UK Gas Consumption

2022-09-26

```
data("UKgas")
UKgas
```

```
##        Qtr1   Qtr2   Qtr3   Qtr4
## 1960  160.1  129.7   84.8  120.1
## 1961  160.1  124.9   84.8  116.9
## 1962  169.7  140.9   89.7  123.3
## 1963  187.3  144.1   92.9  120.1
## 1964  176.1  147.3   89.7  123.3
## 1965  185.7  155.3   99.3  131.3
## 1966  200.1  161.7  102.5  136.1
## 1967  204.9  176.1  112.1  140.9
## 1968  227.3  195.3  115.3  142.5
## 1969  244.9  214.5  118.5  153.7
## 1970  244.9  216.1  188.9  142.5
## 1971  301.0  196.9  136.1  267.3
## 1972  317.0  230.5  152.1  336.2
## 1973  371.4  240.1  158.5  355.4
## 1974  449.9  286.6  179.3  403.4
## 1975  491.5  321.8  177.7  409.8
## 1976  593.9  329.8  176.1  483.5
## 1977  584.3  395.4  187.3  485.1
## 1978  669.2  421.0  216.1  509.1
## 1979  827.7  467.5  209.7  542.7
## 1980  840.5  414.6  217.7  670.8
## 1981  848.5  437.0  209.7  701.2
## 1982  925.3  443.4  214.5  683.6
## 1983  917.3  515.5  224.1  694.8
## 1984  989.4  477.1  233.7  730.0
## 1985 1087.0  534.7  281.8  787.6
## 1986 1163.9  613.1  347.4  782.8
```

This is a Timeseries that shows the quarterly UK gas consumption from 1960 to 1986.

This data set is deleivered in a quarterly fashion.

```
library(fpp)
```

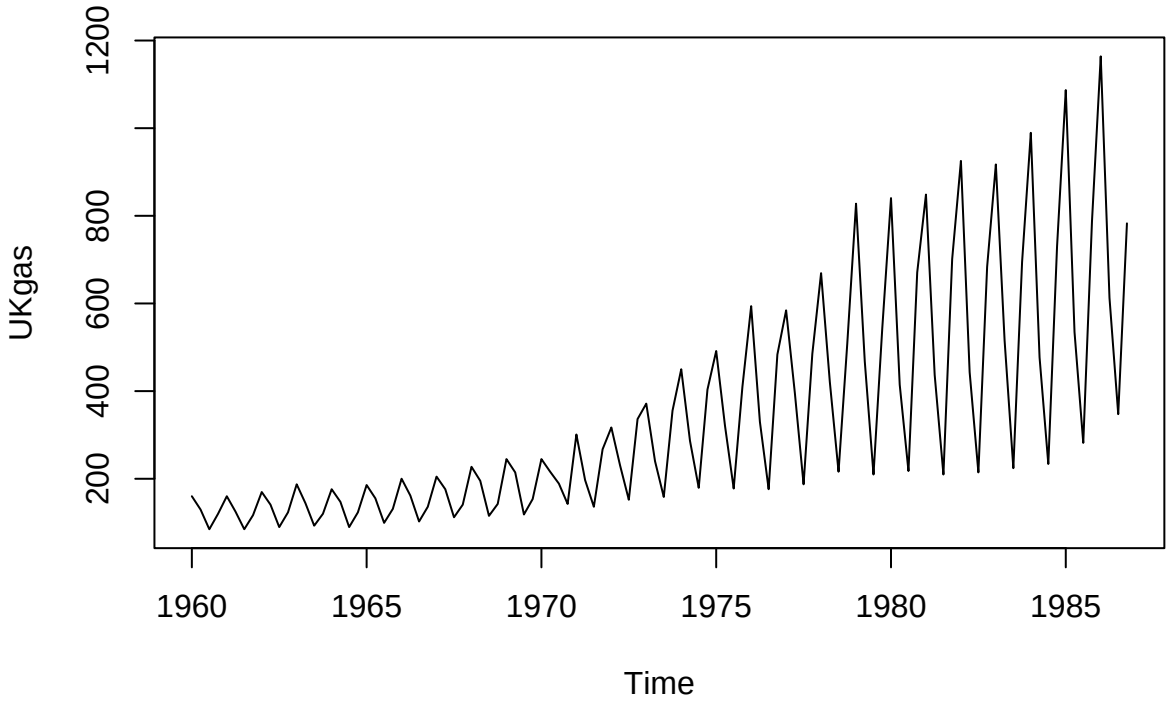
```
## Loading required package: forecast
```

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

## Loading required package: fma

## Loading required package: expsmooth

## Loading required package: lmtest

## Loading required package: zoo

##
## Attaching package: 'zoo'

## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric

## Loading required package: tseries
```

```
library(fpp2)
```

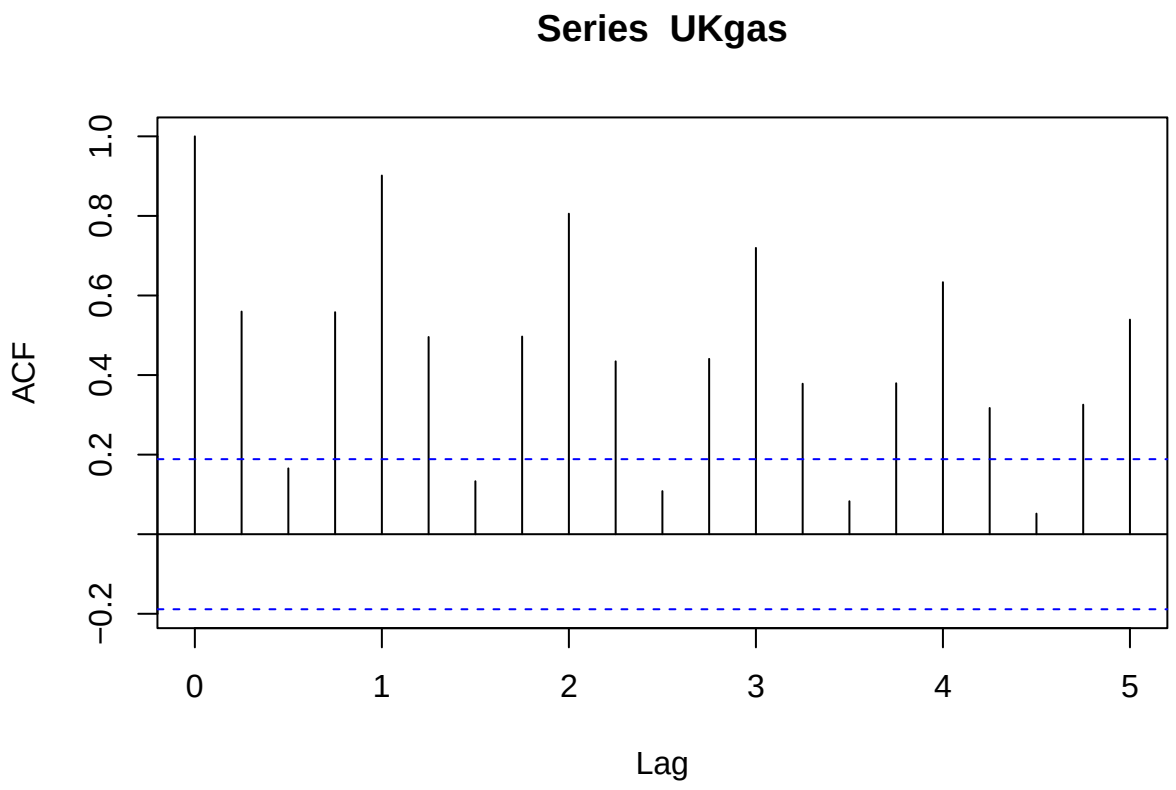
```
## -- Attaching packages --------------------------------------------- fpp2 2.4 --

## v ggplot2 3.3.6

##

##
## Attaching package: 'fpp2'

## The following objects are masked from 'package:fpp':
##
##     ausair, ausbeer, austa, austourists, debitcards, departures,
##     elecequip, euretail, guinearice, oil, sunspotarea, usmelec
```

```
library(forecast)
plot(UKgas)
```



My guess is that the acf would show that there is trend, as time goes on the consumption of gas is definitely increasing. There could also be some seasonality as well as we can see that Q1 has the highest gas consumption throughout the years and Q3 has the lowest gas consumption.

```
acf(UKgas)
```

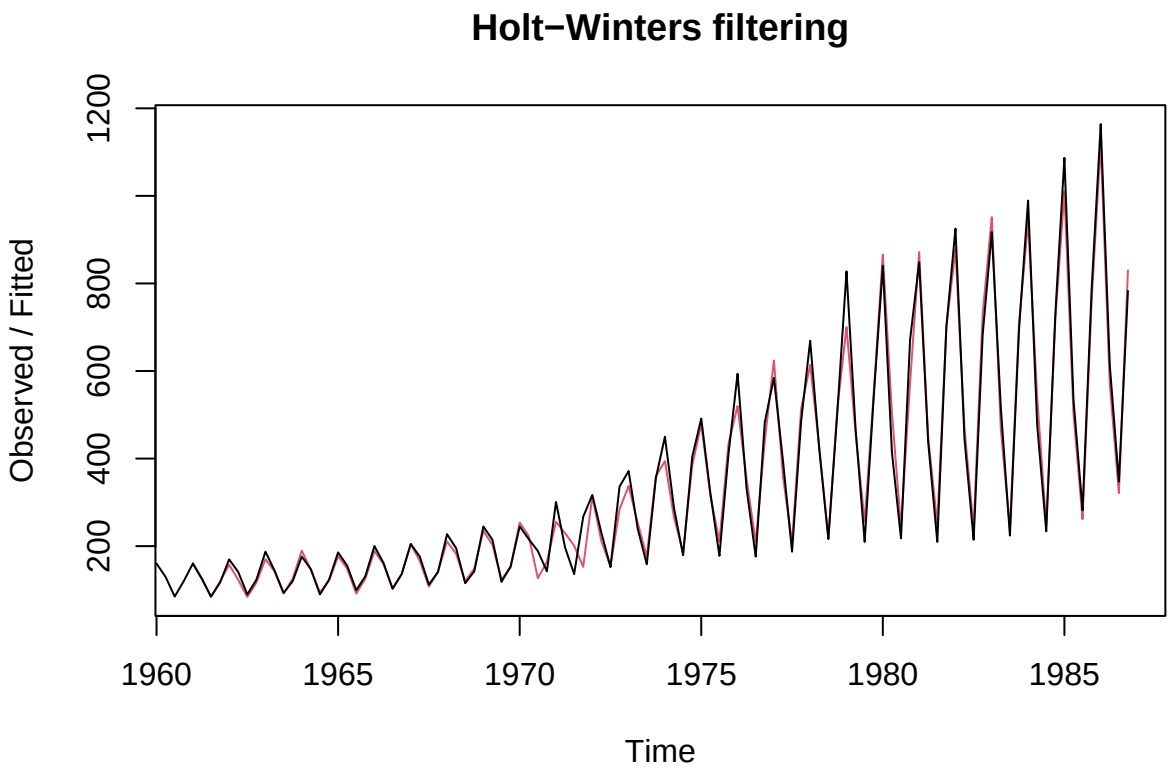


From this we can see that there is in fact a trend; the value of weight of the lags are going down as the lags increase. In addition, there are elements of seasonality; we can clearly see the highs and the lows. We can see that there is also statistical significance.

```
temp <- HoltWinters(UKgas)
attributes(temp)
```

```
## $names
## [1] "fitted"       "x"            "alpha"        "beta"         "gamma"
## [6] "coefficients" "seasonal"     "SSE"          "call"
##
## $class
## [1] "HoltWinters"
```

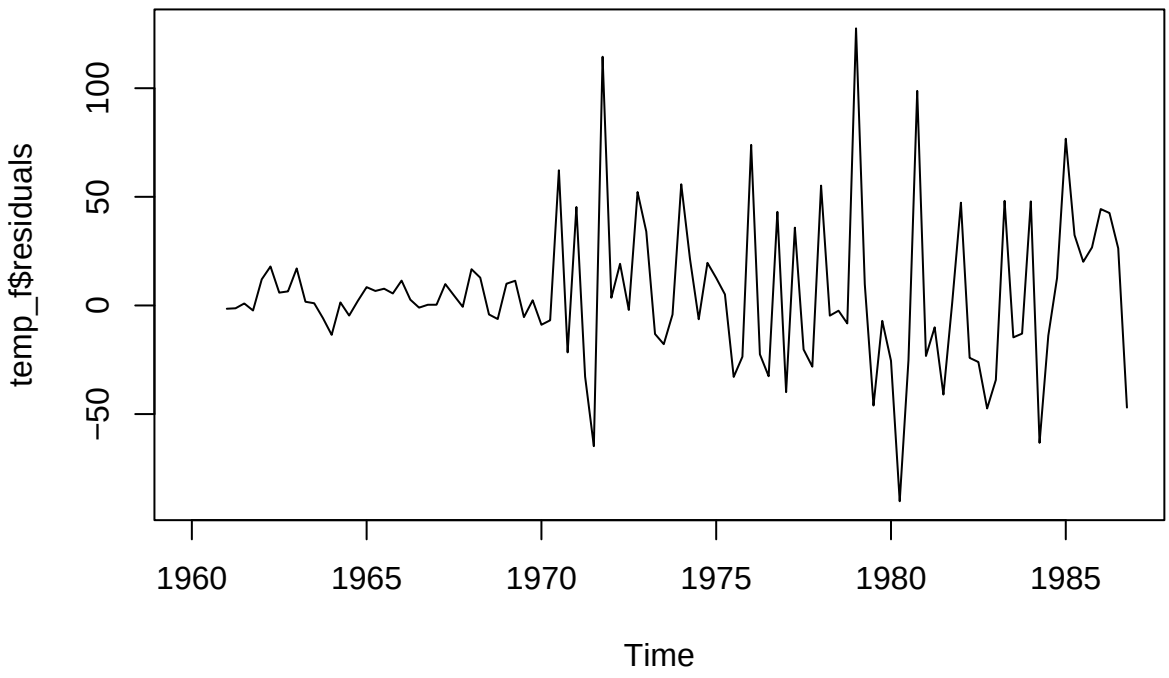
```
plot(temp)
```



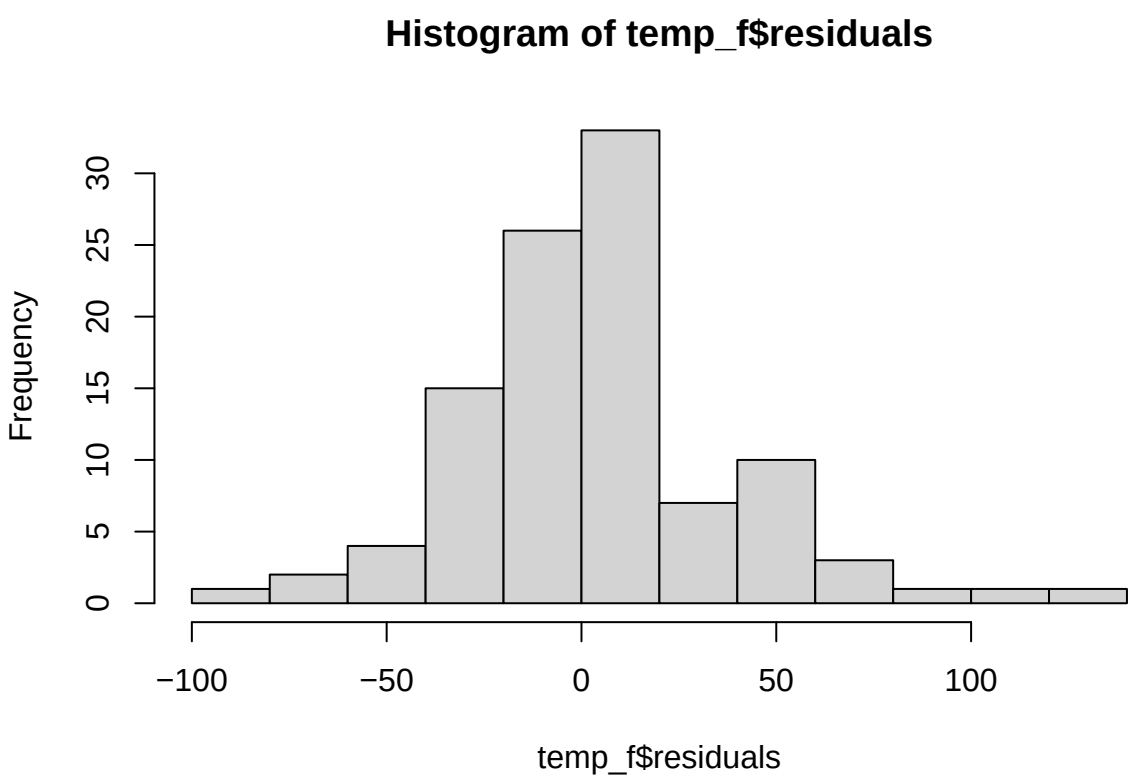

```
temp_f <- forecast(temp)
attributes(temp_f)
```

```
## $names
##  [1] "method"    "model"     "level"     "mean"      "lower"     "upper"
##  [7] "x"         "series"    "fitted"    "residuals"
##
## $class
## [1] "forecast"
```

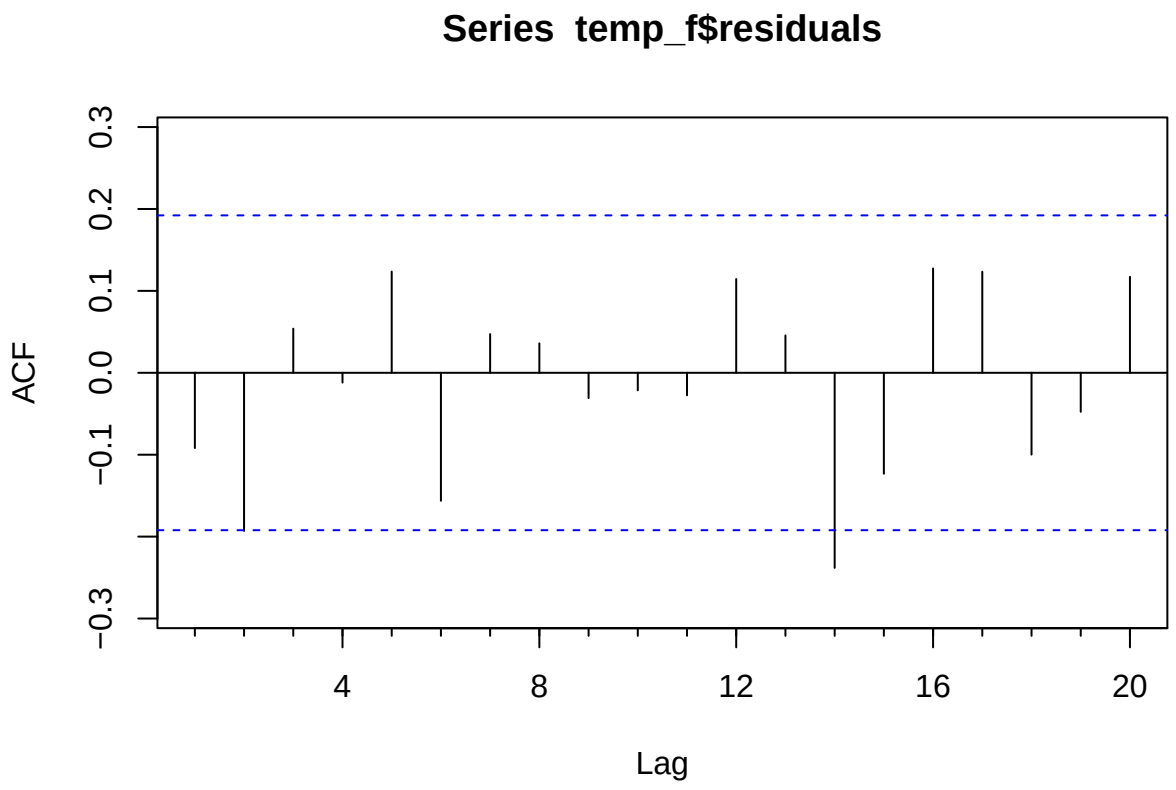
```
plot(temp_f$residuals)
```




```
hist(temp_f$residuals)
```




```
Acf(temp_f$residuals)
```




```
accuracy(temp_f)
```

```
##                     ME     RMSE      MAE       MPE     MAPE      MASE       ACF1
## Training set 4.818073 34.66147 23.89749 0.2897599 7.359041 0.8488468 -0.0918772
```

We can see that the acf of the residuals show there is no statistical significance.

We can also see that there is no trend or seasonality in the acf.