Prova Prática

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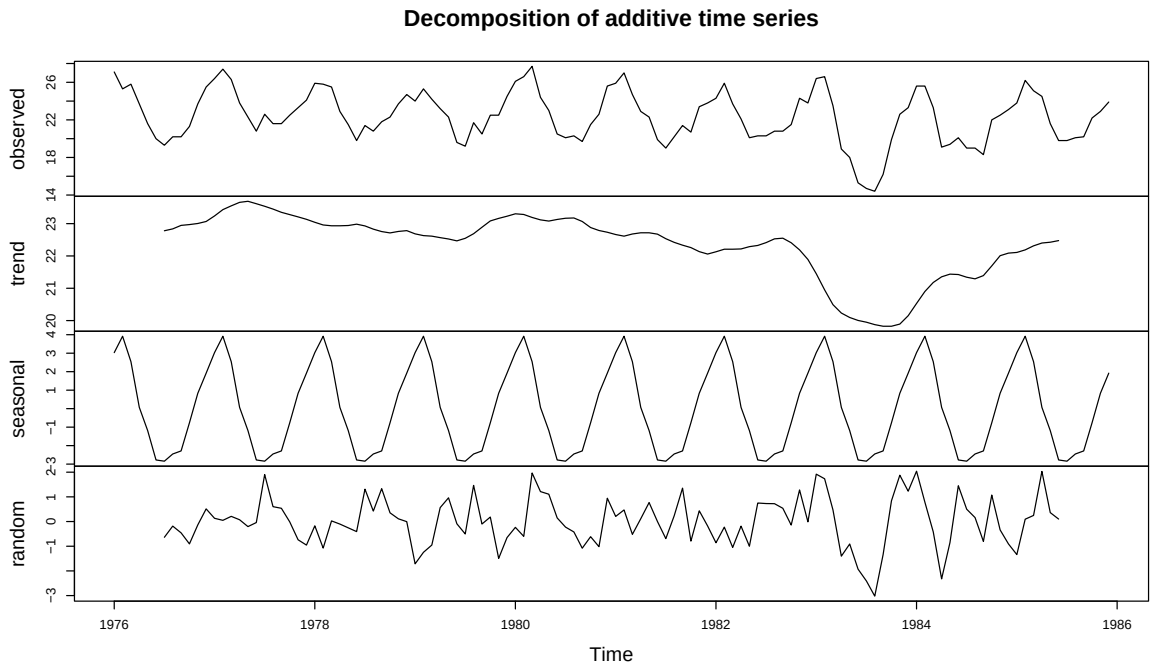
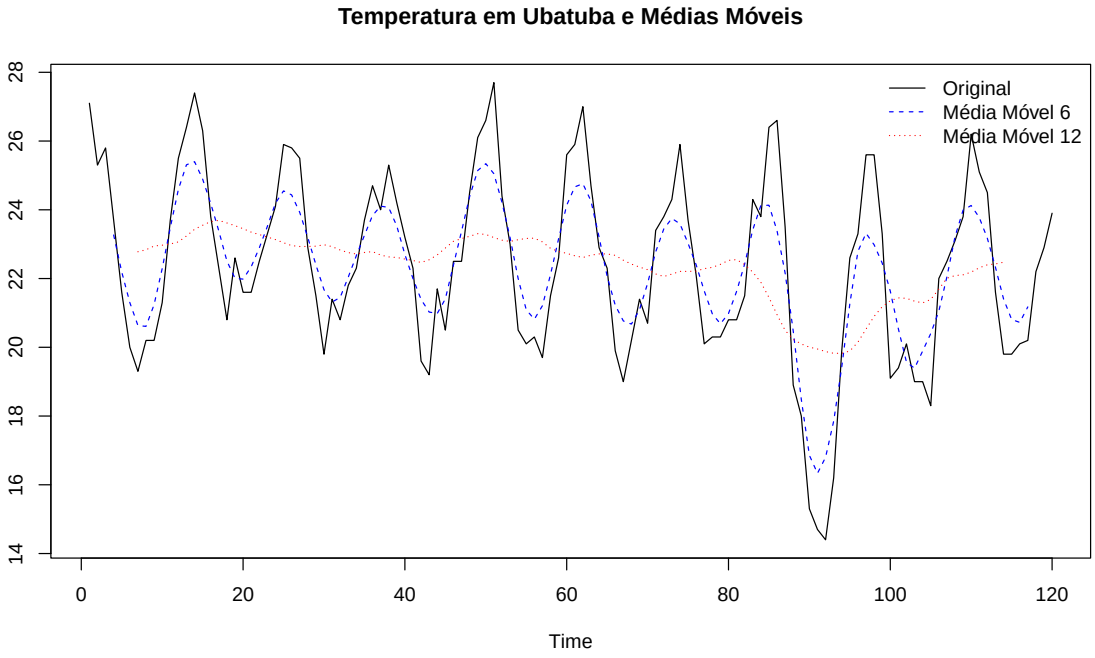
```
library(ggplot2)
library(tseries)
library(readODS)
library(tidyverse)
library(forecast)
library(readxl)
```

A série Temperatura em Ubatuba:

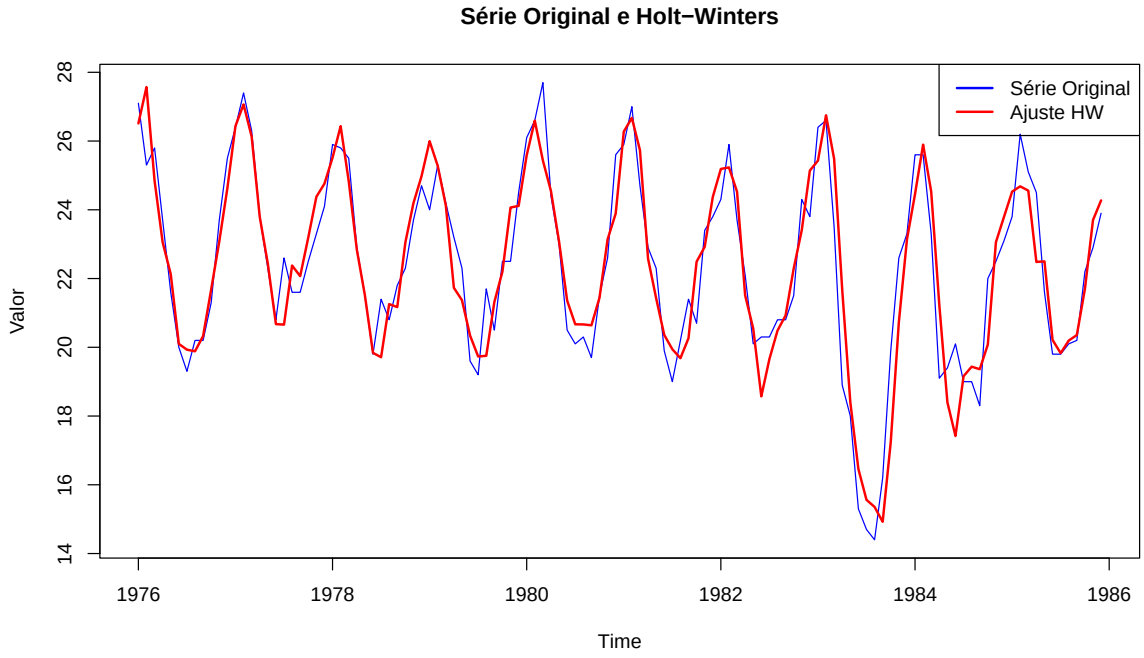
```
data <- read_ods("data/temperatura.ods")

# transformando em formato time series

data_ts <- ts(data$Ubatuba,  start = c(1976, 1), frequency = 12)

decompose <- decompose(data_ts)

plot(decompose)
```




```
data_fit <- data %>% select(-c(Cananeia))

# suavização por médias móveis

df_ma <- cbind(data_fit$Ubatuba,
               ma(data_fit$Ubatuba, order = 6),
               ma(data_fit$Ubatuba, order = 12))


ts.plot(df_ma, col = c("black", "blue", "red"), lty = 1:3,
        main = "Temperatura em Ubatuba e Médias Móveis")
legend("topright",
       legend = c("Original", "Média Móvel 6", "Média Móvel 12"),
       col = c("black", "blue", "red"), lty = 1:3, bty = "n")
```

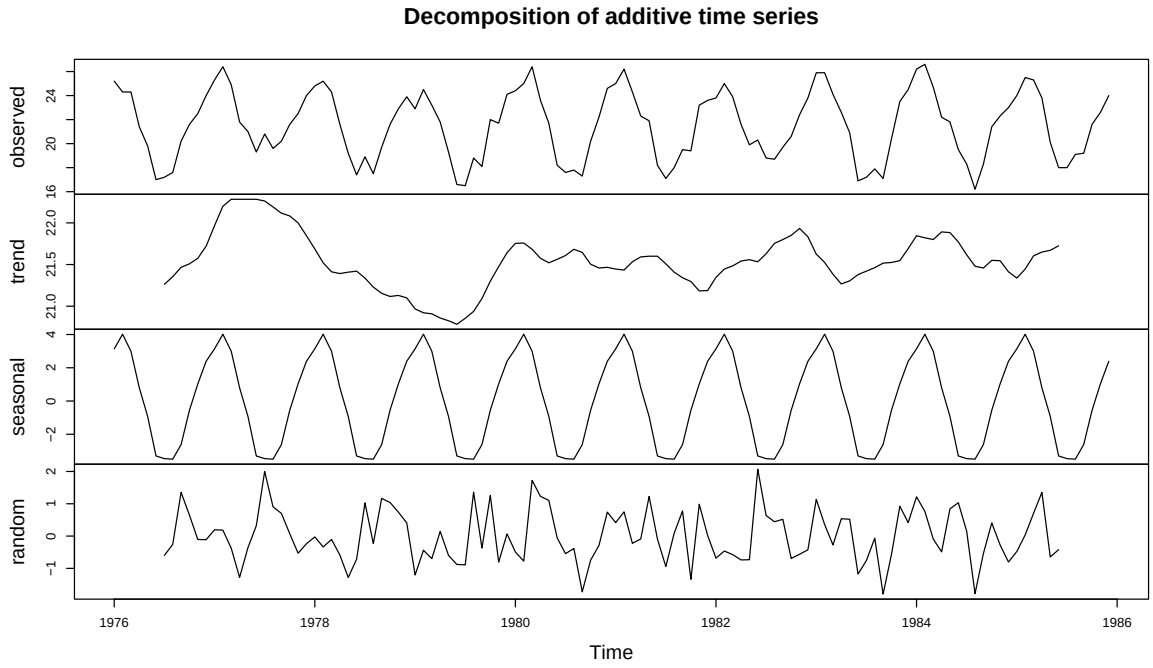



```r
# ajustar o modelo de holt-winters
modelo_hw <- hw(data_ts, seasonal = "additive")

plot(data_ts, type = "l", col = "blue",
     main = "Série Original e Holt-Winters", ylab = "Valor")
lines(modelo_hw$fitted, col = "red", lwd = 2)
legend("topright", legend = c("Série Original", "Ajuste HW"),
       col = c("blue", "red"), lwd = 2)
```

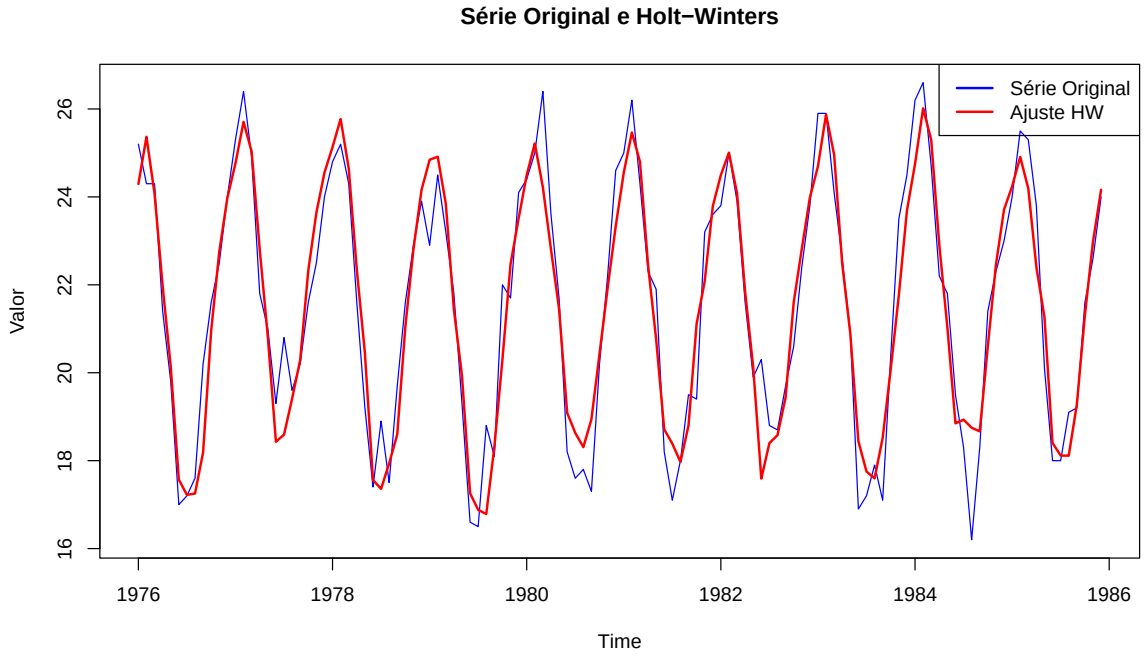


A série temperatura em Cananeia:

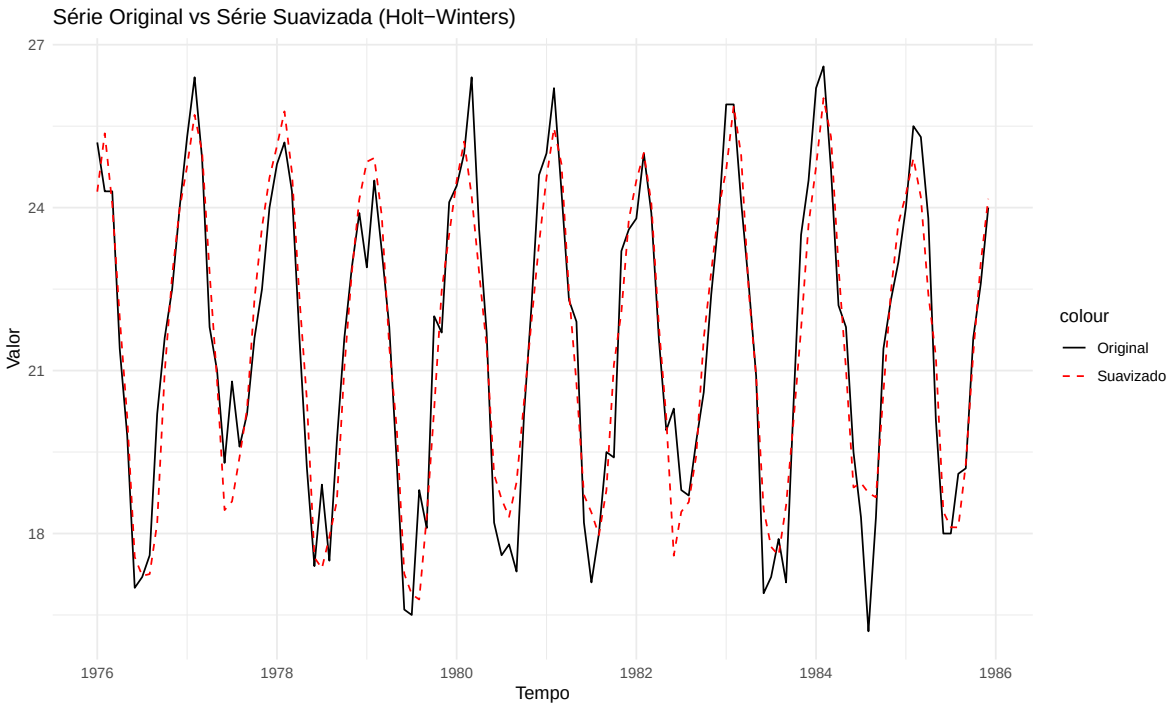
```
data <- read_ods("data/temperatura.ods")

# transformando em formato time series

data_ts <- ts(data$Cananeia,  start = c(1976, 1), frequency = 12)


decompose <- decompose(data_ts)

plot(decompose)
```



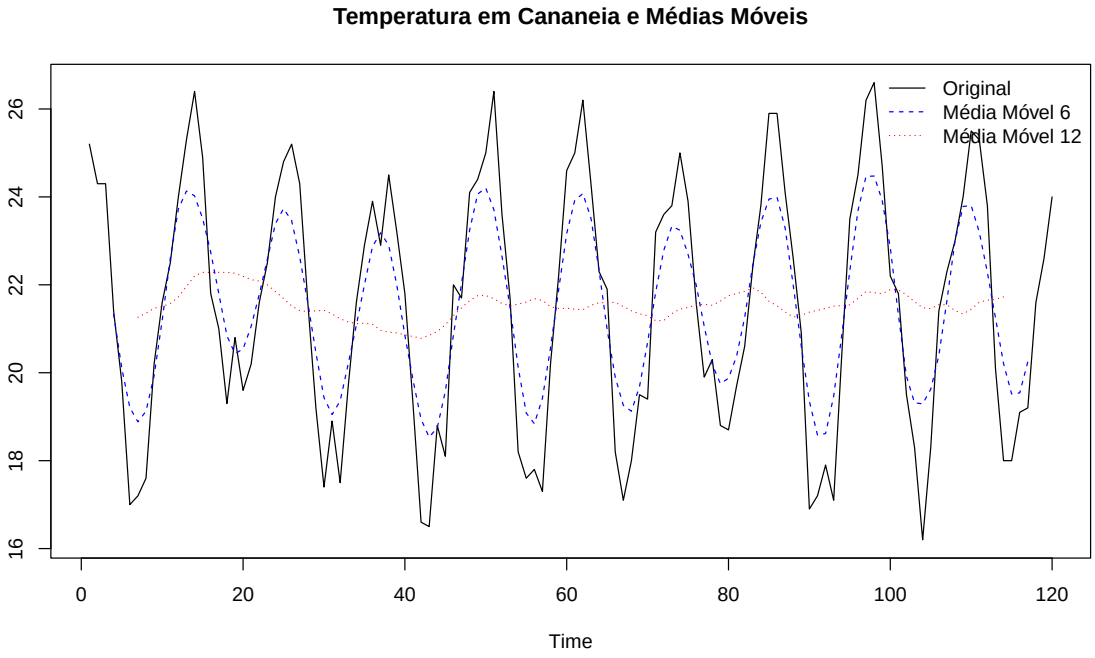

```r
data_fit <- data %>% select(-c(Ubatuba))

# ajustar o modelo de holt-winters
modelo_hw <- hw(data_ts, seasonal = "additive")

plot(data_ts, type = "l", col = "blue", main = "Série Original e Holt-Winters", ylab = "Va
lines(modelo_hw$fitted, col = "red", lwd = 2)
legend("topright", legend = c("Série Original", "Ajuste HW"), col = c("blue", "red"), lwd
```




```
# criando um dataframe para visualização
df_plot <- data.frame(
  Data = time(data_ts),
  Original = as.numeric(data_ts),
  Suavizado = as.numeric(modelo_hw$fitted)
)

# plotando com ggplot2
ggplot(df_plot, aes(x = Data)) +
  geom_line(aes(y = Original, color = "Original")) +
  geom_line(aes(y = Suavizado, color = "Suavizado"), linetype = "dashed") +
  labs(title = "Série Original vs Série Suavizada (Holt-Winters)",
       x = "Tempo", y = "Valor") +
  scale_color_manual(values = c("Original" = "black", "Suavizado" = "red")) +
  theme_minimal()
```

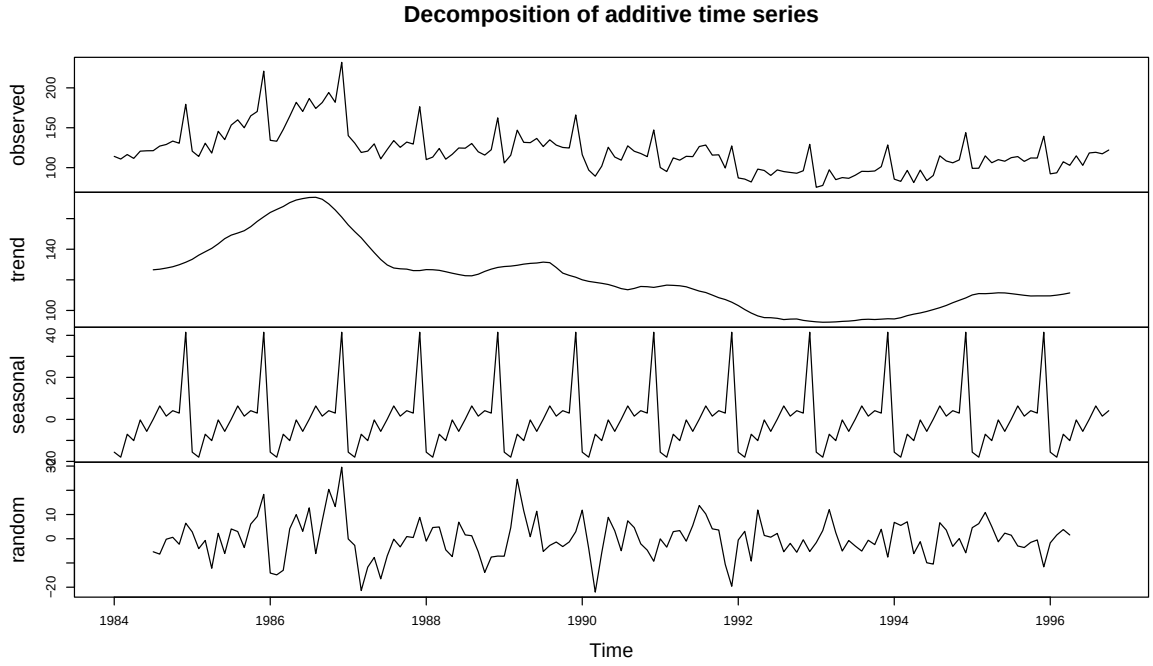



```
# suavização por médias móveis

df_ma <- cbind(data_fit$Cananeia,
               ma(data_fit$Cananeia, order = 6),
               ma(data_fit$Cananeia, order = 12))


ts.plot(df_ma, col = c("black", "blue", "red"), lty = 1:3,
        main = "Temperatura em Cananeia e Médias Móveis")
legend("topright",
       legend = c("Original", "Média Móvel 6", "Média Móvel 12"),
       col = c("black", "blue", "red"), lty = 1:3, bty = "n")
```

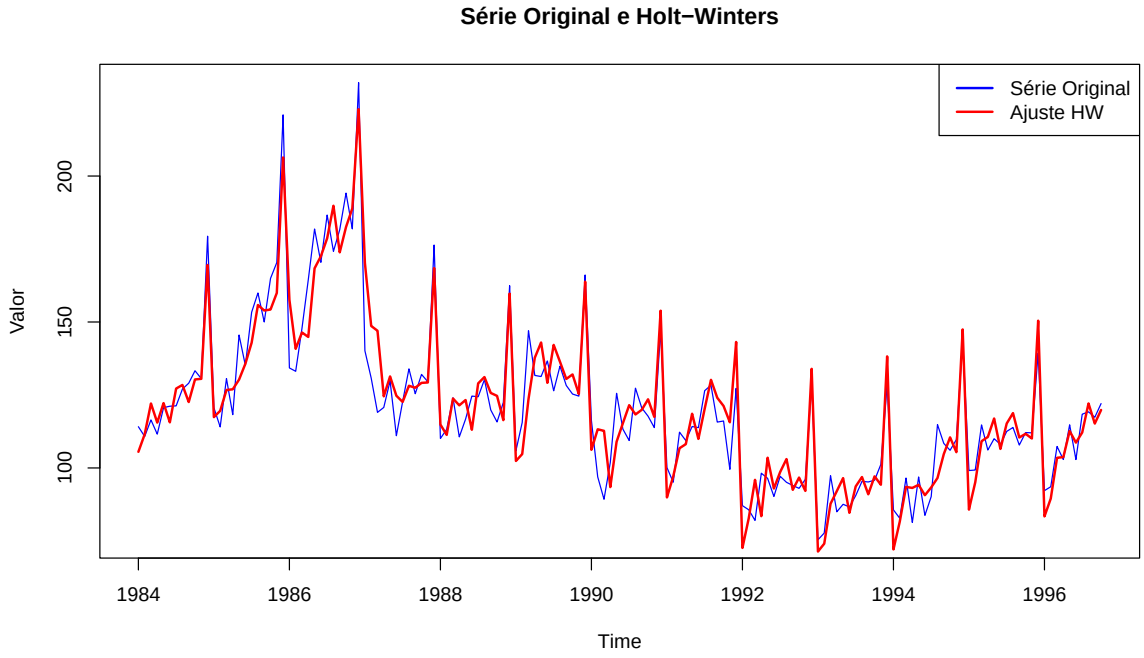


Série Consumo

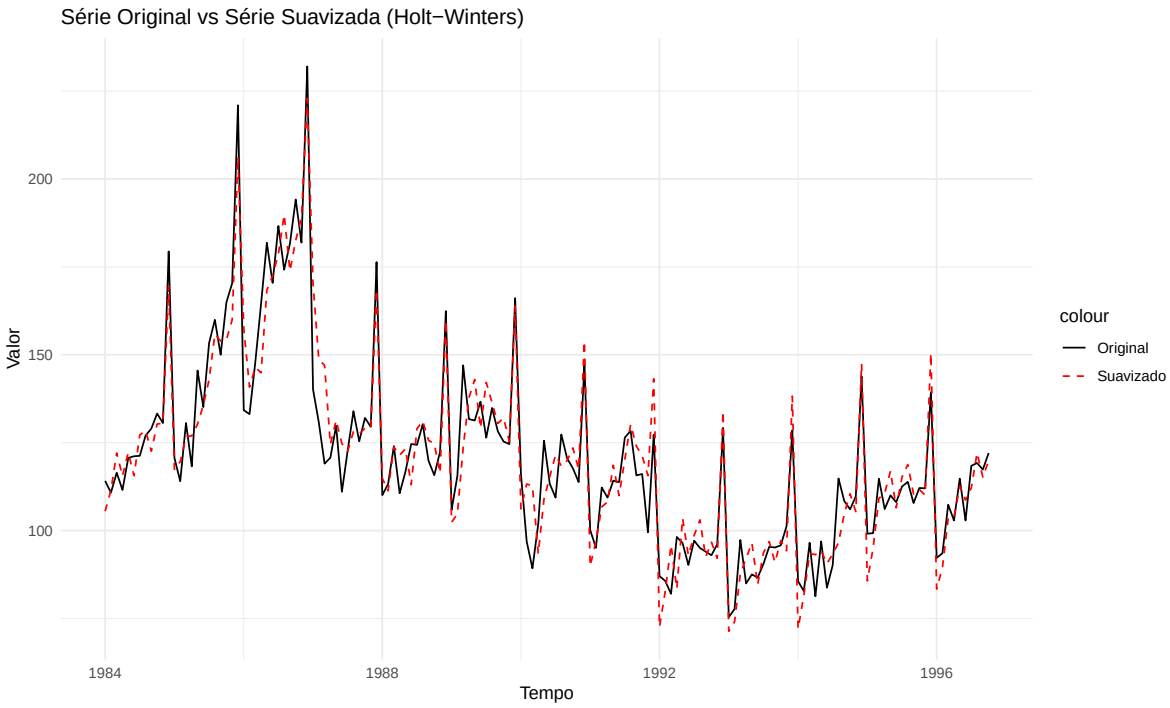
```
data <- read_excel("data/CONSUMO.xls")

# transformando em formato time series

data_ts <- ts(data$consumo,  start = c(1984,1), frequency = 12)


decompose <- decompose(data_ts)

plot(decompose)
```



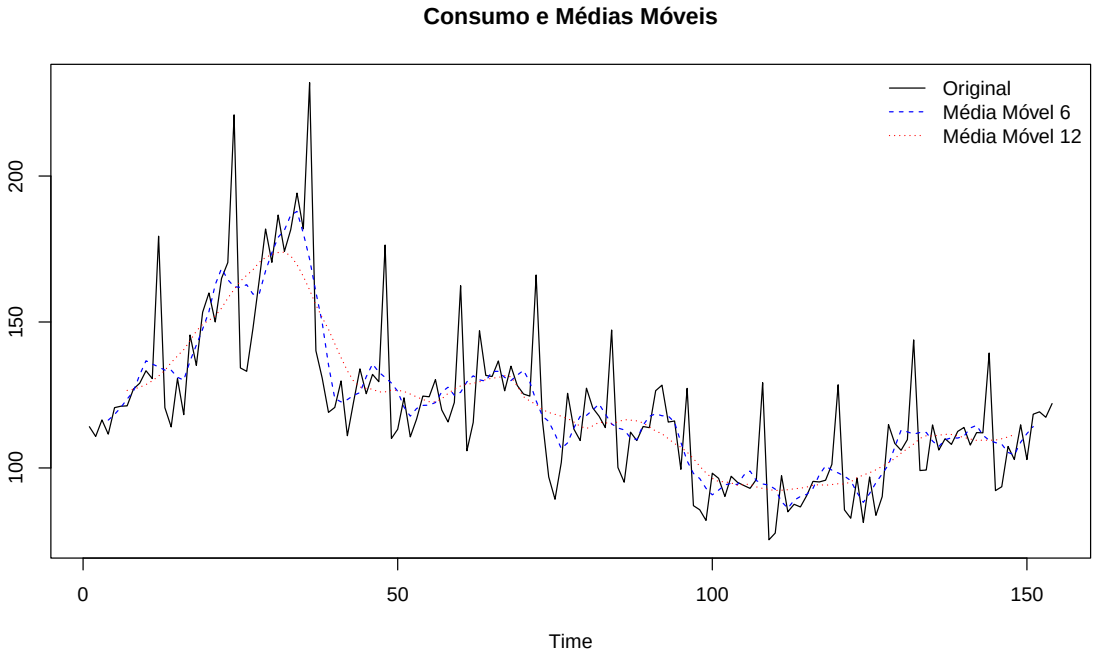

```r
# ajustar o modelo de holt-winters
modelo_hw <- hw(data_ts, seasonal = "additive")

plot(data_ts, type = "l", col = "blue", main = "Série Original e Holt-Winters", ylab = "Va
lines(modelo_hw$fitted, col = "red", lwd = 2)
legend("topright", legend = c("Série Original", "Ajuste HW"), col = c("blue", "red"), lwd
```




```
# criando um dataframe para visualização
df_plot <- data.frame(
  Data = time(data_ts),
  Original = as.numeric(data_ts),
  Suavizado = as.numeric(modelo_hw$fitted)
)

# plotando com ggplot2
ggplot(df_plot, aes(x = Data)) +
  geom_line(aes(y = Original, color = "Original")) +
  geom_line(aes(y = Suavizado, color = "Suavizado"), linetype = "dashed") +
  labs(title = "Série Original vs Série Suavizada (Holt-Winters)",
       x = "Tempo", y = "Valor") +
  scale_color_manual(values = c("Original" = "black", "Suavizado" = "red")) +
  theme_minimal()
```




```
# suavização por médias móveis

df_ma <- cbind(data$consumo,
               ma(data$consumo, order = 6),
               ma(data$consumo, order = 12))


ts.plot(df_ma, col = c("black", "blue", "red"), lty = 1:3,
        main = "Consumo e Médias Móveis")
legend("topright", legend = c("Original", "Média Móvel 6", "Média Móvel 12"),
       col = c("black", "blue", "red"),
       lty = 1:3, bty = "n")
```


Consumo e Médias Móveis
Original
Média Móvel 6
Média Móvel 12
200
150
100
0
50
100
150
Time