7_comparison_SES_and_HoltWinter.R

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2021-10-26

```r
# Course: Time series analysis
# Exercise: 7th / Comparison of SES & Holt's linear trend method
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```

```r
require(astsa)
```

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

```r
require(tseries)
```

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

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

```r
require(Metrics)
```

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

```r
# 1.)
gtemp_train <- window(gtemp, start = 1880, end = 2008)
gtemp_test <- window(gtemp, start = 2009, end = 2009)

# SES
gtemp_ses = HoltWinters(gtemp_train, beta = F, gamma = F)
gtemp_ses$alpha
```

```
## [1] 0.4044185
```

```r
# HES
gtemp_hes = HoltWinters(gtemp_train, gamma = F)
gtemp_hes$alpha
```
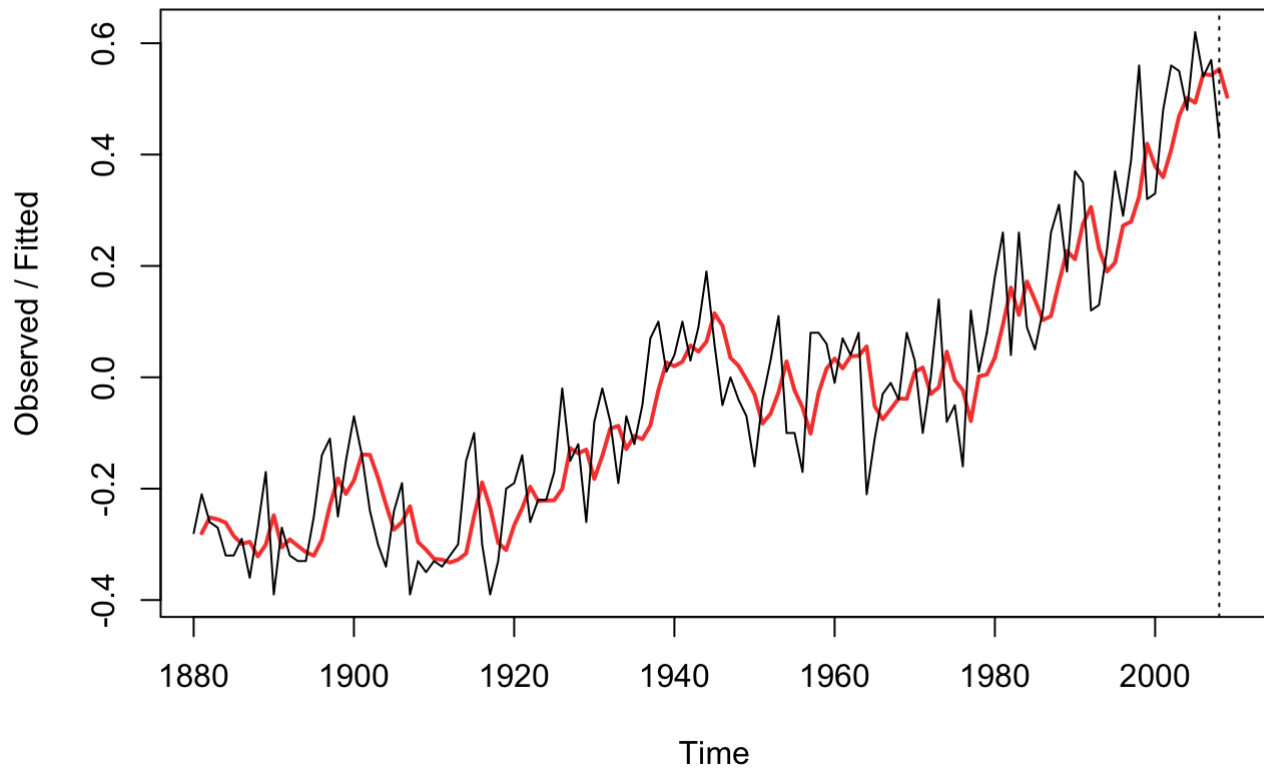
```
##     alpha
## 0.5050981
```

```r
gtemp_hes$beta
```
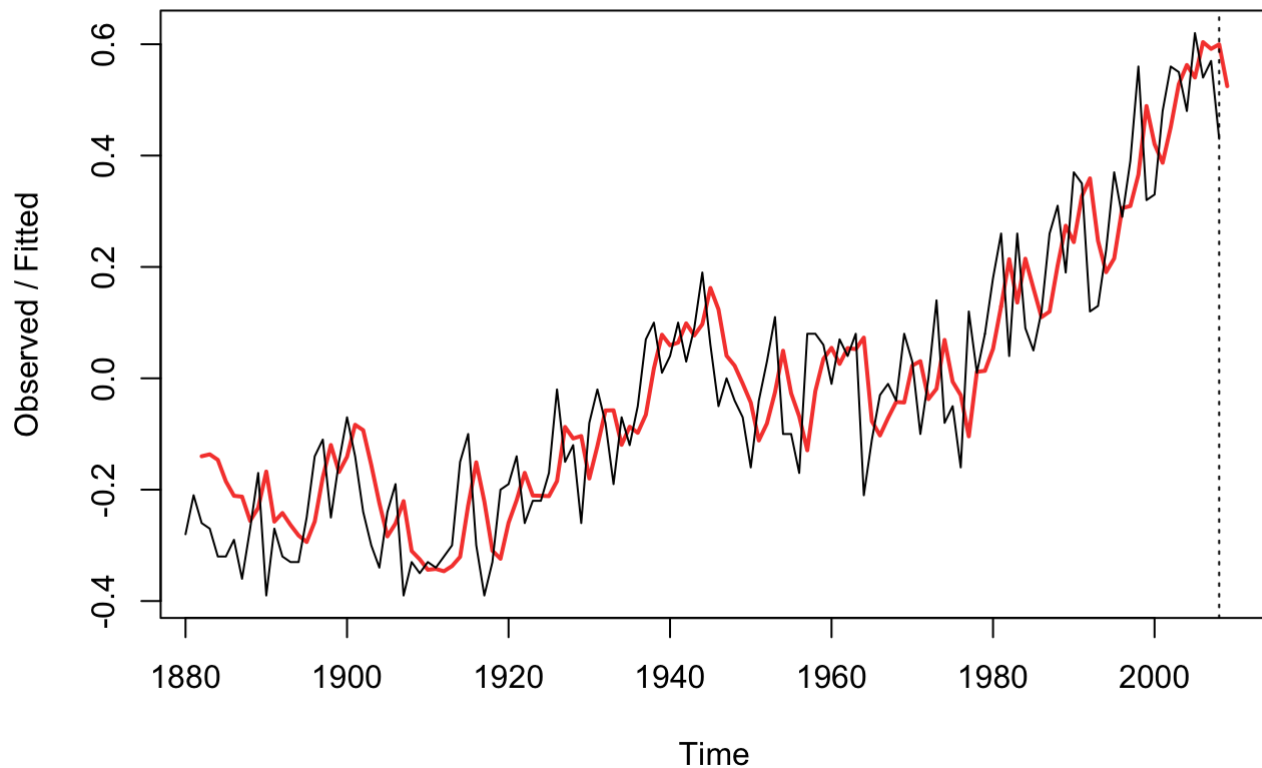
```
##         beta
## 0.09772354
```

```
gtemp_ses_pred = predict(object = gtemp_ses, n.ahead = 1, prediction.interval = F)
gtemp_hes_pred = predict(object = gtemp_hes, n.ahead = 1, prediction.interval = F)

plot(gtemp_ses, gtemp_ses_pred, lwd = 2)
```

Holt-Winters filtering


```
plot(gtemp_hes, gtemp_hes_pred, lwd = 2)
```

Holt-Winters filtering


```
mse_SES = mse(gtemp_test, gtemp_ses_pred)
mse_HES = mse(gtemp_test, gtemp_hes_pred)

mae_SES = mae(gtemp_test, gtemp_ses_pred)
mae_HES = mae(gtemp_test, gtemp_hes_pred)

mape_SES = mape(gtemp_test, gtemp_ses_pred)
mape_HES = mape(gtemp_test, gtemp_hes_pred)

gtemp_ses_pred2 = predict(object = gtemp_ses, n.ahead = 5, prediction.interval = F)
gtemp_hes_pred2 = predict(object = gtemp_hes, n.ahead = 5, prediction.interval = F)

plot(gtemp_ses, gtemp_ses_pred2, lwd = 2)
```
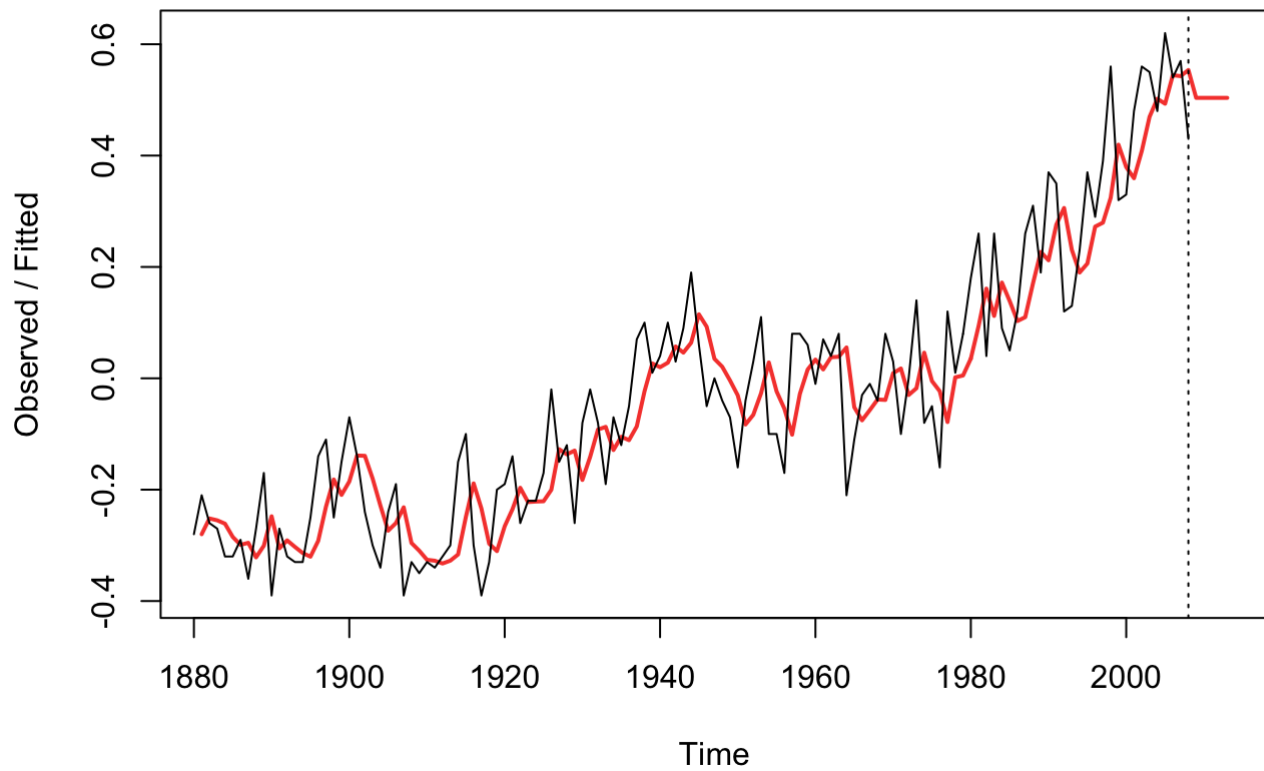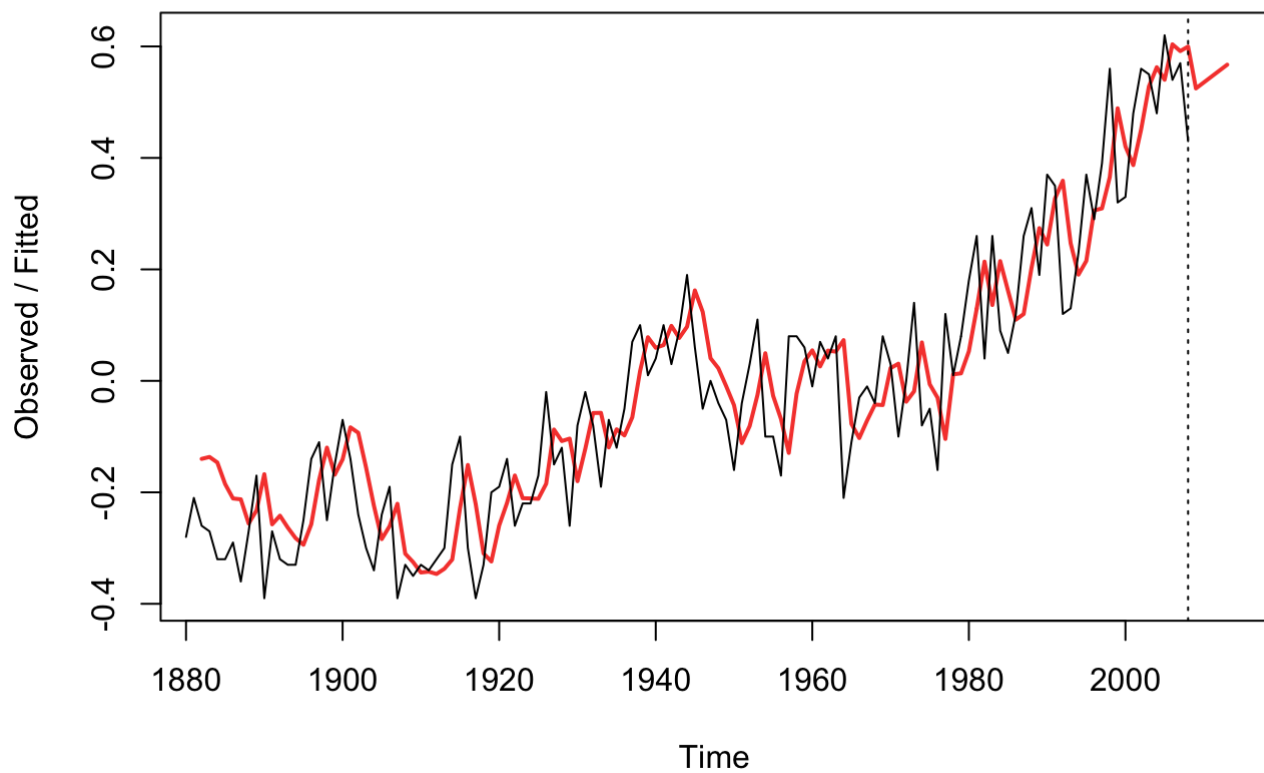
Holt-Winters filtering


```
plot(gtemp_hes, gtemp_hes_pred2, lwd = 2)
```

Holt-Winters filtering

```
# 2.)
uspop_train <- window(uspop, start = 1790, end = 1969)
uspop_test <- window(uspop, start = 1970, end = 1970)

uspop_ses = HoltWinters(uspop_train, beta = F, gamma = F)
uspop_ses$alpha
```

```
## [1] 0.9999226
```

```
uspop_hes = HoltWinters(uspop_train, gamma = F)
uspop_hes$alpha
```
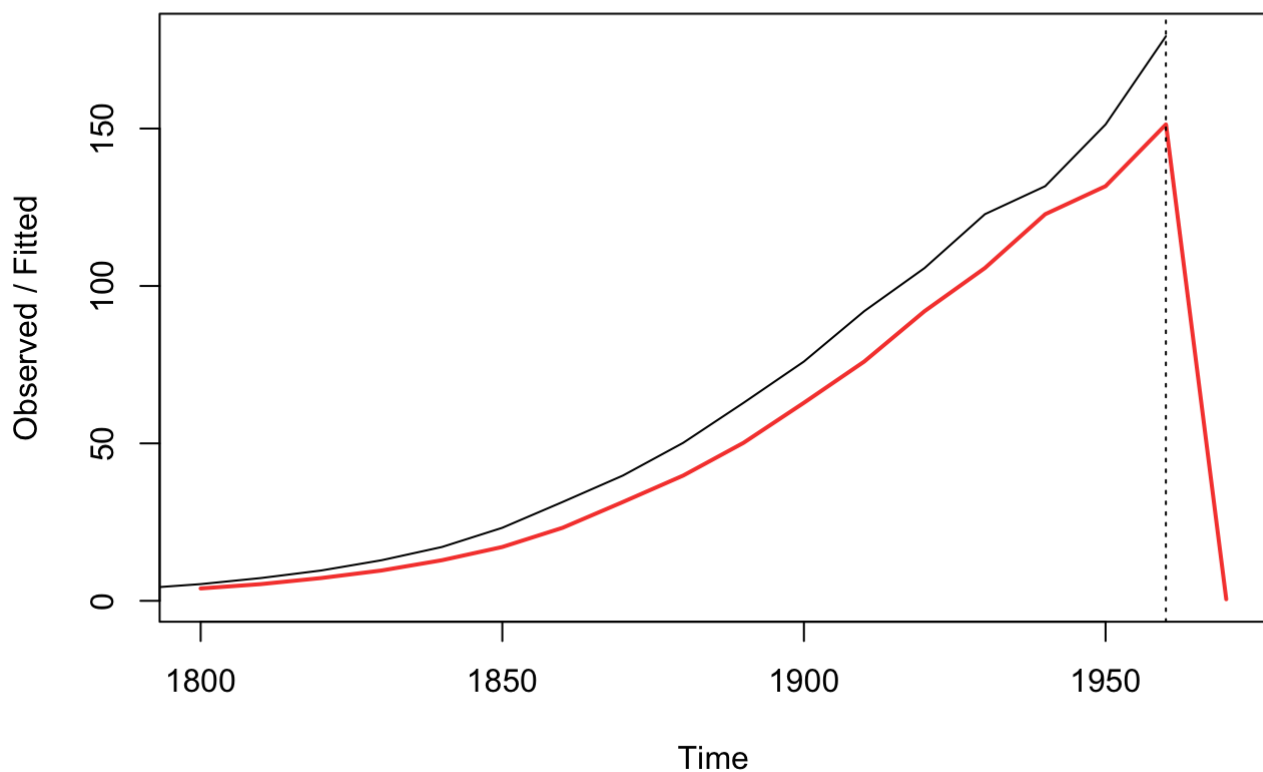
```
##      alpha
## 0.9862772
```

```
uspop_hes$beta
```

```
##      beta
## 0.9126194
```

```
uspop_ses_pred = predict(object = uspop_ses, n.ahead = 1, prediction.interval = F)
uspop_hes_pred = predict(object = uspop_hes, n.ahead = 1, prediction.interval = F)

plot(uspop_ses, gtemp_ses_pred, lwd = 2)
```
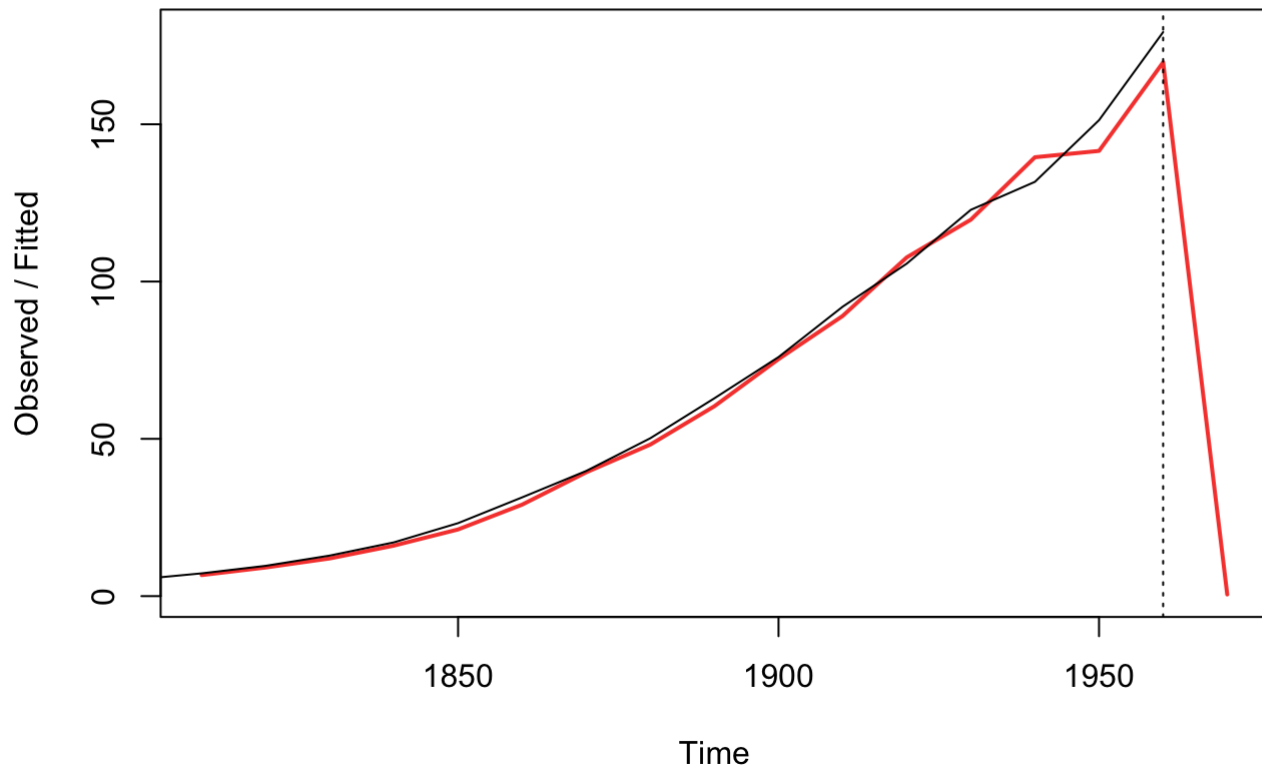
Holt-Winters filtering

```
plot(uspop_hes, gtemp_hes_pred, lwd = 2)
```

Holt-Winters filtering


```
mse_SES = mse(uspop_test, uspop_ses_pred)
mse_HES = mse(uspop_test, uspop_hes_pred)

mae_SES = mae(uspop_test, uspop_ses_pred)
mae_HES = mae(uspop_test, uspop_hes_pred)

mape_SES = mape(uspop_test, uspop_ses_pred)
mape_HES = mape(uspop_test, uspop_hes_pred)

uspop_ses_pred2 = predict(object = uspop_ses, n.ahead = 5, prediction.interval = F)
uspop_hes_pred2 = predict(object = uspop_hes, n.ahead = 5, prediction.interval = F)

plot(uspop_ses, uspop_ses_pred2, lwd = 2)
```
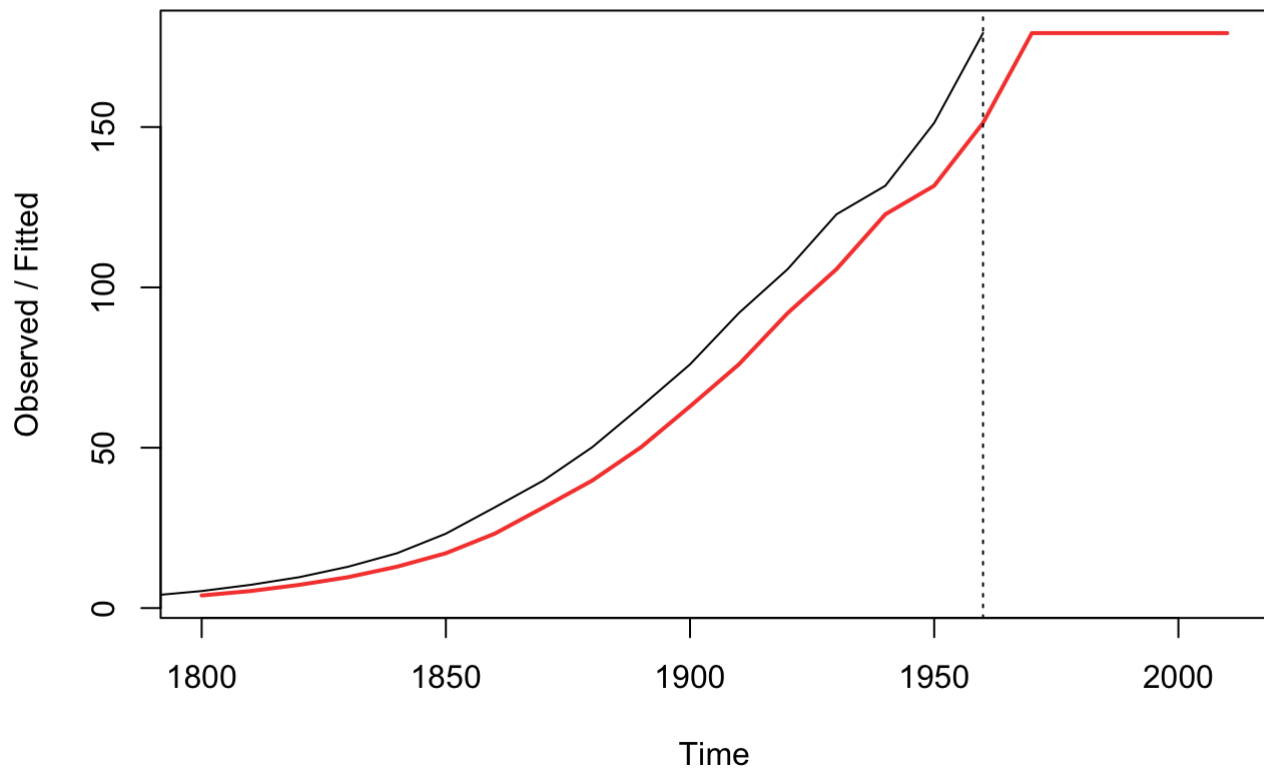
Holt-Winters filtering


```
plot(uspop_hes, uspop_hes_pred2, lwd = 2)
```

Holt-Winters filtering