We clean the memory and charge the libraries

```
rm(list=ls())

library(fpp2)
```

```
## Warning: package 'fpp2' was built under R version 4.0.5
```

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

```
## -- Attaching packages --------------------------------------------- fpp2 2.4 --
```

```
## v ggplot2   3.3.5     v fma       2.4
## v forecast  8.16      v expsmooth 2.3
```

```
## Warning: package 'ggplot2' was built under R version 4.0.5
```

```
## Warning: package 'forecast' was built under R version 4.0.5
```

```
## Warning: package 'fma' was built under R version 4.0.5
```

```
## Warning: package 'expsmooth' was built under R version 4.0.5
```

```
##
```

```
library(tseries)
```

```
## Warning: package 'tseries' was built under R version 4.0.5
```

We assign a variable with the time series of the train data

```
tr_PM10_24h_00 <- read.csv("~/It Academy/Data Science/Aire/tr_PM10_24h_00.csv", row.names=1)
```

We execute auto.arima to find the optimal parameters of the model

```
mod.tr_PM10_24h_00 <- auto.arima(tr_PM10_24h_00, trace=TRUE, allowdrift=FALSE)
```

```
##
##  Fitting models using approximations to speed things up...
##
##  ARIMA(2,0,2) with non-zero mean : 6252.781
##  ARIMA(0,0,0) with non-zero mean : 6532.552
##  ARIMA(1,0,0) with non-zero mean : 6247.618
##  ARIMA(0,0,1) with non-zero mean : 6303.467
##  ARIMA(0,0,0) with zero mean     : 8159.011
##  ARIMA(2,0,0) with non-zero mean : 6249.899
##  ARIMA(1,0,1) with non-zero mean : 6249.637
##  ARIMA(2,0,1) with non-zero mean : 6251.957
##  ARIMA(1,0,0) with zero mean     : 6444.45
##
##  Now re-fitting the best model(s) without approximations...
##
##  ARIMA(1,0,0) with non-zero mean : 6249.495
##
##  Best model: ARIMA(1,0,0) with non-zero mean
```

The best model is ARIMA (1,0,0). We create a model with this parameters and the train data

```
mod.tr_PM10_24h_00 <- Arima(tr_PM10_24h_00[,1], order=c(1,0,0))
```

We evaluate the accuracy of the prediction model, in this case the one step forecasting is executed on the train data

```
accuracy(mod.tr_PM10_24h_00)
```

```
##                       ME     RMSE      MAE       MPE     MAPE      MASE
## Training set -0.01066215 9.046426 5.545863 -10.5769 24.77577 0.9297155
##                      ACF1
## Training set 0.0007913917
```

We assign a variable with the time series of the test data

```
te_PM10_24h_00 <- read.csv("~/It Academy/Data Science/Aire/te_PM10_24h_00.csv", row.names=1)
```

We perform a one step forecast in the data test using the model with the fitted parameters from the train data

```
mod.te_PM10_24h_00<- Arima(te_PM10_24h_00[,1], model=mod.tr_PM10_24h_00)
```

We evaluate the accuracy of the model on the test data,

```
accuracy(mod.te_PM10_24h_00)
```

```
##                     ME     RMSE      MAE      MPE     MAPE      MASE      ACF1
## Training set 3.059189 8.898989 6.860889 1.799681 22.69108 0.9507219 0.1518352
```

We write a csv with the values of the time series forecast of the data test

```
write.csv(mod.te_PM10_24h_00[["fitted"]],"C:\\Users\\hinoj\\OneDrive\\Documentos\\It Academy
\\Data Science\\Aire\\fr_PM10_24h_00.csv")
```