Time Series Analysis

Basics of Time Series Analysis: Data Example

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Bitcoin Price Exploratory Analysis

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About This Lesson

Bitcoin Price Analysis

Background: Bitcoin is the first decentralized cryptocurrency in the world and possesses characteristics different from traditional financial assets. Its price surge in recent years has triggered enormous interest among the investing public.

Source: Pixabay

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Exploratory Analysis

```
# Load BTC data
databtc = read.csv('BTC-USD.csv',header = TRUE)
pricebtc = databtc[,c(5)]
mydates=as.Date(databtc[, 1], "%m/%d/%Y")
tsbtc=xts(pricebtc,mydates)
dlbtc=diff(log(tsbtc))[-c(1),]

# Display BTC data
plot(tsbtc,main='BTC-USD')
acf(tsbtc,main='ACF of BTC')

# Display BTC log differenced data
plot(dlbtc,main='Diff_log_BTC')
acf(dlbtc[-1],main='ACF of Diff_log_BTC')
```

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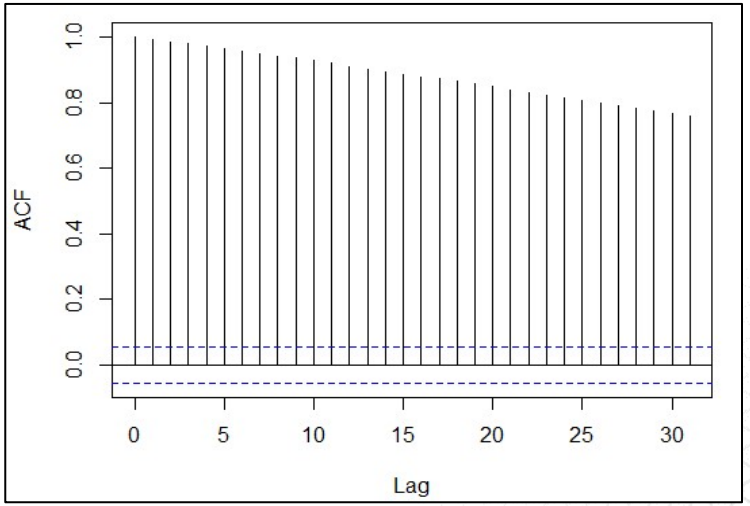
Exploratory Analysis: Time Series



The time series is nonstationary with a non-linear trend

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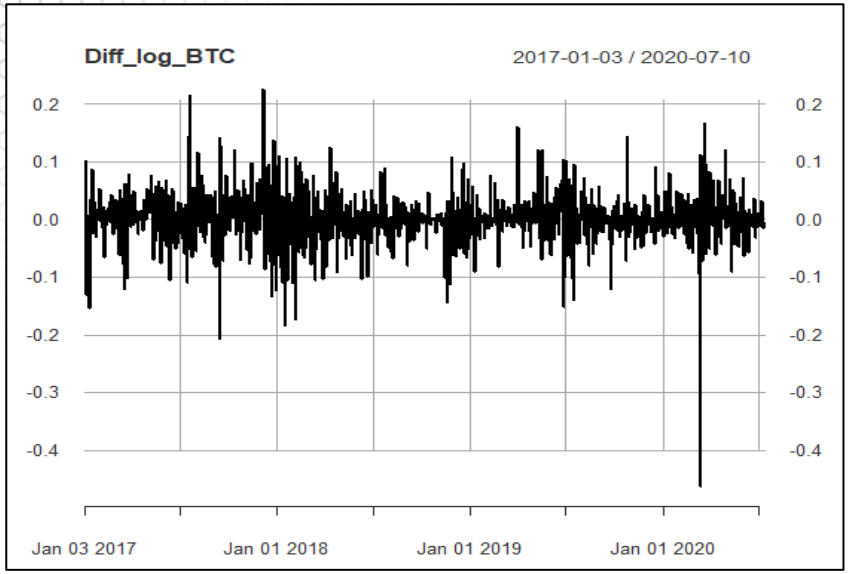
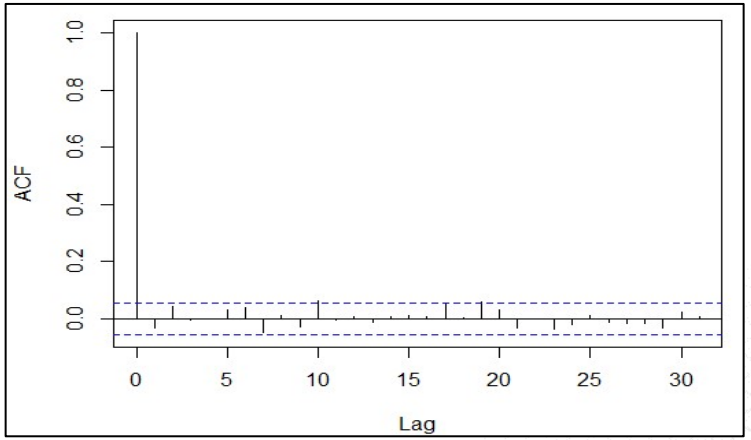
Exploratory Analysis: Log-Differenced Data





The time series appears to be (weakly) stationary by looking at the acf plot, although with non-constant variability over time.

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Exploratory Analysis: Stationarity Test

```
# Kwiatkowski-Phillips-Schmidt-Shin
(KPSS) test
kpss.test(dlbtc[-1])
# Ljung-Box test
Box.test(dlbtc[-1], lag=5, type="Ljung-Box")
# Dickey-Fuller test
adf.test(dlbtc[-1], alternative = "stationary")
```

The differenced log series appears to be stationary

```
Box-Ljung Test
X-squared = 4.825, df=5, p-value = 0.4376
alternative hypothesis: non-stationary

Augmented Dickey-Fuller Test
Dickey-Fuller = -10.327, Lag order = 10,
p-value < 0.01
alternative hypothesis: stationary
```

Why are the p-values different?

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Summary