ica19_syz

Shuangyu Zhao

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1.

```
passenger <- read.csv("/Users/apple/Desktop/STT811_appl_stat_model/data/passenger.csv")
head(passenger, 13)
```

```
##        time AirPassengers
## 1  1949.000          112
## 2  1949.083          118
## 3  1949.167          132
## 4  1949.250          129
## 5  1949.333          121
## 6  1949.417          135
## 7  1949.500          148
## 8  1949.583          148
## 9  1949.667          136
## 10 1949.750          119
## 11 1949.833          104
## 12 1949.917          118
## 13 1950.000          115
```
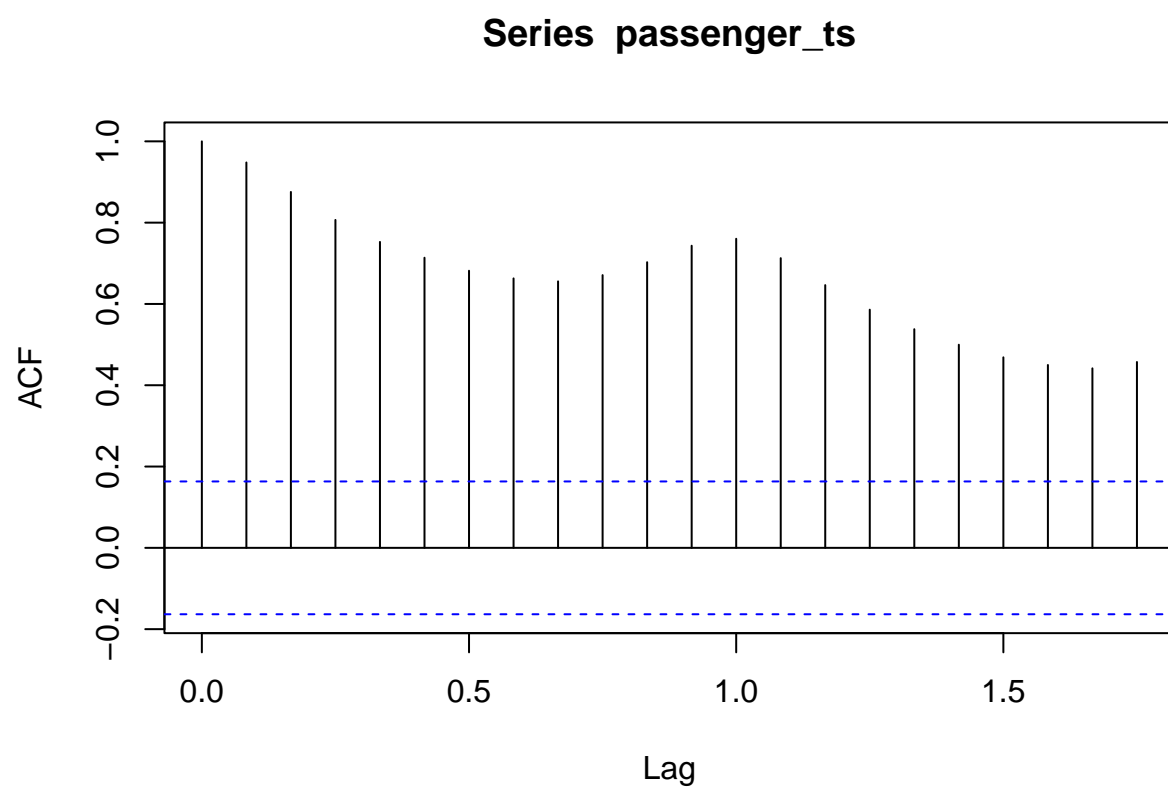
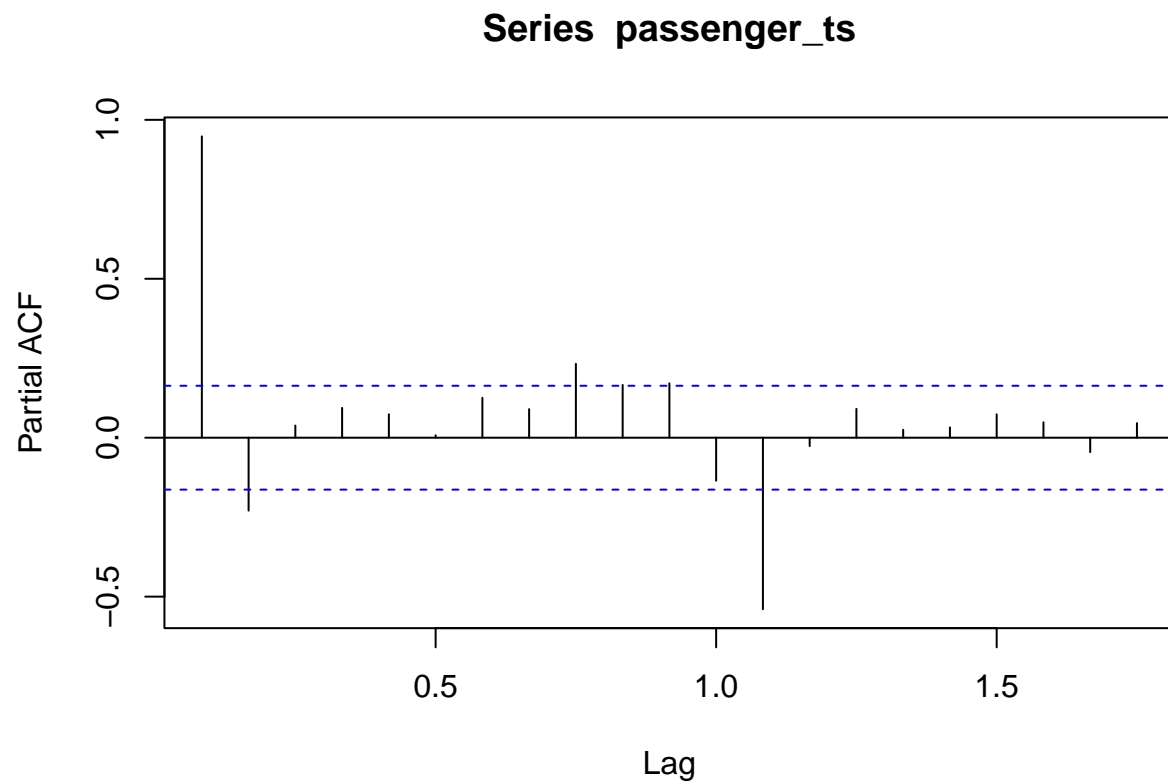b. Convert it into a time series

```
passenger_ts <- ts(passenger$AirPassengers, frequency = 12, start = c(1949, 1), end = c(1960,12))
```

c. Create the autocorrelation and partial autocorrelation panels. Comment on how the seasonality is observed
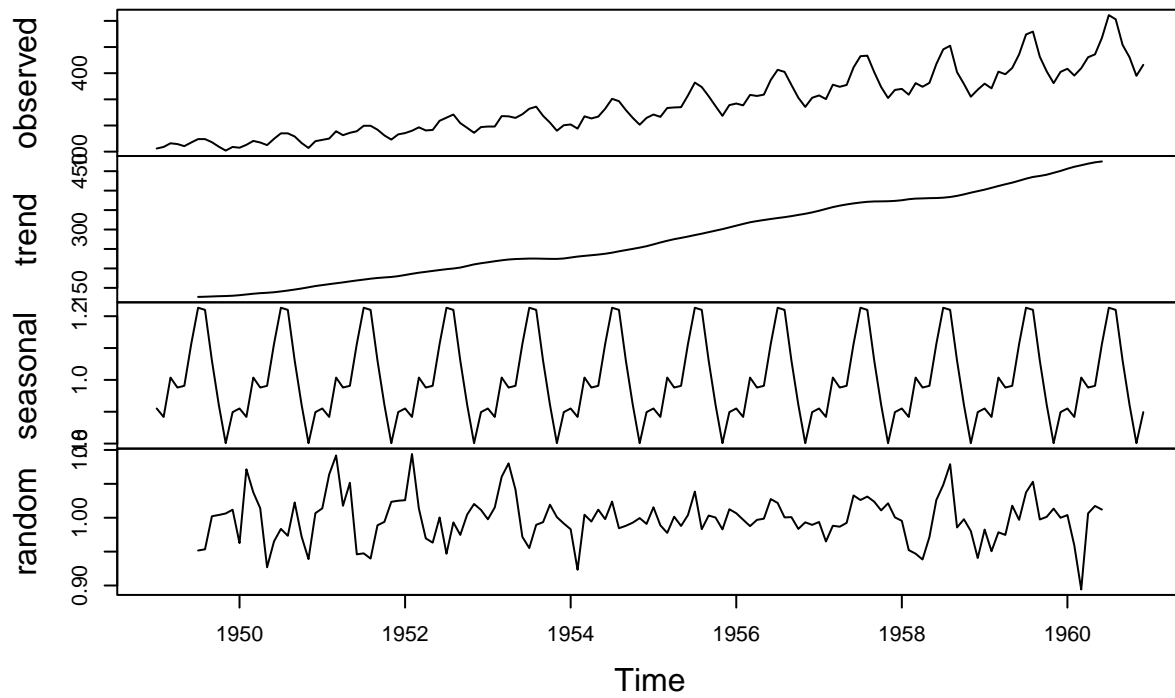
```
acf(passenger_ts)
```

Series passenger_ts


```
pacf(passenger_ts)
```

Series passenger_ts

d. Perform a decomposition of the time series, trying both additive and multiplicative. Which one "looks" better?
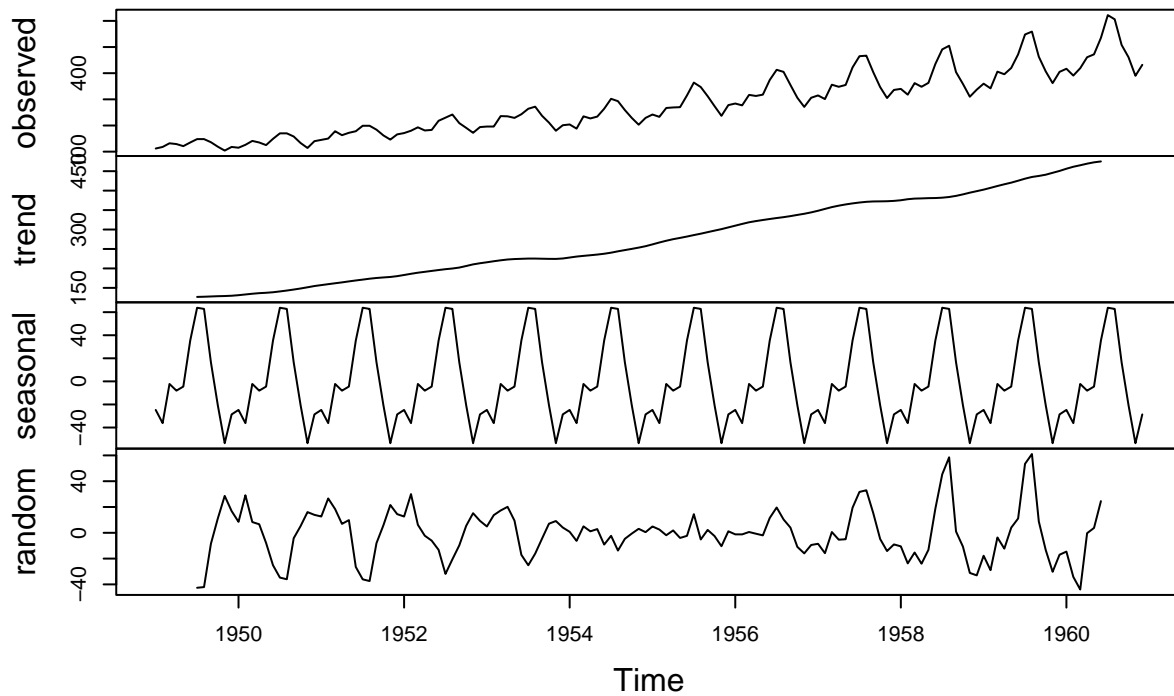
```r
pass_multi <- decompose(passenger_ts, type = "multiplicative")
plot(pass_multi)
```

Decomposition of multiplicative time series


```
pass_add <- decompose(passenger_ts, type = "additive")
plot(pass_add)
```

Decomposition of additive time series

additive looks better

2.

```r
oil_gas <- read.csv("/Users/apple/Desktop/STT811_appl_stat_model/data/oil-gas.csv")
head(oil_gas)
```

```
##           Date    Oil   Gas
## 1 Jan 04, 2013 92.74 3.233
## 2 Jan 11, 2013 93.36 3.236
## 3 Jan 18, 2013 94.54 3.254
## 4 Jan 25, 2013 95.83 3.296
## 5 Feb 01, 2013 97.44 3.471
## 6 Feb 08, 2013 96.20 3.537
```

```r
tail(oil_gas)
```

```
##              Date    Oil   Gas
## 479 Mar 04, 2022 106.62 3.963
## 480 Mar 11, 2022 113.43 4.180
## 481 Mar 18, 2022 100.43 4.091
## 482 Mar 25, 2022 113.01 4.078
## 483 Apr 01, 2022 103.51 4.021
## 484 Apr 08, 2022  99.15 3.943
```

b. Convert the oil and gas data into 2 separate time series (what is the seasonality frequency?)

```
oil_ts <- ts(oil_gas$Oil, frequency = 52, start = c(2013, 1), end = c(2022,4))
gas_ts <- ts(oil_gas$Gas, frequency = 52, start = c(2013, 1), end = c(2022,4))
```
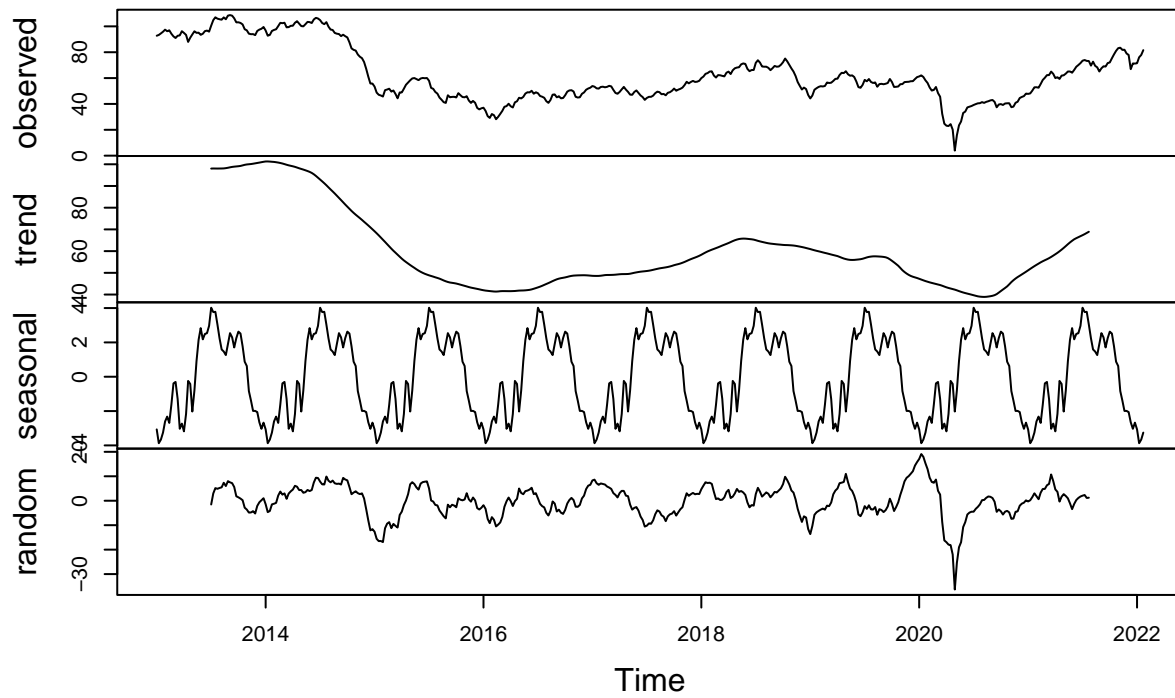
c. Perform a decomposition on the oil data. How strong is the seasonality?

```
oil_multi <- decompose(oil_ts, type = "multiplicative")
plot(oil_multi)
```
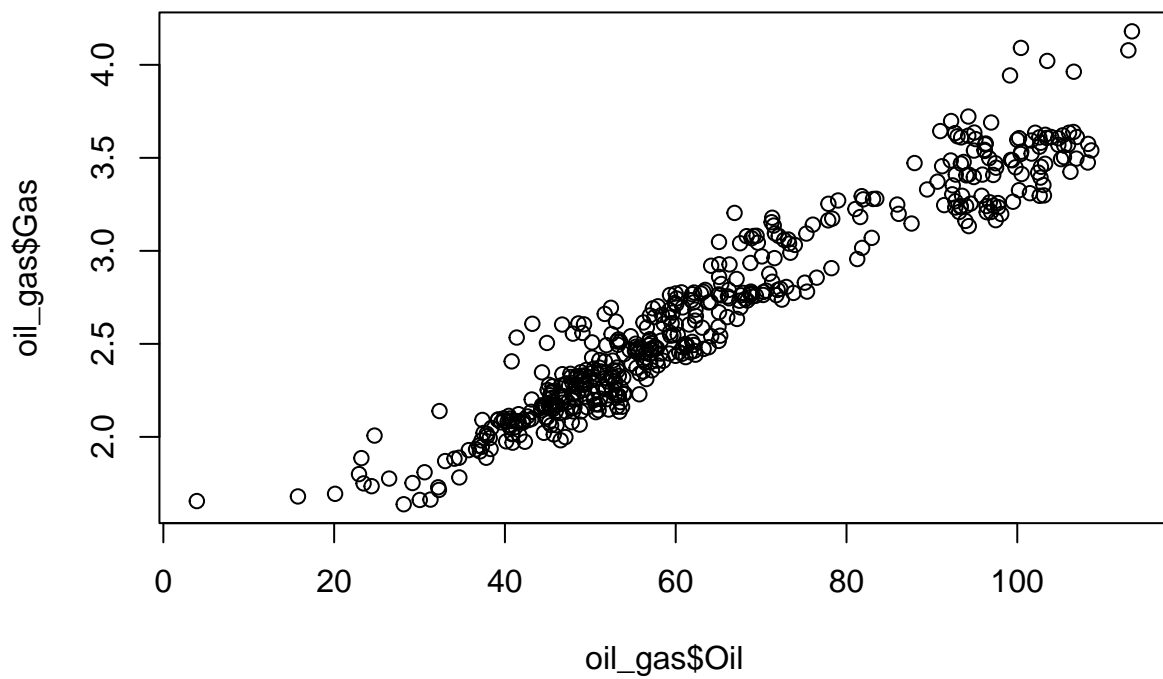

Decomposition of multiplicative time series
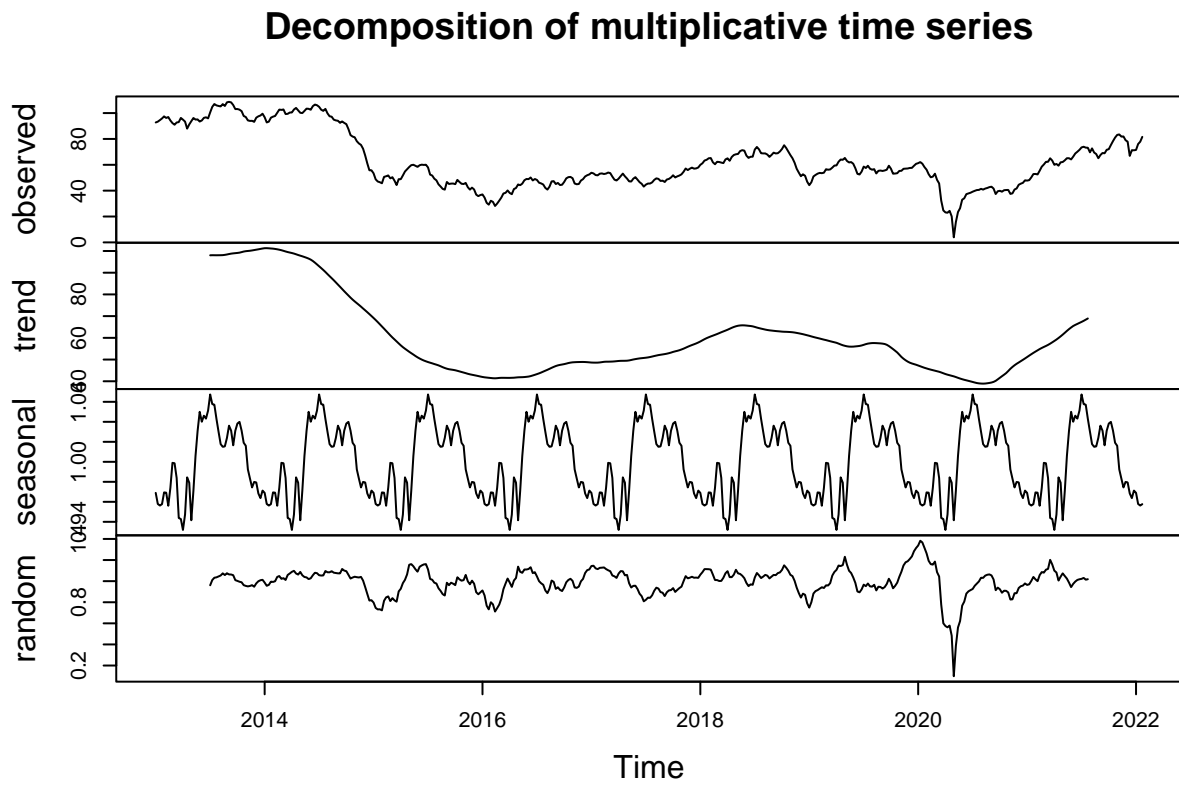
```
oil_add <- decompose(oil_ts, type = "additive")
plot(oil_add)
```

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Decomposition of additive time series

d. Create a scatterplot of gas vs. oil (oil on x axis). How correlated are they?

```
plot(oil_gas$Oil, oil_gas$Gas)
```

they have great correlation