

Hw3

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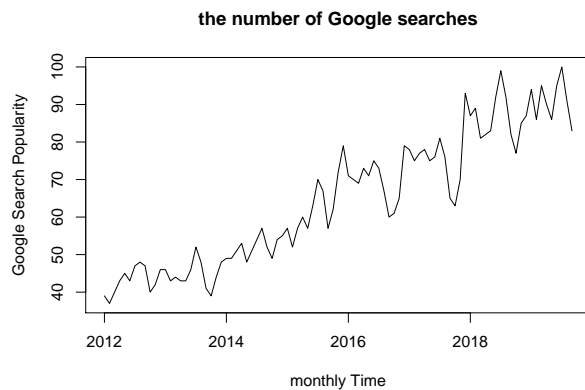
10/5/2021

Computer Exercises

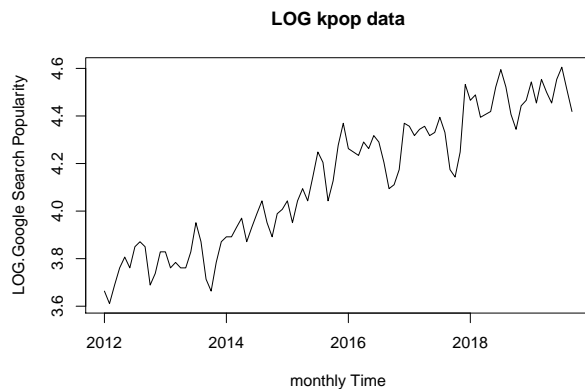
1a variance stabilizing transform

Assume the Variance is in quadratic form of mean, $Var(Xt) = C\mu_t^2$, choose $F() = \log()$.

```
dataset = read.csv("/Users/li/Desktop/STAT153/HW3/kpop.csv")
t = dataset$timestamp
kpop = dataset$kpop
plot(t,kpop,type = "l", ylab = "Google Search Popularity", xlab = "monthly Time", main = "the number of
```

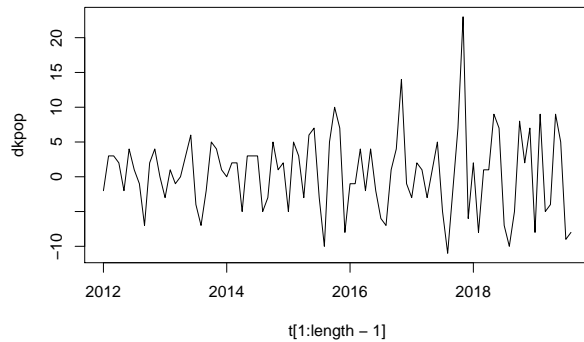


```
kpop.log = log(kpop) # assume Var(Xt)=C*ut^2, choose F()=log().
plot(t,kpop.log,type = "l", ylab = "LOG.Google Search Popularity", xlab = "monthly Time", main = "LOG k
```

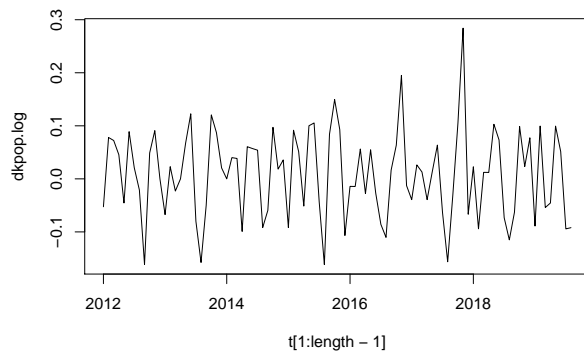


1b difference

```
length = length(kpop)
dkpop = kpop[2:length]-kpop[1:length-1]
dkpop.log = kpop.log[2:length]-kpop.log[1:length-1]
plot(t[1:length-1],dkpop,type = "l" )
```



```
plot(t[1:length-1],dkpop.log,type = "l")
```



The difference of $\log(\text{kpoppopulation})$ is more plausibly stationary.

1c Forecast

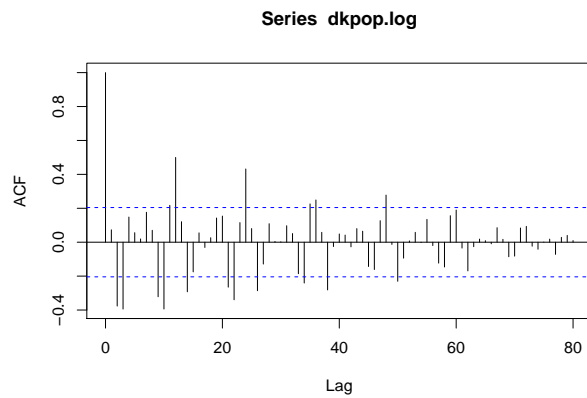
```
#choose log(kpop) as basic data.
log.predict = kpop.log[length-1] + mean(dkpop.log)
predict = exp(log.predict+var(dkpop.log)/2) #E(exp(x))=exp(EX)*exp(Var(X)/2)
print("The predict value Yt+1 is")
```

```
## [1] "The predict value Yt+1 is"
```

```
print(predict)
```

```
## [1] 92.06665
```

```
acf(dkpop.log, lag.max = 80)
```



1c Forecast

ACF shows it probably has periodic terms. So the result in 1c may be biased due to the lack of periodic term.

It doesn't look like white noise because

Theoretical exercises

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