AirPassenger_TimeSeriesForecast

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Project Overview

This project analyzes the `AirPassengers` dataset in R, which contains monthly totals of international airline passengers from 1949 to 1960.
The goal is to explore patterns, detect seasonality, and forecast future passenger numbers.

Loading the Data

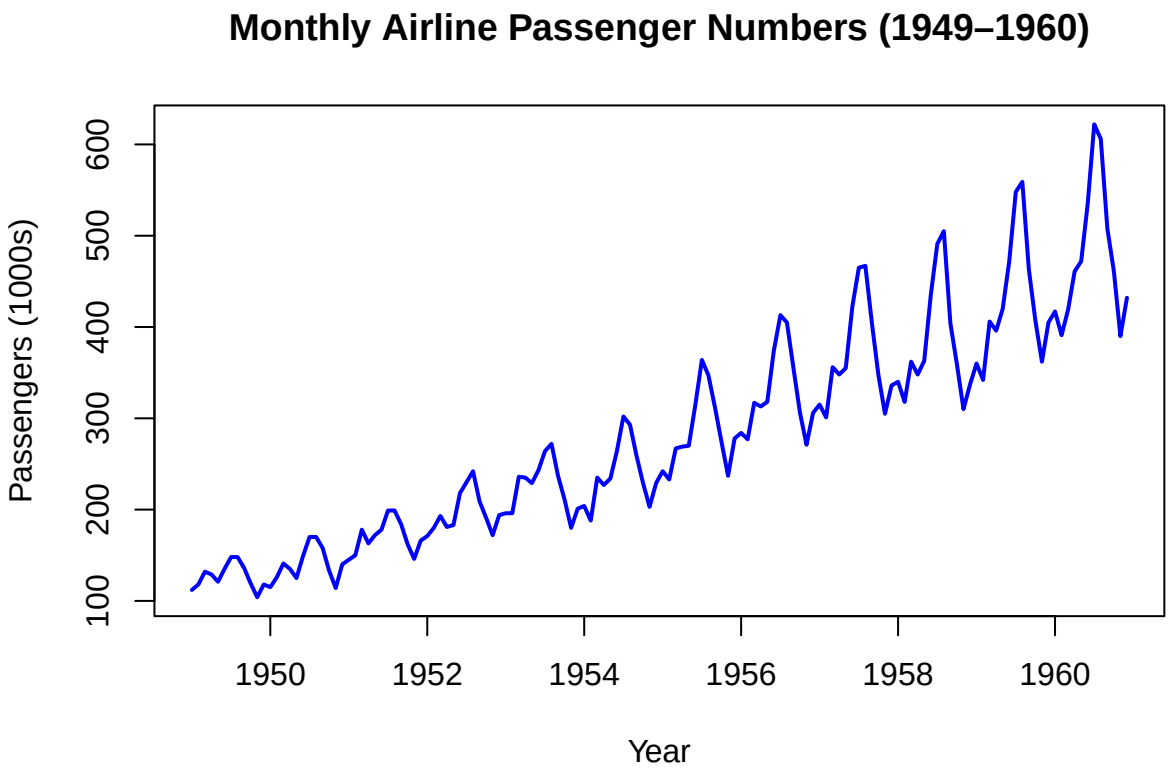
```
# Load the built-in dataset
data(AirPassengers)
ts_data <- AirPassengers
```

Basic summary

```
summary(ts_data)
```

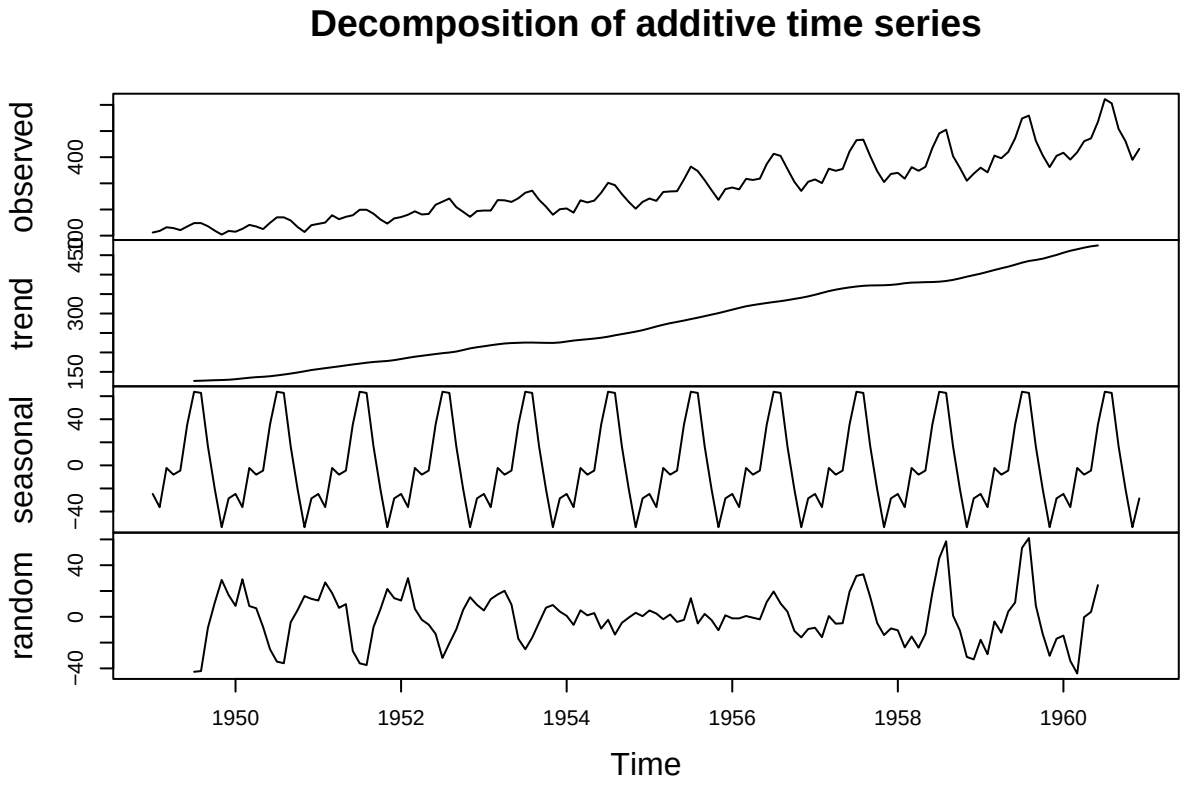
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   104.0   180.0   265.5   280.3   360.5   622.0
```

```
plot(ts_data,
     main="Monthly Airline Passenger Numbers (1949-1960)",
     ylab="Passengers (1000s)",
     xlab="Year",
     col="blue",
     lwd=2)
```



Decompose of the time series

```
decomposed <- decompose(ts_data)
plot(decomposed)
```

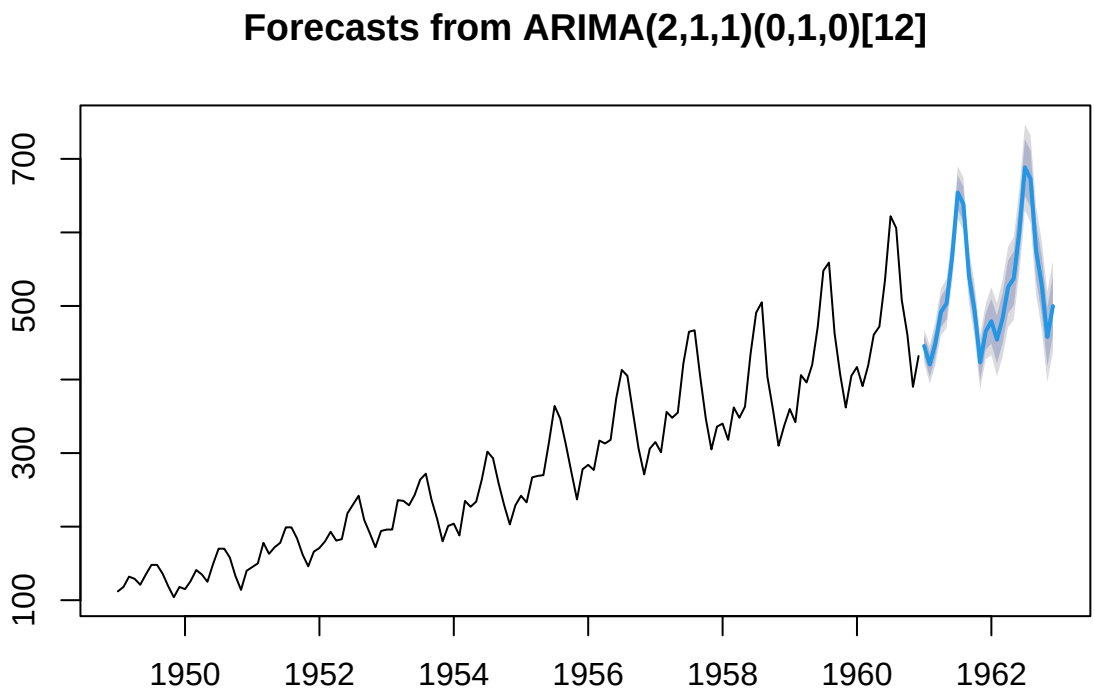


Forecast

```
library(forecast)
```

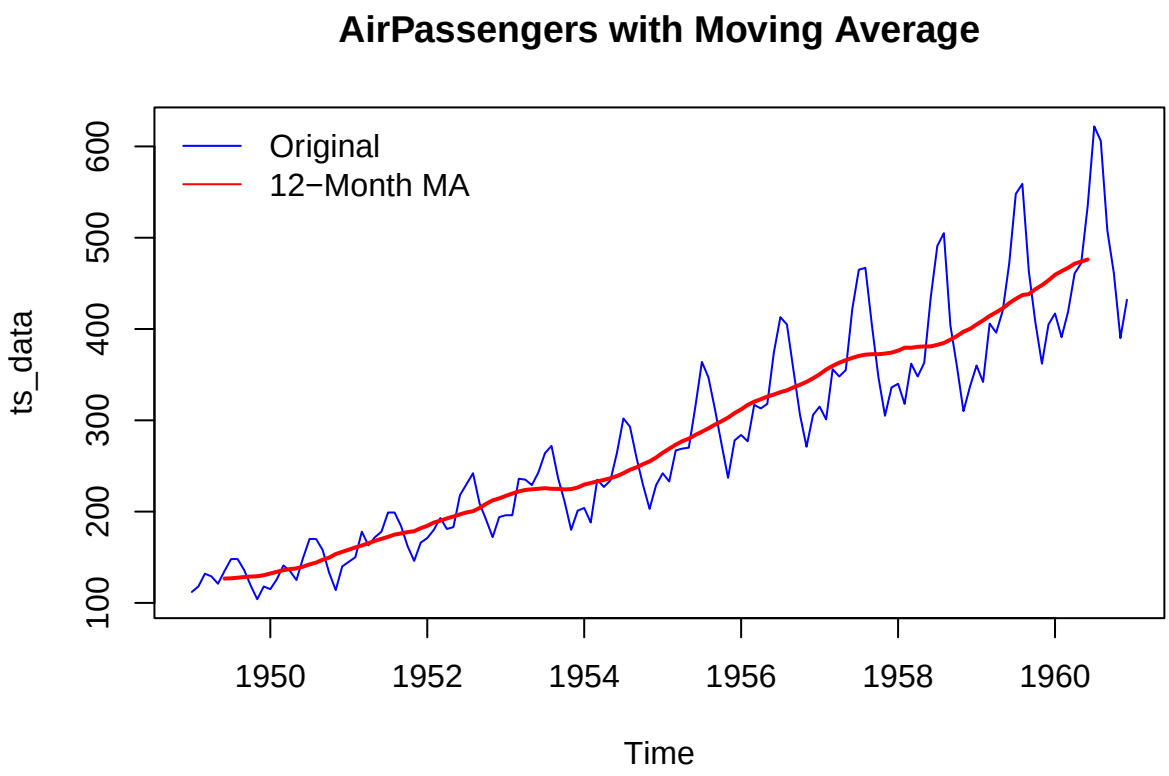
```
## Registered S3 method overwritten by 'quantmod':
##   method            from
##   as.zoo.data.frame zoo
```

```
model <- auto.arima(ts_data)
forecasted <- forecast(model, h=24)
plot(forecasted)
```



Calculate a simple moving average for smoothing

```
ma <- filter(ts_data, rep(1/12, 12), sides=2)
plot(ts_data, col="blue", main="AirPassengers with Moving Average")
lines(ma, col="red", lwd=2)
legend("topleft", legend=c("Original", "12-Month MA"),
       col=c("blue", "red"), lty=1, bty="n")
```


AirPassengers with Moving Average
Original
12−Month MA
ts_data
100
200
300
400
500
600
1950
1952
1954
1956
1958
1960
Time