Loading data for accuracy purpose

```
library(forecast)

load("../Data/Data.RData")

X <- Cat[["BHL_1"]][,"BHL"]

X
```

```
##      Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
## 2006  12  24  32  16  22  16   9   8  19  17  22   9
## 2007  18   9  15  18  24  20  19  18  17  10  11  15
## 2008  37  11  22  20  25  28  16  22  12  17  22  13
## 2009  18  28  38   3  32  19  31  19  43  33  42  33
## 2010  29  29  47  41  36  46  40  22   3  66  37  39
## 2011   2  27  43  34  31  38  28  19  13  14  21  42
## 2012  24  22  40  27  25  30  14  15  20  27  27  30
## 2013  18  29  17  56  34  26  22  18  16  31  24  35
## 2014  34  26  28  37  32  23   8  13  26  25  34  30
```

ETS model results and accuracy

```
#ETS model results:
X_ets <- ets(X)
X_ets
```

```
## ETS(M,N,N)
##
## Call:
##  ets(y = X)
##
##   Smoothing parameters:
##     alpha = 0.1214
##
##   Initial states:
##     l = 17.8422
##
##   sigma:  0.4291
##
##      AIC     AICc      BIC
## 1008.583 1008.697 1013.947
```

```
# ETS accuracy
accuracy(X_ets)
```

```
##                     ME     RMSE      MAE       MPE     MAPE     MASE
## Training set 0.641067 10.56825 7.784707 -39.19311 62.77463 0.769837
##                     ACF1
## Training set 0.03275658
```

Mean Error(ME), Mean Absolute Error(MAE), Mean Squared Error(MSE) and Root Mean Squared Error (RMSE)

```
X_fitted <- X_ets$fitted
X_error <- X - X_fitted

# Mean Error(ME):
X_ME <- mean(X_error)
X_ME

## [1] 0.641067

# Mean Absolute Error(MAE):
X_MAE <- mean(abs(X_error))
X_MAE

## [1] 7.784707

# Mean Squared Error(MSE):
X_MSE <- mean(abs(X_error^2))
X_MSE

## [1] 111.6879

#Root Mean Squared Error (RMSE):
X_RMSE <- sqrt(X_MSE)
X_RMSE

## [1] 10.56825
```

Mean Percentage Error(MPE), Mean Absolute Percentage Error(MAPE) and Mean Absolute Scaled Error(MASE)

```
X_PE <- 100 * X_error / X

#Mean Percentage Error(MPE):
X_MPE <- mean(X_PE)
X_MPE

## [1] -39.19311

#Mean Absolute Percentage Error(MAPE):
X_MAPE <- mean(abs(X_PE))
X_MAPE

## [1] 62.77463

#Mean Absolute Scaled Error(MASE):
X_QE <- X_error / (sum(abs(diff(X)))/(length(X)-1))
X_MASE <- mean(abs(X_QE))
X_MASE

## [1] 0.769837
```

Autocorrelation of errors at lag 1 (ACF1)

```
#Autocorrelation of errors at lag 1 (ACF1):
ACF1 <- acf(X_error, plot = FALSE)$acf[2]
ACF1

## [1] 0.03275658
```