-Fuller = -1.6073, Lag order = 3,
p-value = 0.7324 alternative hypothesis: stationary

KPSS Test for Level Stationarity

data: tsd KPSS Level = 0.24024
Truncation lag parameter = 3, p-value = 0.1

Phillips-Perron Unit Root Test

data: tsd Dickey-Fuller Z(alpha) = -9.3188,
Truncation lag parameter = 3, p-value = 0.5576
alternative hypothesis: stationary

First Difference

Since the series is not stationary we perform 1st differencing in order to achieve stationarity; The figure 4.2 below is a plot after the first differencing .

Plot of First Difference

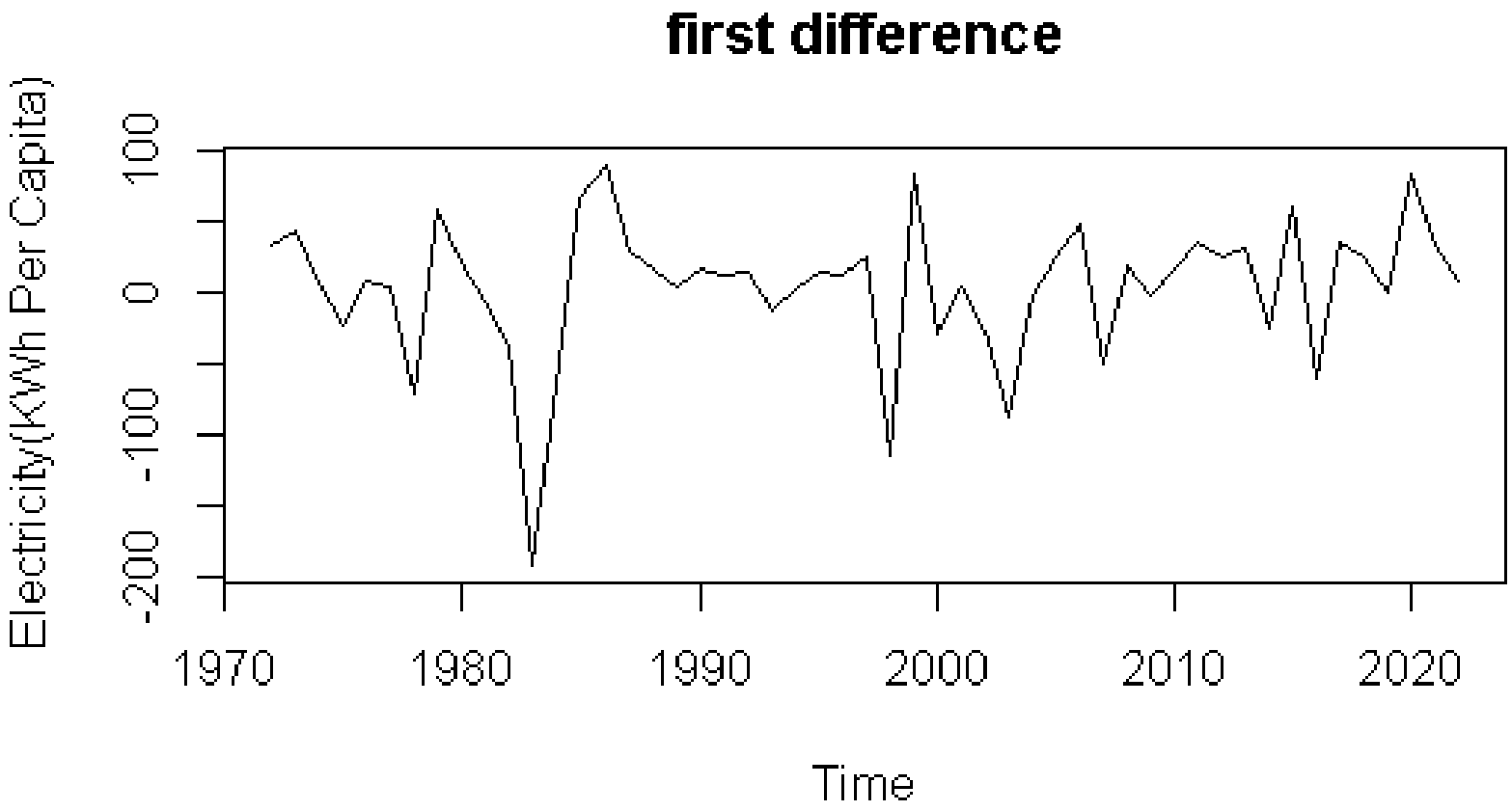


Figure: First difference plot

Stationarity Testing For Differenced Data

Augmented Dickey-Fuller Test

data: diff1 Dickey-Fuller = -4.8579, Lag order = 3, p-value = 0.01
alternative hypothesis: stationary

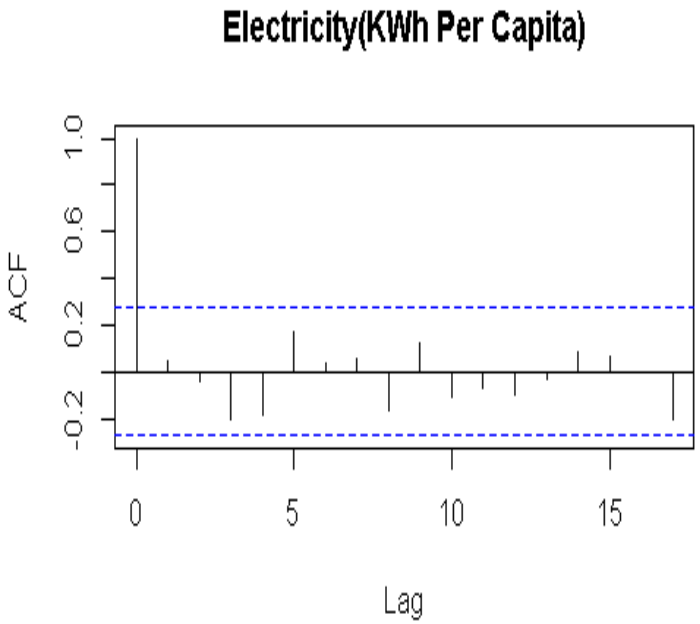
KPSS Test for Level Stationarity

data: diff1 KPSS Level = 0.14346, Truncation lag parameter = 3, p-value = 0.1

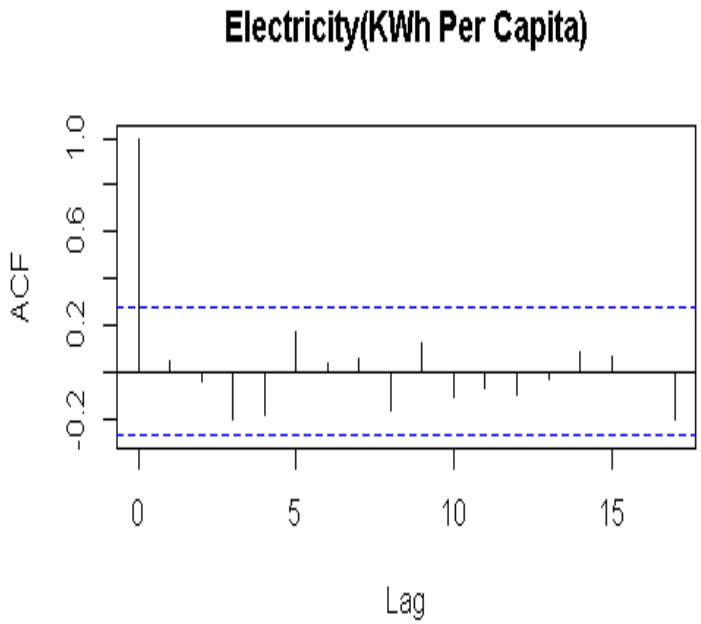
Phillips-Perron Unit Root Test

data: diff1 Dickey-Fuller Z(alpha) = -43.687, Truncation lag parameter = 3, p-value = 0.01 alternative hypothesis: stationary.

ACF and PACF



(a) ACF Plot



(b) PACF Plot

Since non of the spikes are significant, we will use the information criterion