STA 3100 Programming With Data in R: Time Series

Time Series

Time series is a collection of data points collected at regular intervals over a period of time. It is used to analyze and understand trends in data over time. Time series analysis is used to forecast future values, detect patterns, and identify outliers.

Key Concepts

* **Time Series Components:** A time series can be decomposed into four components: trend, seasonality, cyclical, and irregular.

* **Trend:** The long-term direction of the data. It is the overall pattern of the data over time.

* **Seasonality:** The repeating pattern of the data. It is the regular fluctuations of the data that occur at specific times of the year.

* **Cyclical:** The periodic fluctuations of the data. It is the regular fluctuations of the data that occur over longer periods of time.

* **Irregular:** The random fluctuations of the data. It is the random fluctuations of the data that cannot be explained by the other components.

Coding Examples

Plotting a Time Series

```
Start of Code
```R
# Load the necessary packages
library(tidyverse)
library(lubridate)
# Read in the data
data <- read_csv("data.csv")
# Convert the date column to a date type
data$date <- mdy(data$date)
# Plot the time series
ggplot(data, aes(x = date, y = value)) +
    geom_line()
End of Code
```
```

Decomposing a Time Series

Start of Code

```R
# Load the necessary packages
library(forecast)

# Decompose the time series
decomposed <- decompose(data$value)

# Plot the components
plot(decomposed)
```

End of Code

Practice Multiple Choice Questions

Q: What are the four components of a time series?

A: Trend, seasonality, cyclical, and irregular.