8_HoltWinters_additive_or_seasonal_component.R

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```
# Course: Time series analysis
# Exercise: 8th / Holt-Winters with seasonal component
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```

```
require(astsa)
```

```
## Loading required package: astsa
```

```
require(tseries)
```

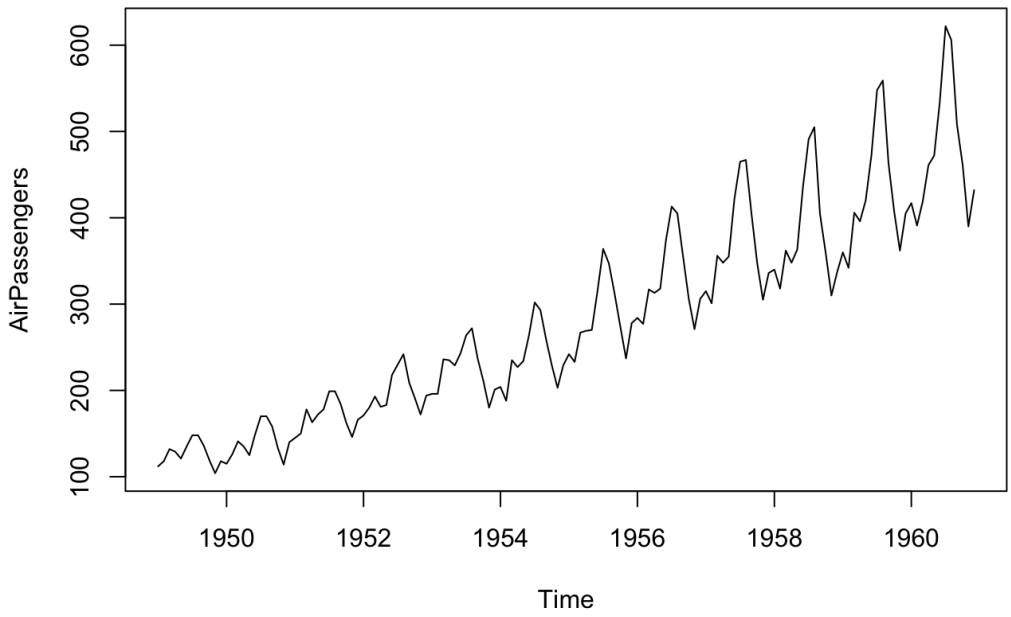
```
## Loading required package: tseries
```

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

```
require(Metrics)
```

```
## Loading required package: Metrics
```

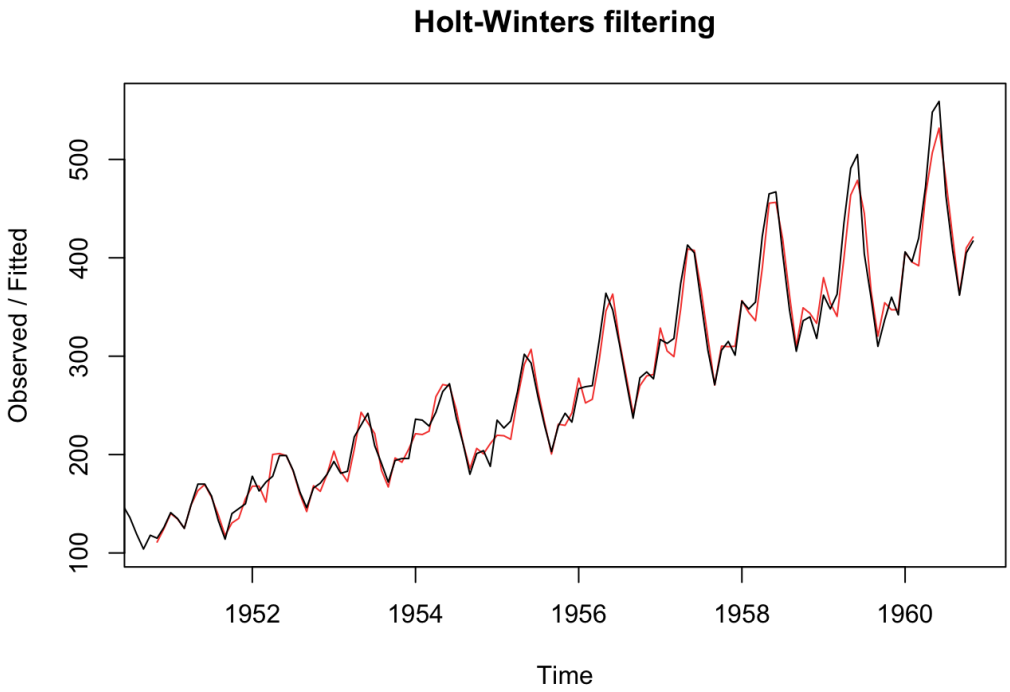
```
len_AirPassengers <- length(AirPassengers)
plot(AirPassengers)
```



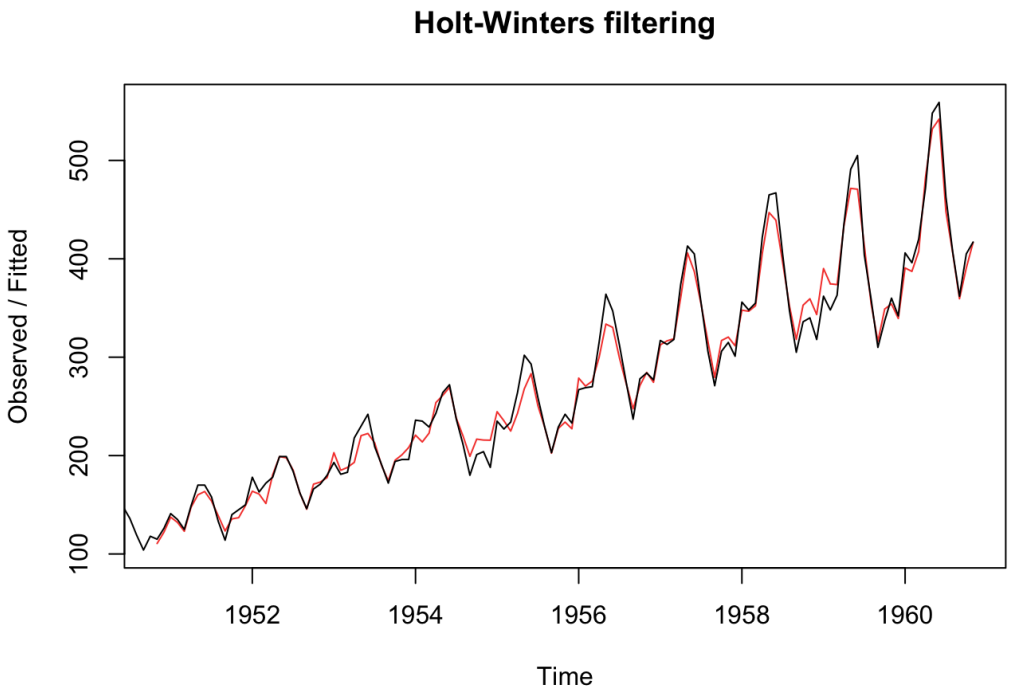
```
# (1/12)*(11-1) = 0.8333333333
AirPassengers_train <- ts(data = AirPassengers, start = 1949.8333333333,end = 1960.8333333333, frequency = 12
)
AirPassengers_test <- AirPassengers[len_AirPassengers-1:len_AirPassengers]

AirPassengers_exp_m = HoltWinters(AirPassengers_train, seasonal = "multiplicative")
AirPassengers_exp_a = HoltWinters(AirPassengers_train, seasonal = "additive")

plot(AirPassengers_exp_m)
```

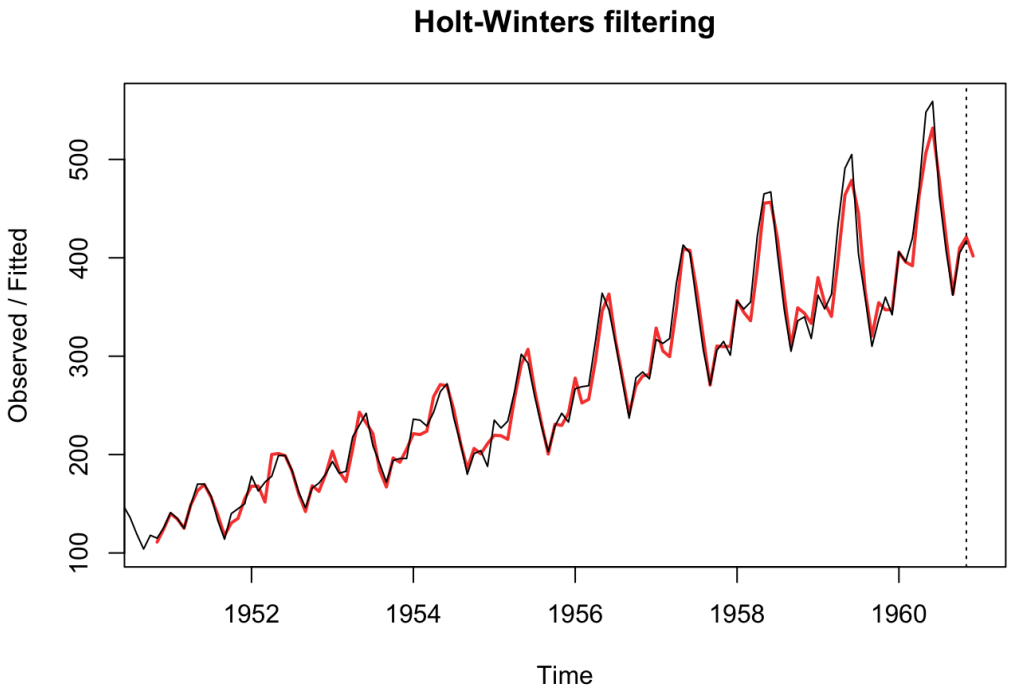



```
plot(AirPassengers_exp_a)
```

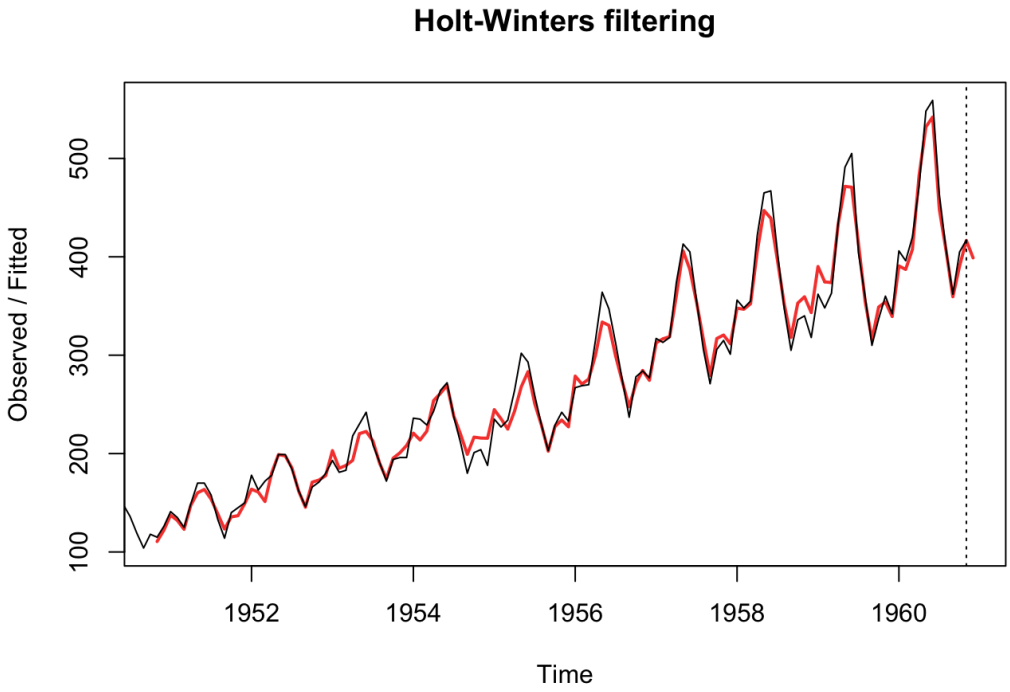



```
AirPassengers_pred_1 = predict(AirPassengers_exp_m, n.ahead = 1, prediction.interval = T)
AirPassengers_pred_2 = predict(AirPassengers_exp_a, n.ahead = 1, prediction.interval = T)

plot(AirPassengers_exp_m, AirPassengers_pred_1, lwd = 2)
```




```
plot(AirPassengers_exp_a, AirPassengers_pred_2, lwd = 2)
```




```
AirPassengers_pred_1
```

```
##              fit      upr      lwr
## Dec 1960 401.8088 427.4278 376.1898
```

```
fit1 <- AirPassengers_pred_1[1]
print(fit1)
```

```
## [1] 401.8088
```

```
AirPassengers_pred_2
```

```
##               fit      upr      lwr
## Dec 1960 398.9029 422.6925 375.1133
```

```
fit2 <- AirPassengers_pred_2[1]
print(fit2)
```

```
## [1] 398.9029
```

```
# errs.

mse_err1 = mse(AirPassengers_test,fit1)
print(mse_err1)
```

```
## [1] 29253.52
```

```
mse_err2 = mse(AirPassengers_test,fit2)
print(mse_err2)
```

```
## [1] 28549.61
```

```
mae_err1 = mae(AirPassengers_test,fit1)
print(mae_err1)
```

```
## [1] 146.9509
```

```
mae_err2 = mae(AirPassengers_test,fit2)
print(mae_err2)
```

```
## [1] 145.1424
```

```
mape_err1 = mape(AirPassengers_test,fit1)
print(mape_err1)
```

```
## [1] 0.7871916
```

```
mape_err2 = mape(AirPassengers_test,fit2)
print(mape_err2)
```

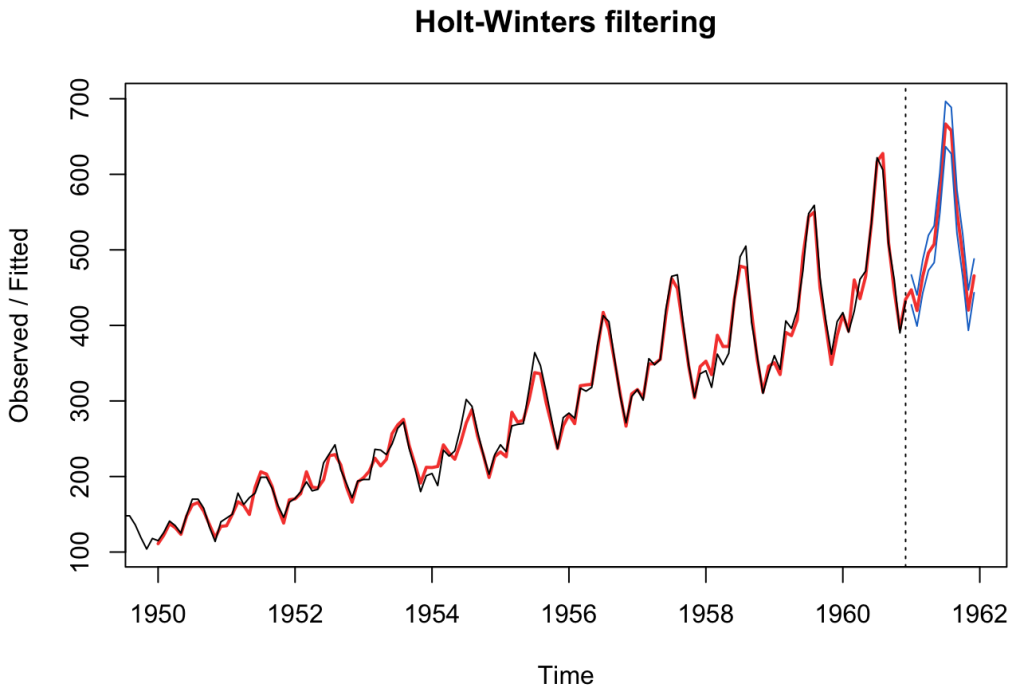
```
## [1] 0.7769976
```

```
# 2.)

AirPassengers_exp_m = HoltWinters(AirPassengers, seasonal = "multiplicative")
AirPassengers_exp_a = HoltWinters(AirPassengers, seasonal = "additive")

AirPassengers_predict_1 = predict(AirPassengers_exp_m, n.ahead = 12, prediction.interval = T)
AirPassengers_predict_2 = predict(AirPassengers_exp_a, n.ahead = 12, prediction.interval = T)

plot(AirPassengers_exp_m, AirPassengers_predict_1, lwd = 2)
```




```
plot(AirPassengers_exp_a, AirPassengers_predict_2, lwd = 2)
```