meeting report 5.27

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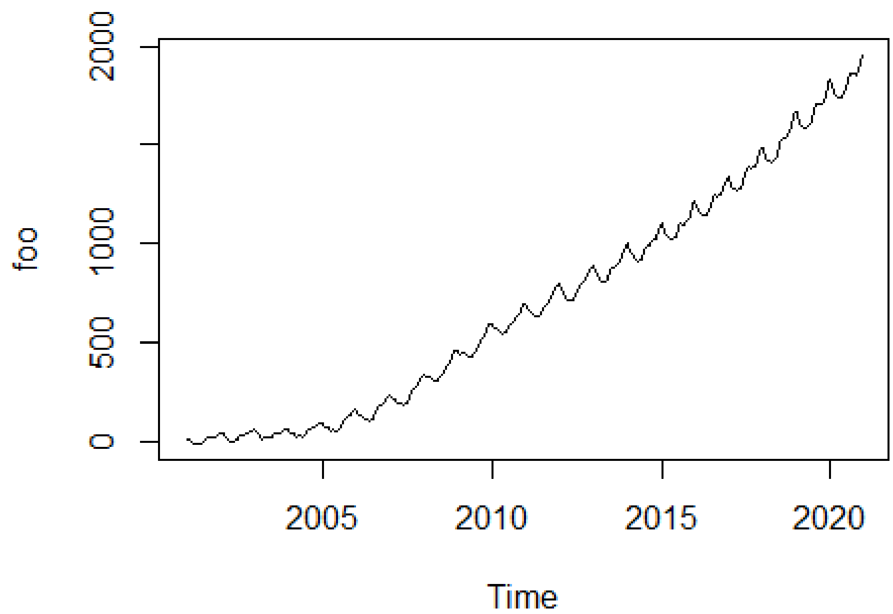
Dear Aaron,

I am writing to give you a brief about the stuff that I have done in last three days.

I Simulation

I tried to simulate data from a fixed seasonal arima model, the code is mainly referred to this website. Of course I tried some other methods as well, but this one seems to be more reliable. But the questions is, I think the data simulated is kinda of not right.

```
library(forecast)

## Registered S3 methods overwritten by 'ggplot2':
##   method         from 
##   [.quosures     rlang
##   c.quosures     rlang
##   print.quosures rlang

## Registered S3 method overwritten by 'xts':
##   method     from
##   as.zoo.xts zoo

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

## Registered S3 methods overwritten by 'forecast':
##   method             from    
##   fitted.fracdiff    fracdiff
##   residuals.fracdiff fracdiff

set.seed(1)
model <- Arima(ts(rnorm(24000),freq=12), order=c(0,1,1), seasonal=c(0,1,
1),fixed=c(theta=0.5, Theta=0.5))
foo <- simulate(model,nsim = 240)
plot(foo,type="l")
```




```
fit <- Arima(foo, order=c(0,1,1), seasonal=c(0,1,1))
summary(fit)

## Series: foo
## ARIMA(0,1,1)(0,1,1)[12]
##
## Coefficients:
##          ma1    sma1
##       0.4743  0.5398
## s.e.  0.0592  0.0519
##
## sigma^2 estimated as 15.79:  log likelihood=-636.48
## AIC=1278.96   AICc=1279.07   BIC=1289.23
##
## Training set error measures:
##                     ME     RMSE      MAE      MPE     MAPE       MAS
E
## Training set 0.2033584 3.847513 3.002382 0.661369 4.463736 0.0314150
2
##                     ACF1
## Training set -0.02291549
```

II Reproduction

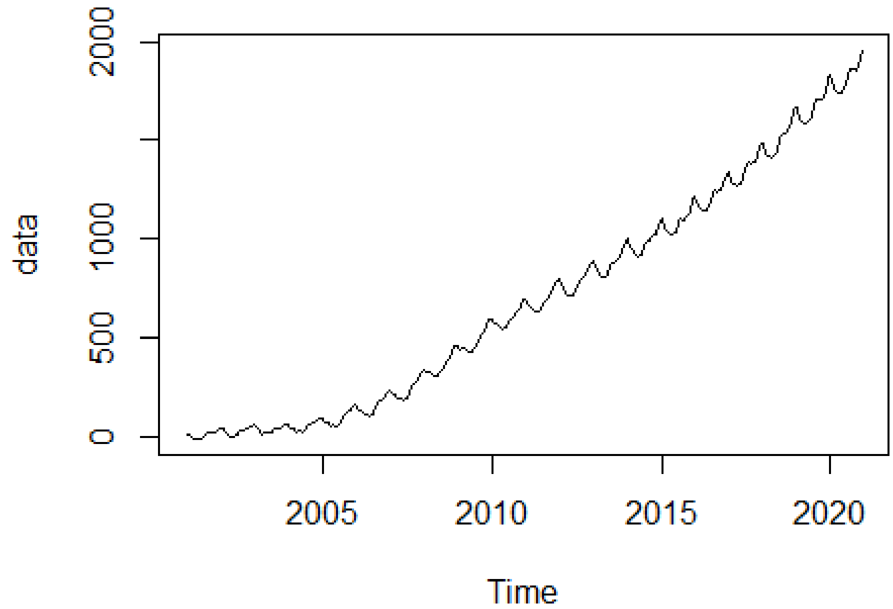
The main reference is the document about *X-13ARIMA-SEATS(X-13)*. Something to clearify: By default, a call to **seas** also invokes the following automatic procedures of X-13:

- Transformation selection (log / no log);
- Detection of trading day and Easter effects;
- Outlier detection;
- ARIMA model search.

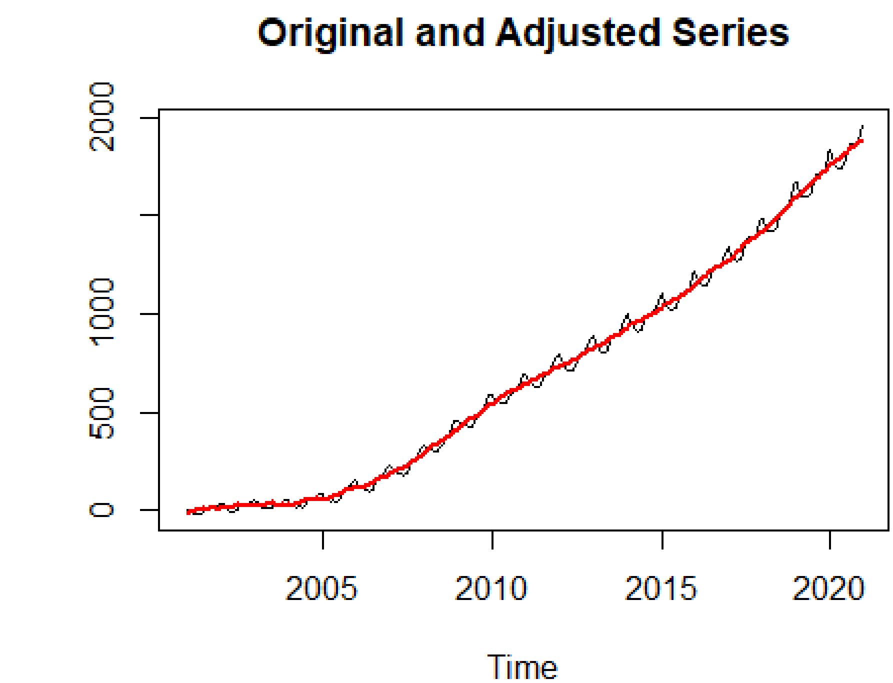
By default, seas calls the *SEATS* adjustment procedure(which decomposes the ARIMA model).To perform the alternative *X-11* adjustment procedure, we need to add **x11 = " "**.

But when I tried to use these code on the simulated data, the curves I got from them are too smooth and looks same. I am thinking: maybe the data I simulated before is not appropriate. In addition, something wrong with the SEATS, cause the model from it(*SARIMA(0,1,1)(0,1,0)[12]*) is different from that of x-11, which is close to our true model *SARIMA(0,1,1)(0,1,1)[12]*

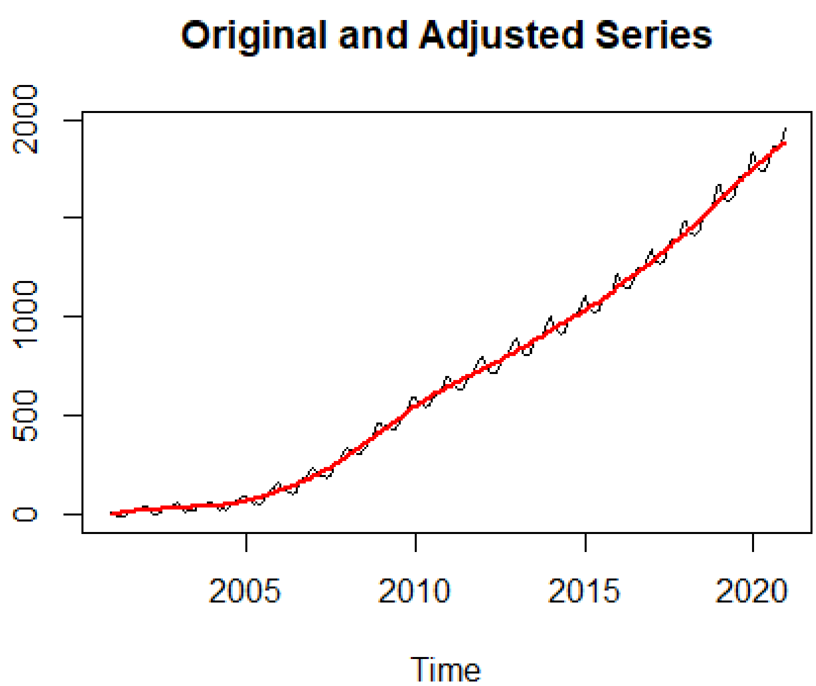
```
library(seasonal)
library(forecast)
set.seed(1)
model <- Arima(ts(rnorm(24000),freq=12), order=c(0,1,1), seasonal=c(0,1,
1),fixed=c(theta=0.5, Theta=0.5))
data <- simulate(model,nsim=240)
plot(data)
```



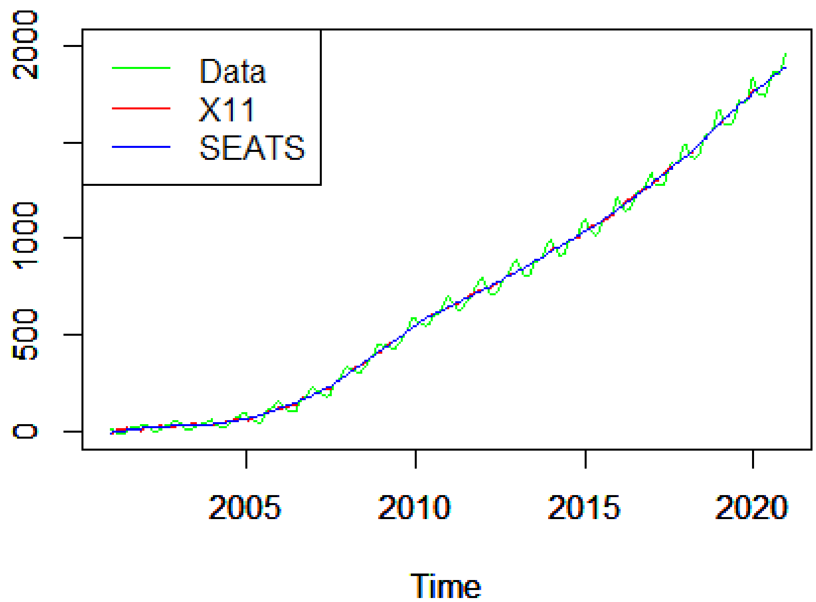

```r
m_x11 <- seas(data, x11 = "", regression.aictest =  NULL)
plot(m_x11)
```



```
m_seats <- seas(data, regression.aictest = NULL)

## Model used in SEATS is different: (0 1 1)(0 1 0)

plot(m_seats)
```

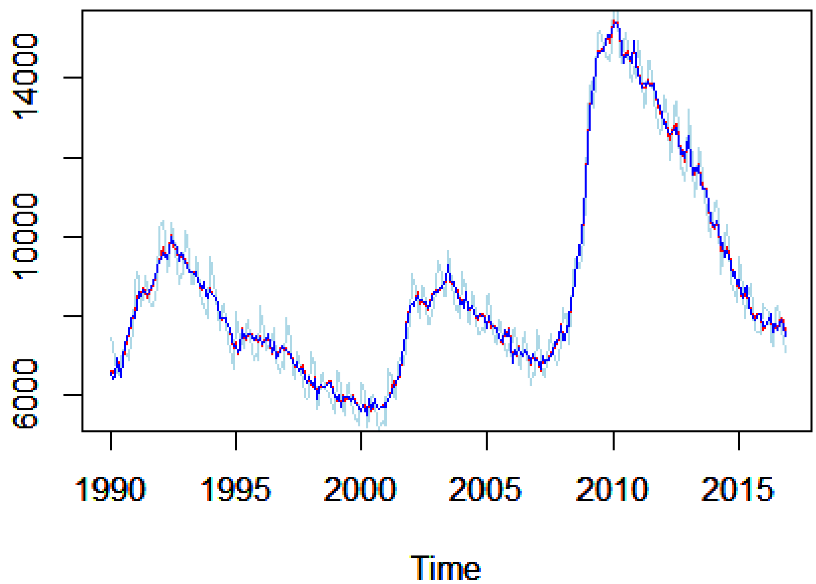



```
plot(data,col="green",ylim=c(-10,2000),ylab="")
par(new=T)
plot(final(m_x11),col="red",ylim=c(-10,2000),ylab="")
par(new=T)
plot(final(m_seats),col="blue",ylim=c(-10,2000),ylab="")
legend("topleft",c("Data","X11","SEATS"),col=c("green","red","blue"),lt
y=c(1,1,1))
```



I tried the same code on the data set **unemp**, whose results seem to be good, at least not very smooth and not totally same:

```
library(seasonal)
library(seasonalview)

##
## Attaching package: 'seasonalview'

## The following object is masked from 'package:seasonal':
##
##     view

eg_seats <- seas(unemp)
eg_x11 <- seas(unemp, x11 = "")
plot(unemp,col="lightblue",ylim=c(5500,15300),ylab="")
par(new=T)
plot(final(eg_seats),col="red",ylim=c(5500,15300),ylab="")
par(new=T)
plot(final(eg_x11),col="blue",ylim=c(5500,15300),ylab="")
```



And I am still working on the state space model.

Update 5.30 以下是 Aaron 的回复，包含了几条不错的建议：

- The discuss about 'spickness' is not enough, to verify *SEAS* can decompose our seasonal/trend component, we can try: i) remove the S/T from our data, which can be achieved only when data is simulated, cause we know the specific model for each component; ii) detrend/deseason our data by *seas*, and compare two series to see whether *seas* works well(yes if both seem similar)
- the seasonal component we used before is kinda of easy or regular, maybe we can try some more complicated case? like kinds of holidays.
- In reality, the noise is always not gaussian, so maybe we can create some our own noise. To be specific, use the residuals of one data set, like **unemp**. The residual is just the true value minus the prediction of some reasonable model. And we can build a 'noise' library, this may be helpful in future.