Fifth Assignment

Chargement des bibliothèques

Chargement des bibliothèques nécessaires à l'analyse des séries temporelles

```
library(readr)
library(forecast)
library(ggplot2)
library(tidyverse)
library(tidyr)
```

Charger les données

```
hawai <- read_csv("C:/Users/Mayad2/OneDrive - Université Laval/Phd/Winter 2023/Statistic/f
```

Convertir les caractères à transformer en date

```
hawai$time <- as.Date(hawai$time, format = "%Y-%m")
```

Créer des séries chronologiques sur le Co2

```
ts_data <- ts(hawai$CO2, start = c(1958, 3), end = c(2001, 12), frequency = 12)
plot(ts_data, ylab= "CO2")
```

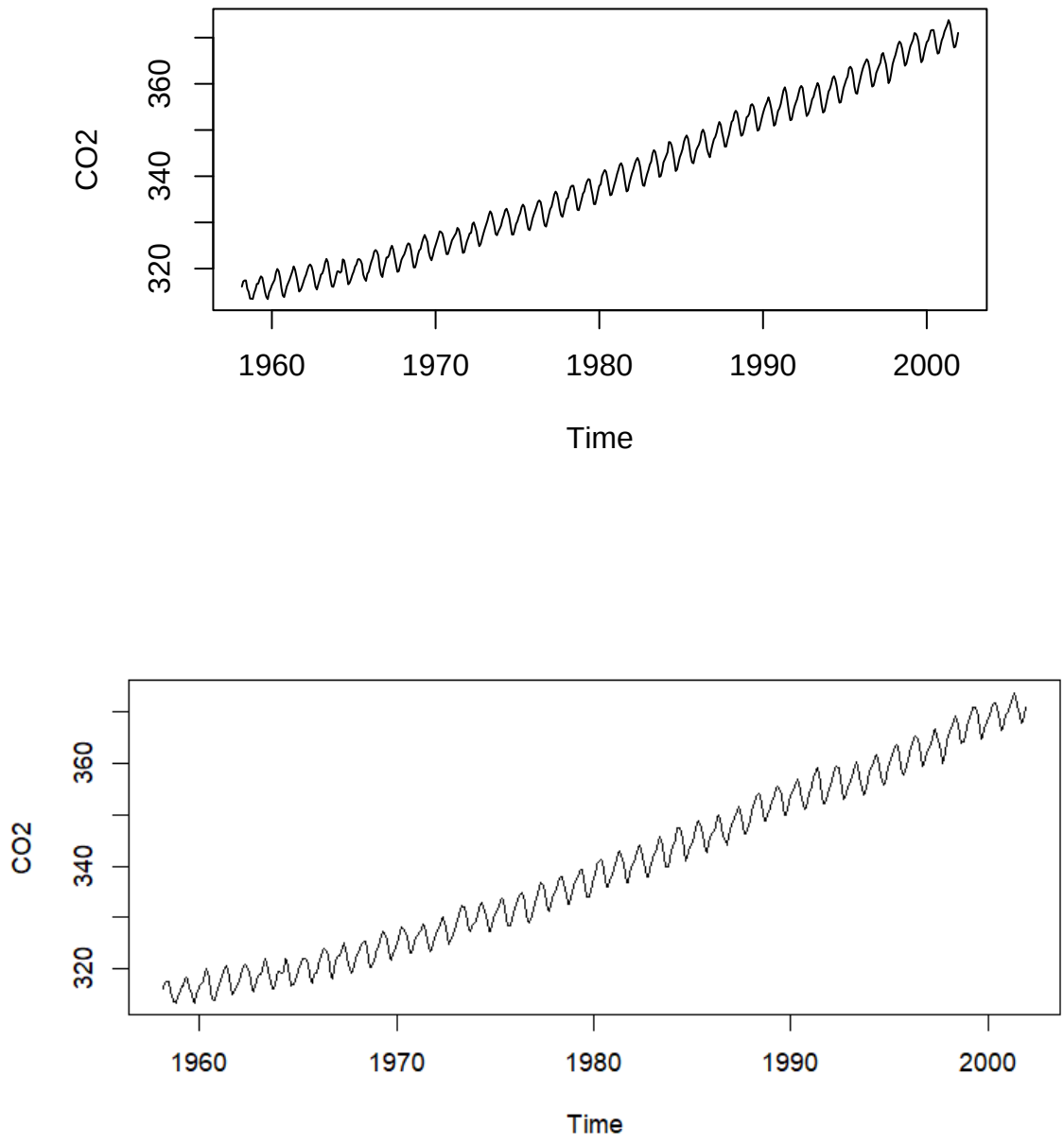


Figure 1: Série chronologique sur le CO2

Séparer la série en parties d'entraînement (environ 70 % des données) et en parties de test

```
train_size <- round(0.7 * length(ts_data))
train_data <- window(ts_data, end = c(1985, 12))
test_data <- window(ts_data, start = c(1986, 1))
```

créer un modèle de prévision sur les données d'apprentissage

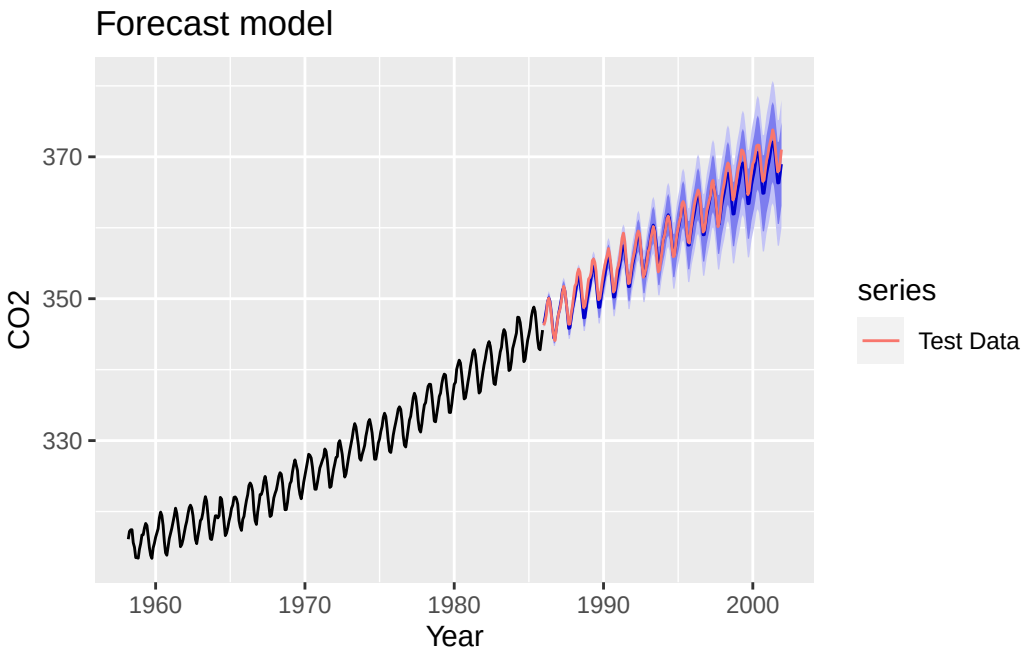
```
model <- auto.arima(train_data)
```

Prévisions

```
forecast <- forecast(model, h = length(test_data))
```

Traçage

```
autoplot(forecast) +
  autolayer(test_data, series = "Test Data") +
  xlab("Year") +
  ylab("CO2") +
  ggtitle("Forecast model")
```



Effectuer une analyse résiduelle

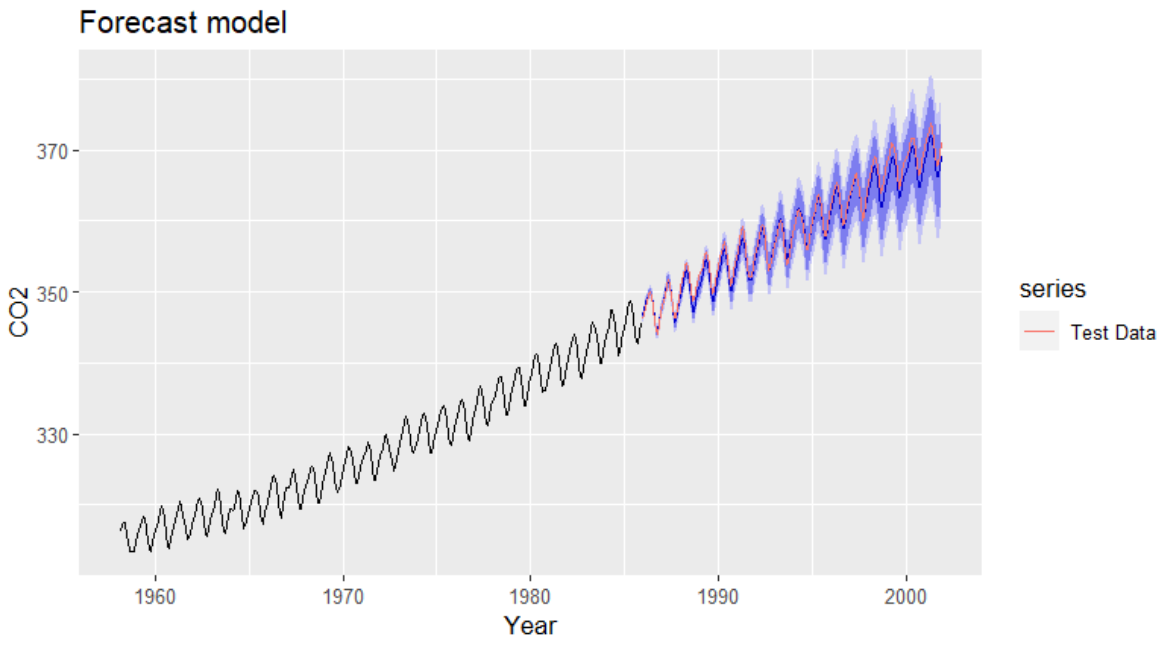
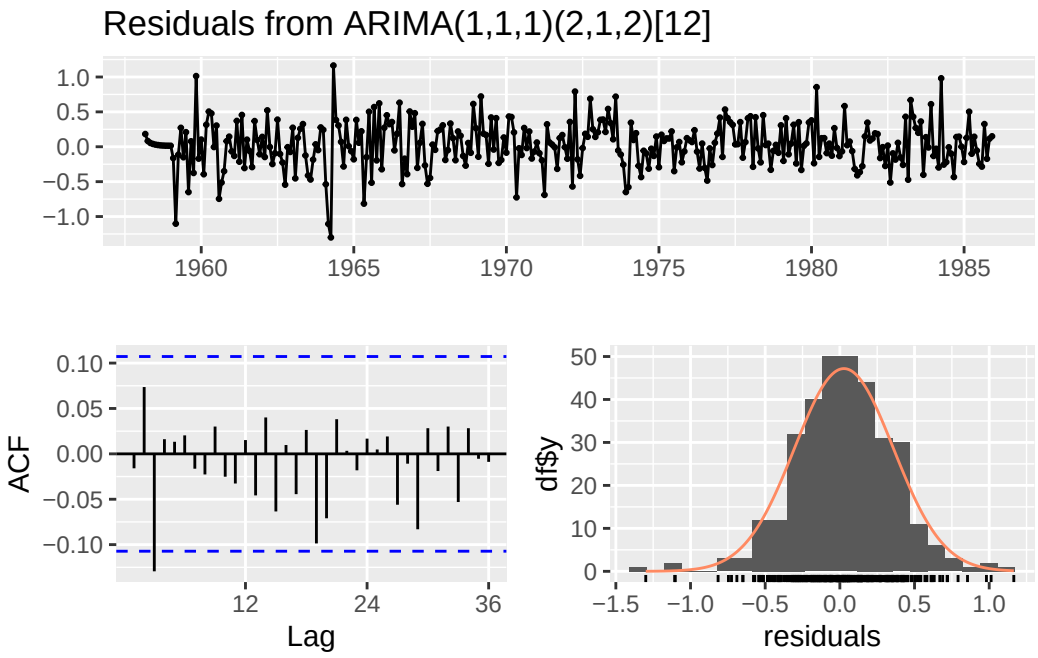


Figure 2: Forecast model

```
checkresiduals(model)
```



```
    Ljung-Box test

data:  Residuals from ARIMA(1,1,1)(2,1,2)[12]
Q* = 18.846, df = 18, p-value = 0.4014

Model df: 6.   Total lags used: 24
```

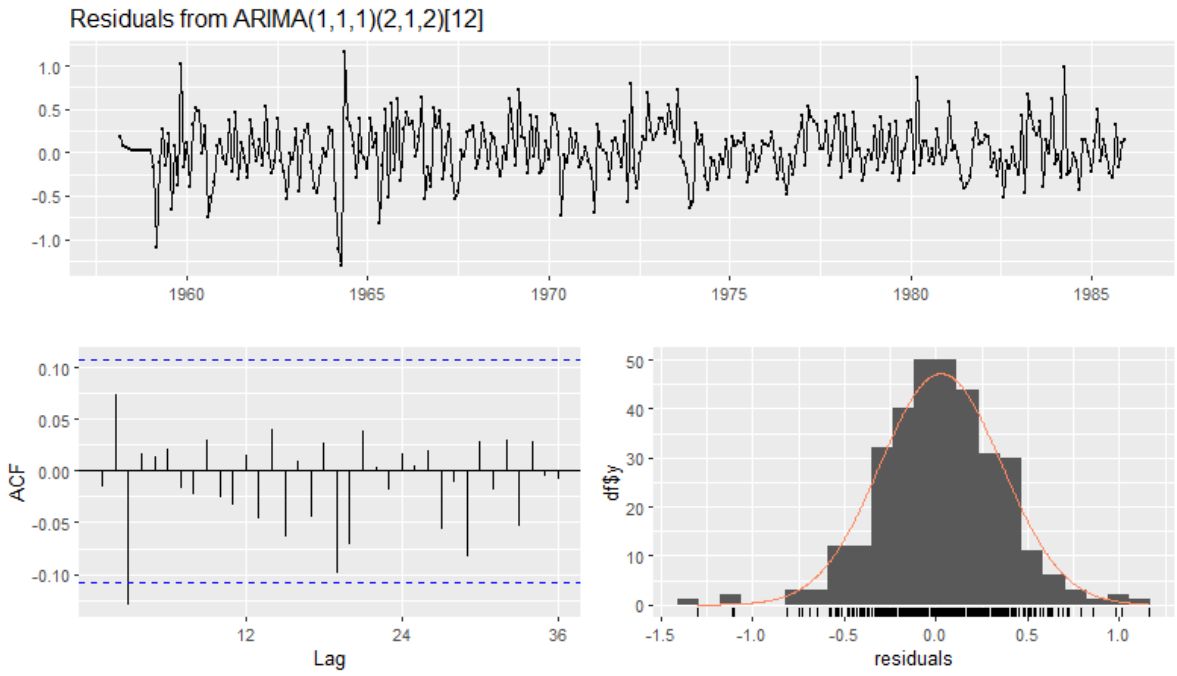


Figure 3: Residual analysis