Date: 14/Mar/2024	TIME-SERIES FORECASTING
EXPERIMENT – 07	

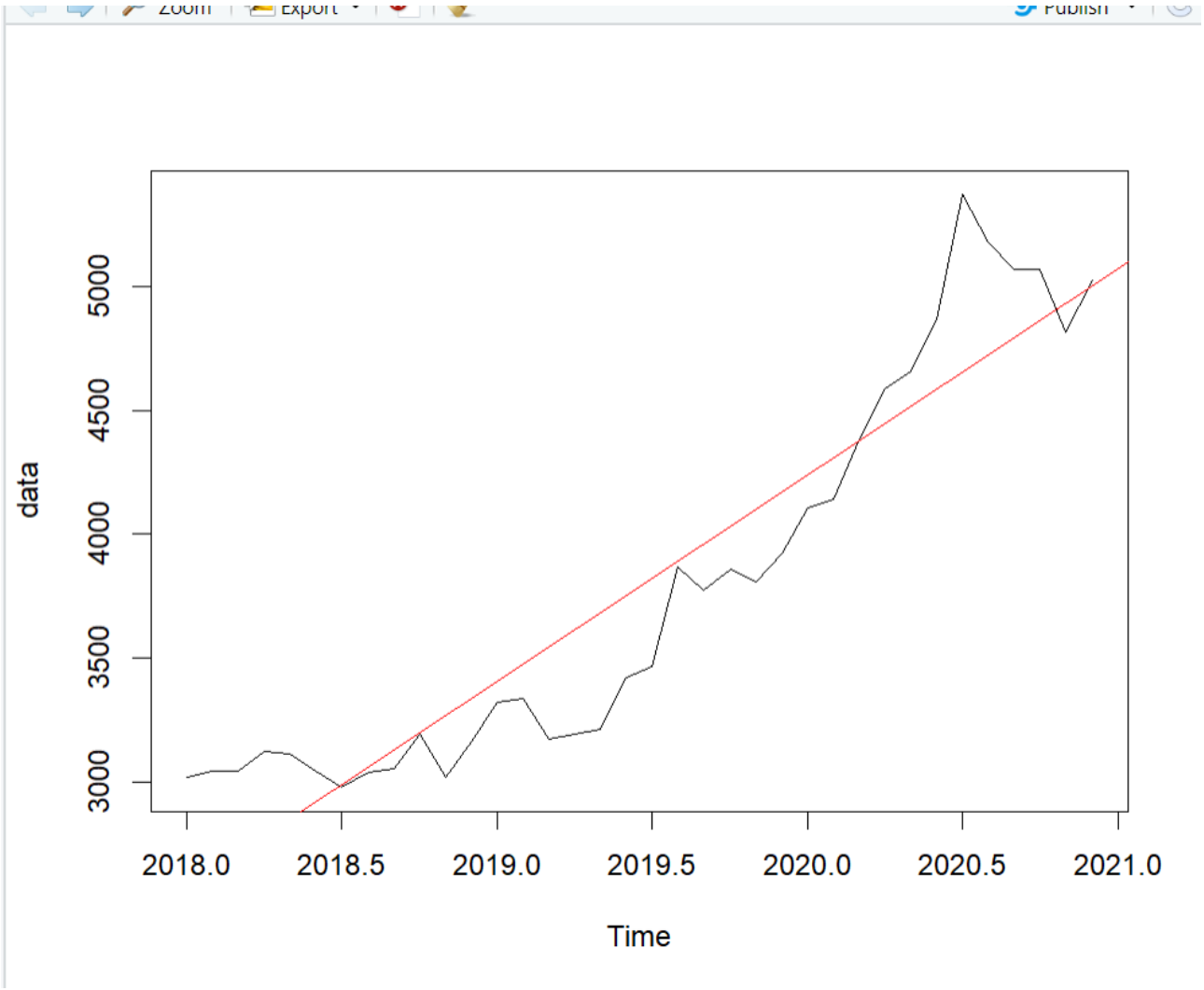
AIM: To perform time-series forecasting and obtain the plots.

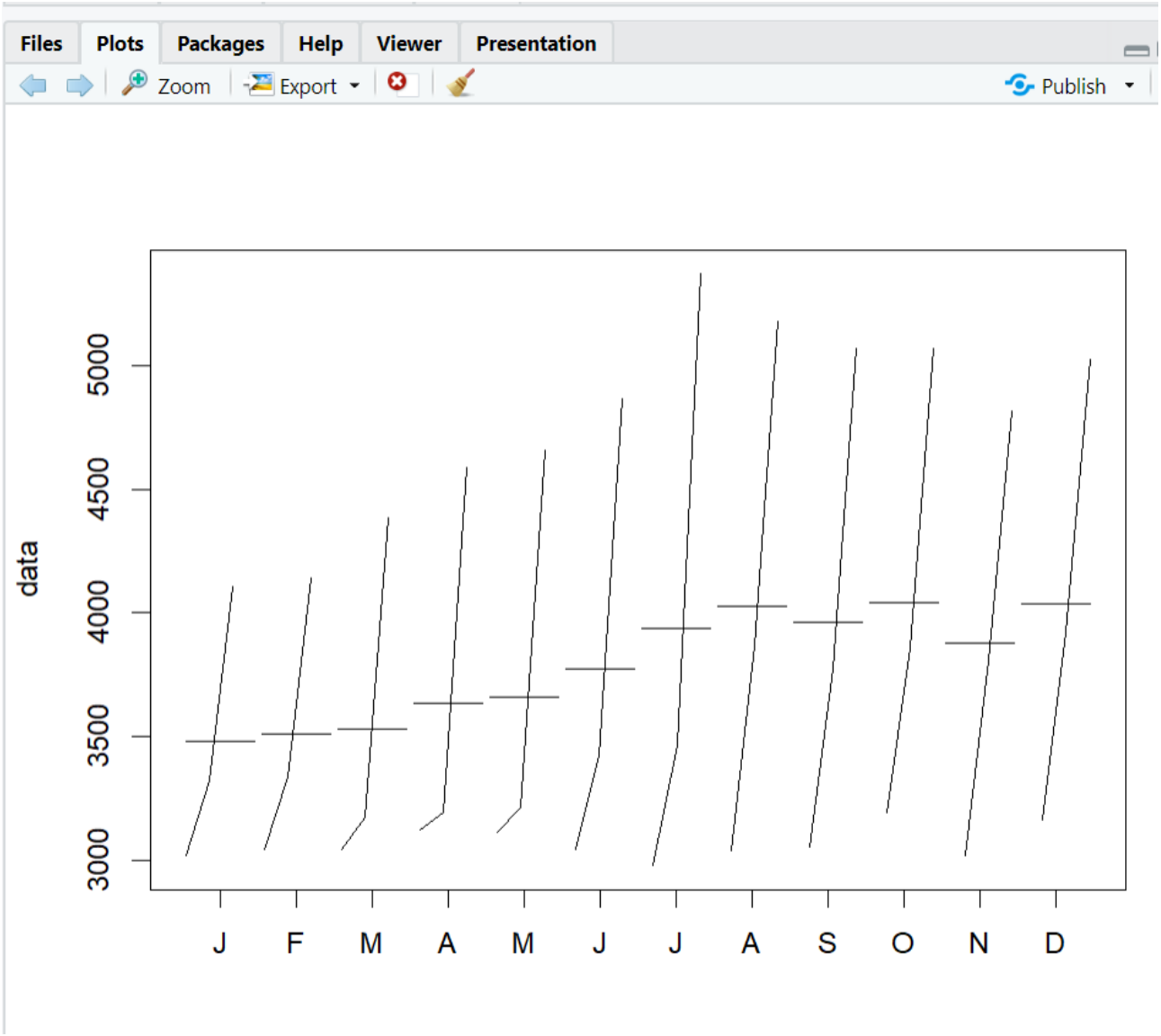
SOFTWARE REQUIRED: RStudio

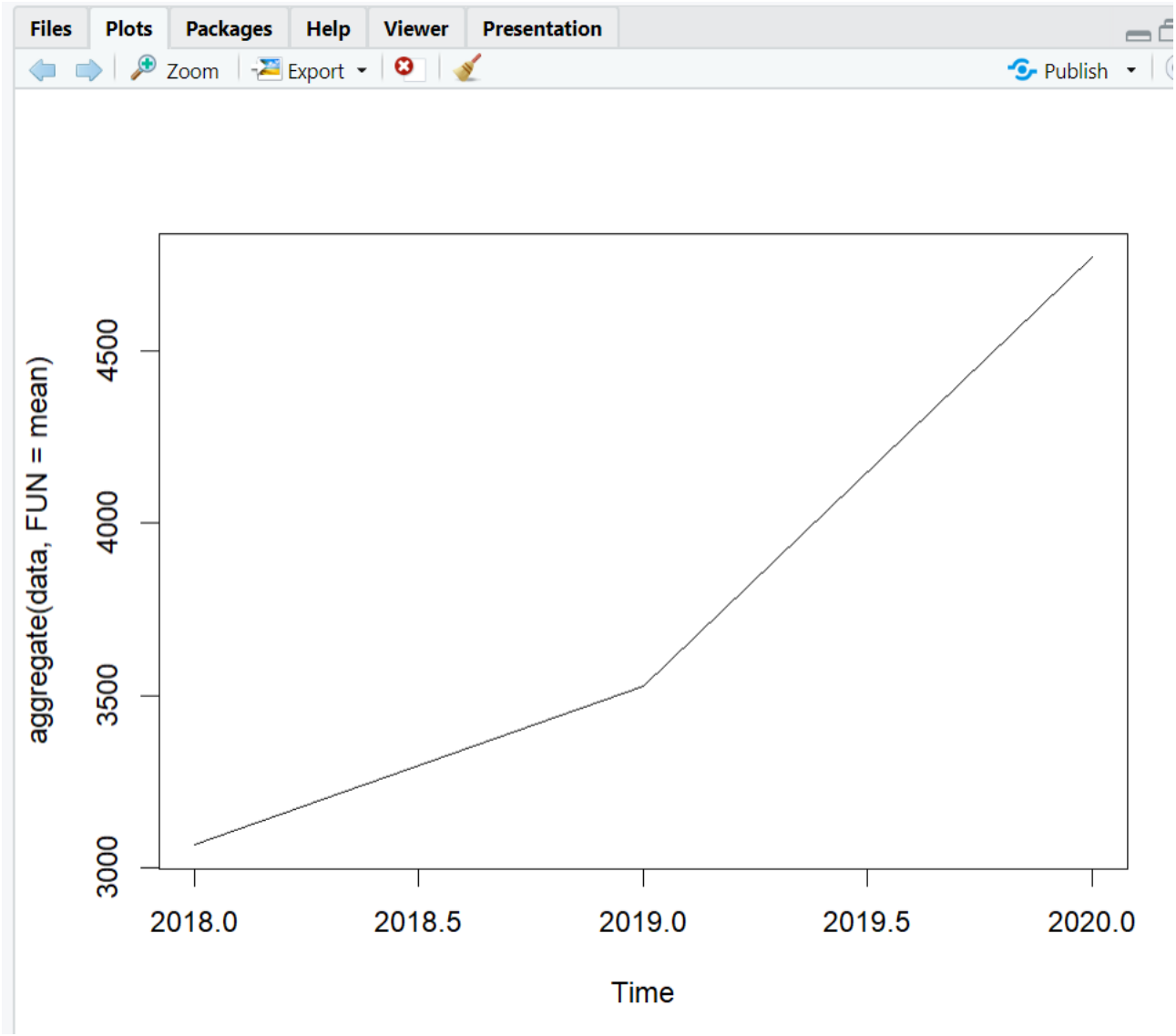
R CODE:

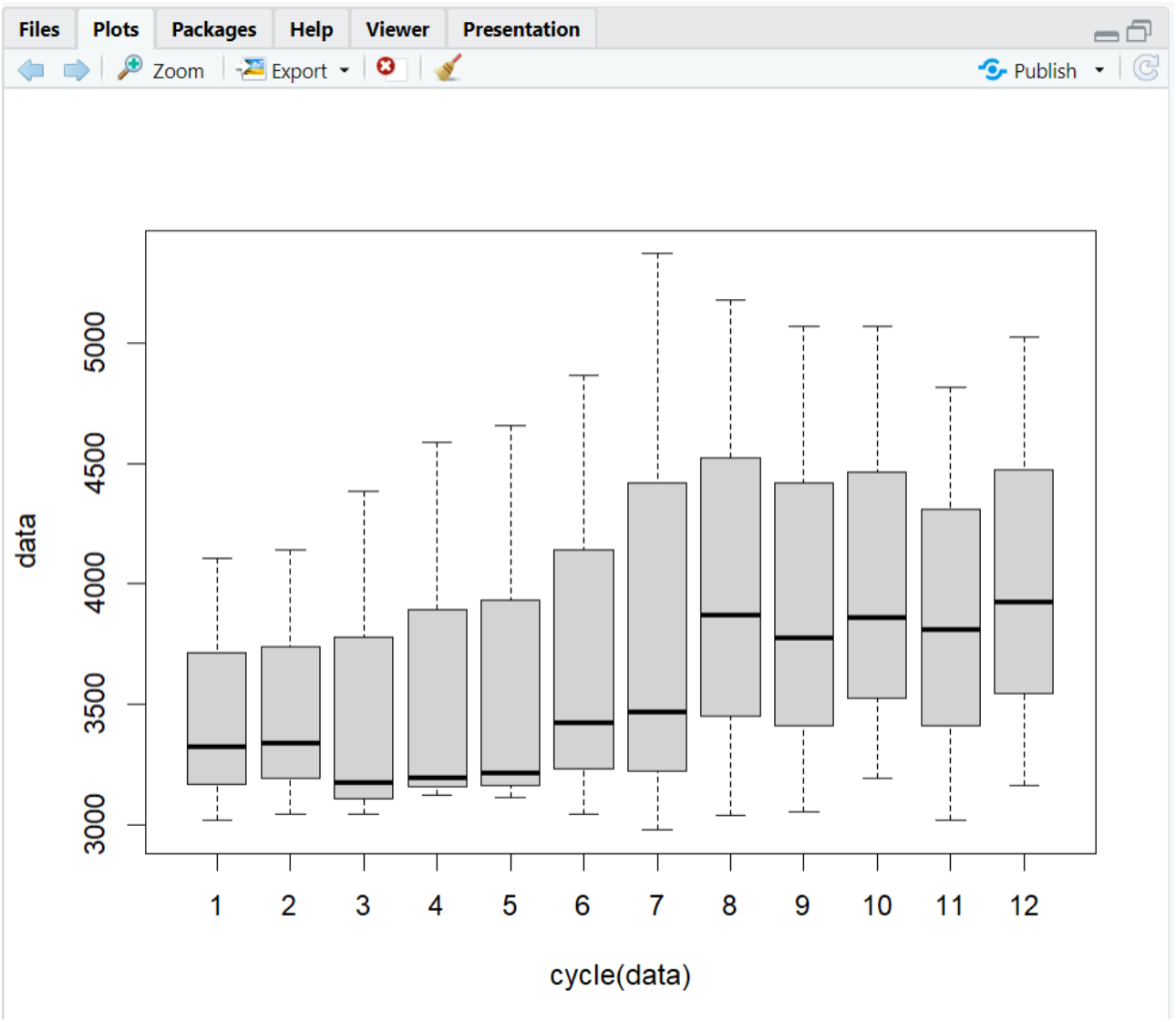
```
rm(list=ls())
vec=c(3016, 3044, 3041, 3121, 3111, 3043, 2977, 3036, 3051, 3191,
3016, 3164, 3321, 3338, 3170, 3194, 3212, 3420, 3465, 3866, 3774,
3858, 3807, 3922, 4105, 4141, 4383, 4587, 4656, 4864, 5373, 5179,
5068, 5071, 4814, 5024)
data<- ts(vec, start=c(2018,1), end=c(2020,12), frequency=12)
start(data)
end(data)
frequency (data)
cycle(data)
summary(data)
plot(data)
abline(reg=lm(data~time(data)), col="red")
monthplot(data)
plot(aggregate(data,FUN=mean))
boxplot(data~cycle(data))
library (forecast)
seasonplot(data)
acf(data)
pacf(data, lag=length(data), pl=TRUE)
fit<- arima(data, order=c(3,2,2))
accuracy(fit)
newdata<- forecast(fit, 4)
plot(newdata)
fit<- auto.arima(data)
newdata<- forecast(fit, 4)
plot(newdata)
```

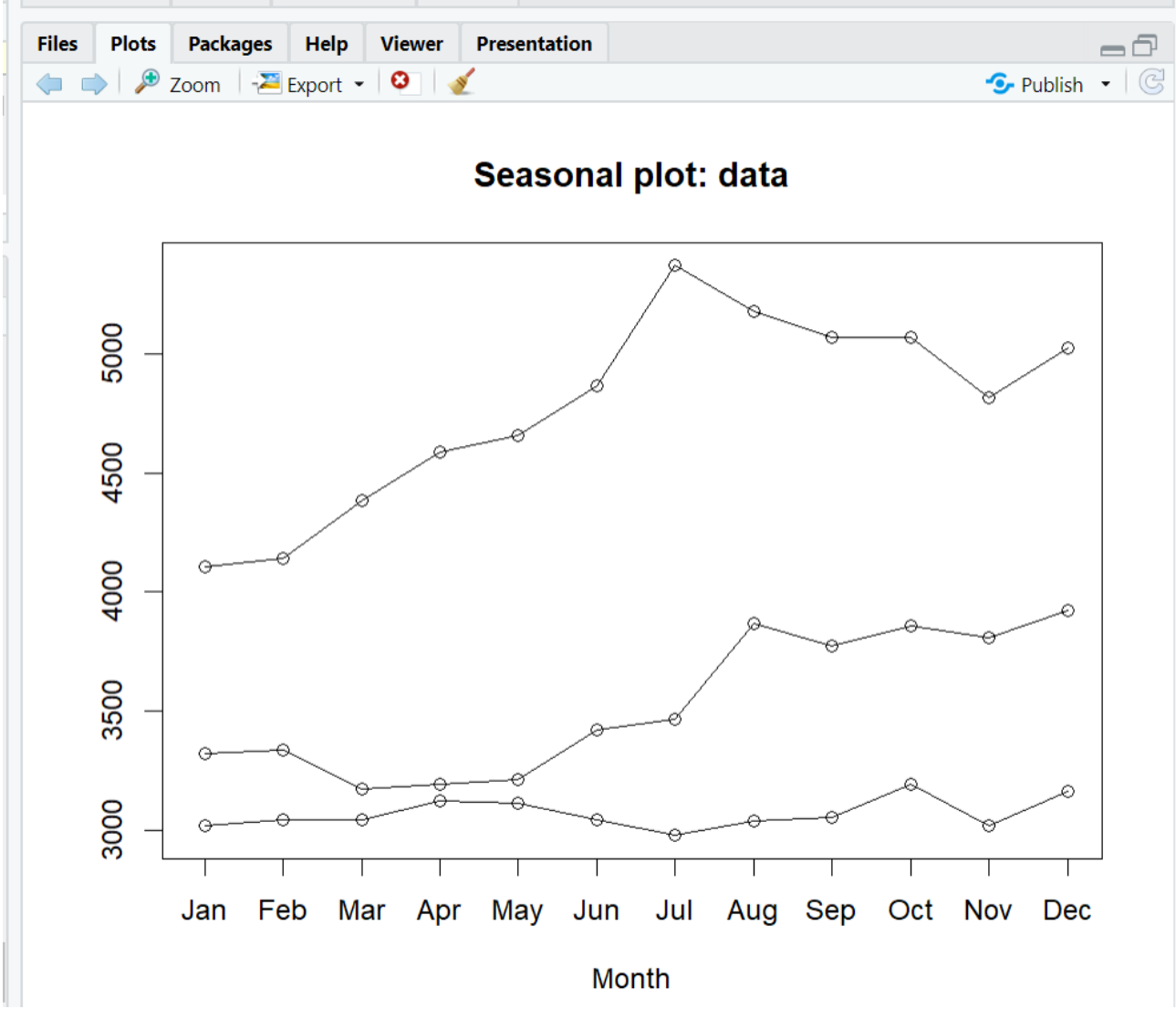
OUTPUT:

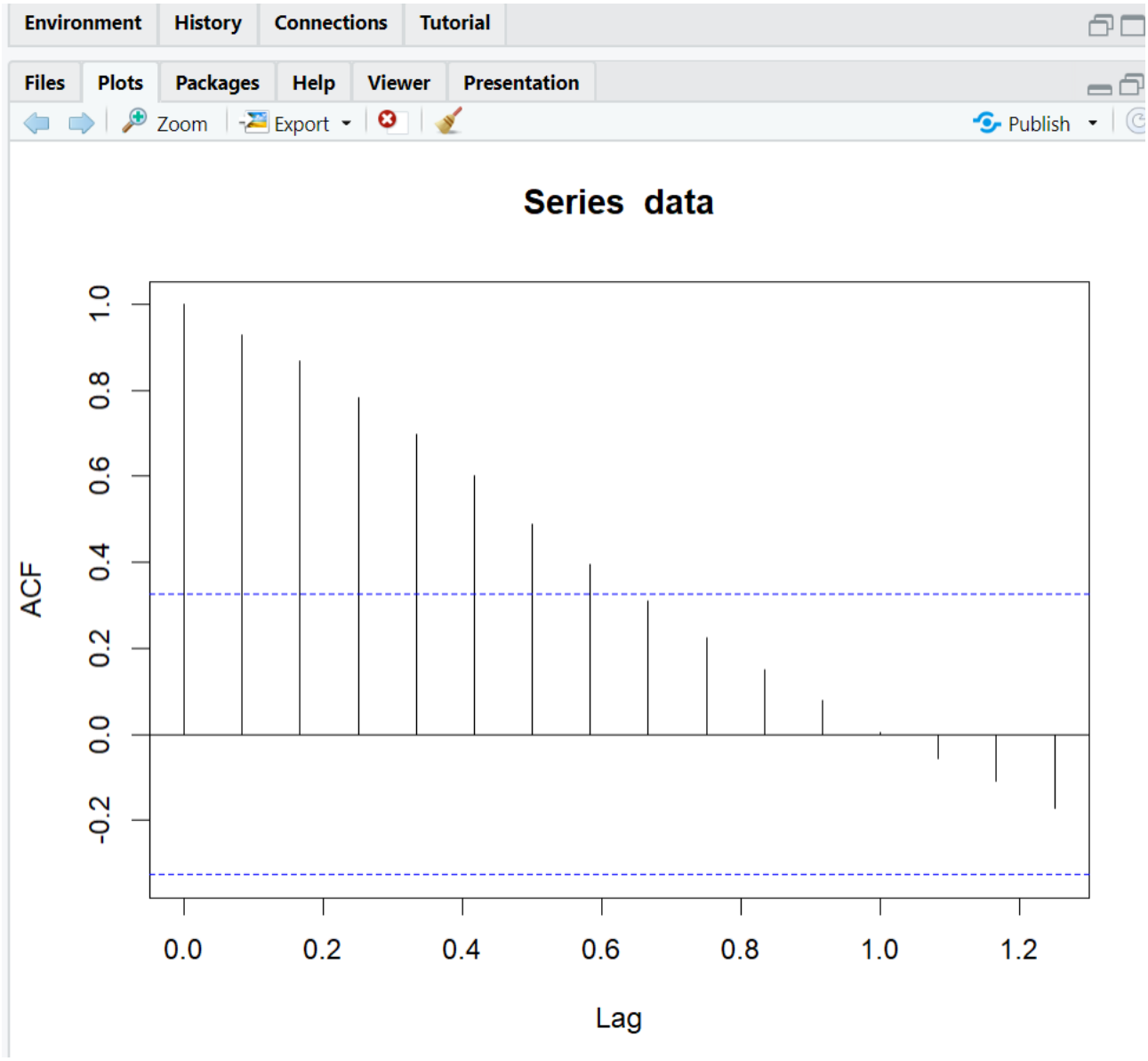

Zoom
Export
Publish
data
3000
3500
4000
4500
5000
2018.0
2018.5
2019.0
2019.5
2020.0
2020.5
2021.0
Time

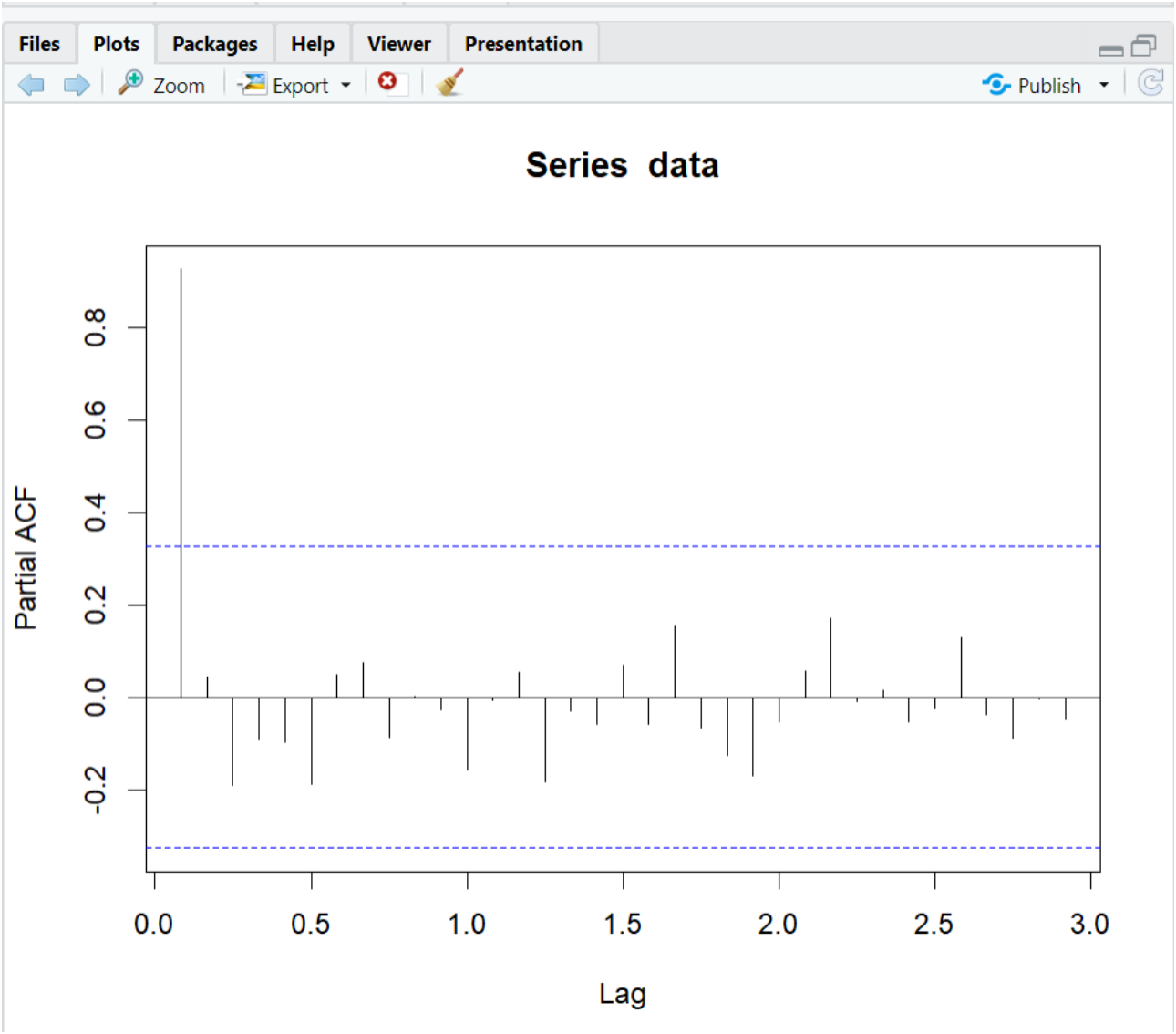

Files
Plots
Packages
Help
Viewer
Presentation
Zoom
Export
Publish
data
3000
3500
4000
4500
5000
J
F
M
A
M
J
J
A
S
O
N
D

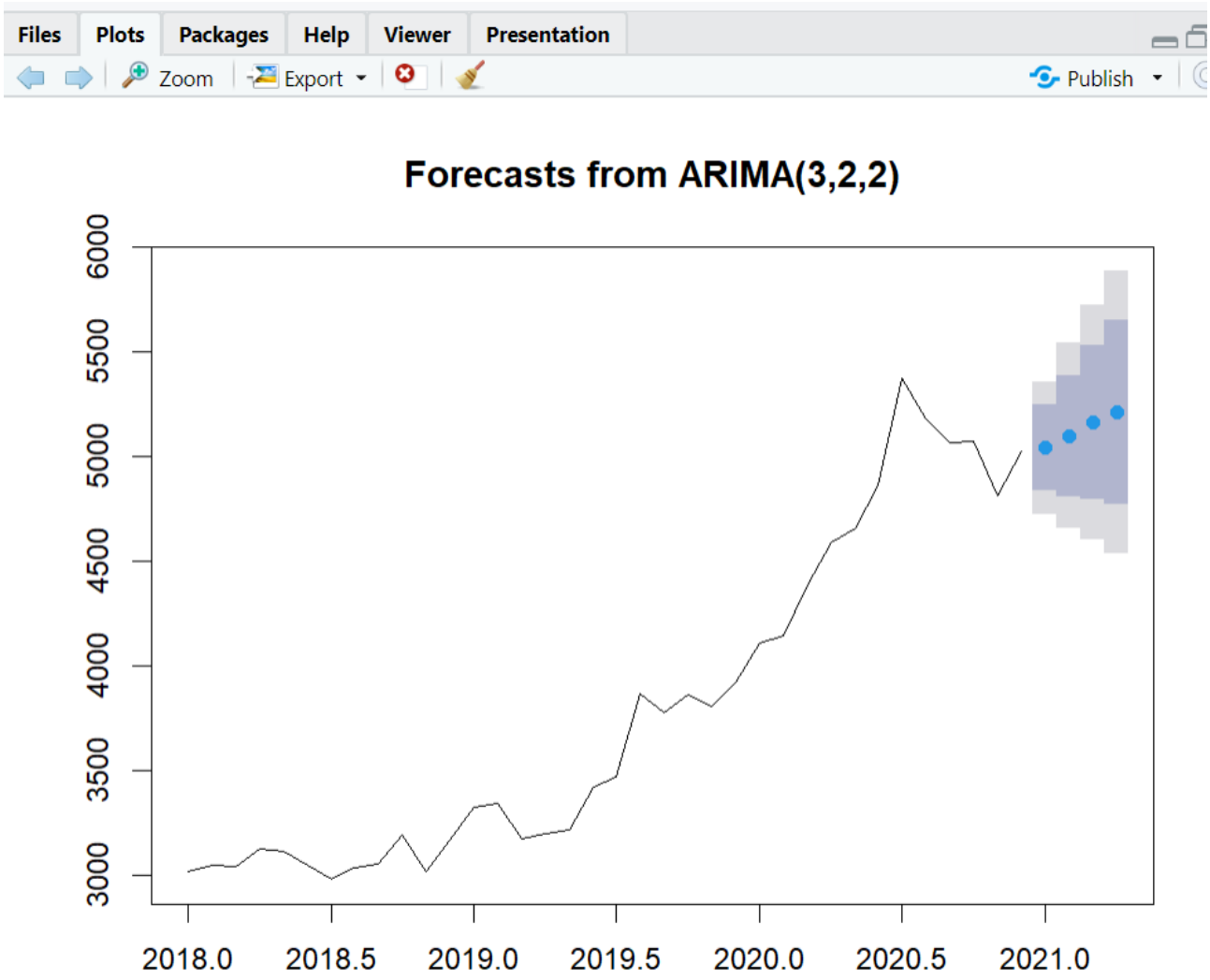

Files
Plots
Packages
Help
Viewer
Presentation
Zoom
Export
Publish
aggregate(data, FUN = mean)
3000
3500
4000
4500
2018.0
2018.5
2019.0
2019.5
2020.0
Time

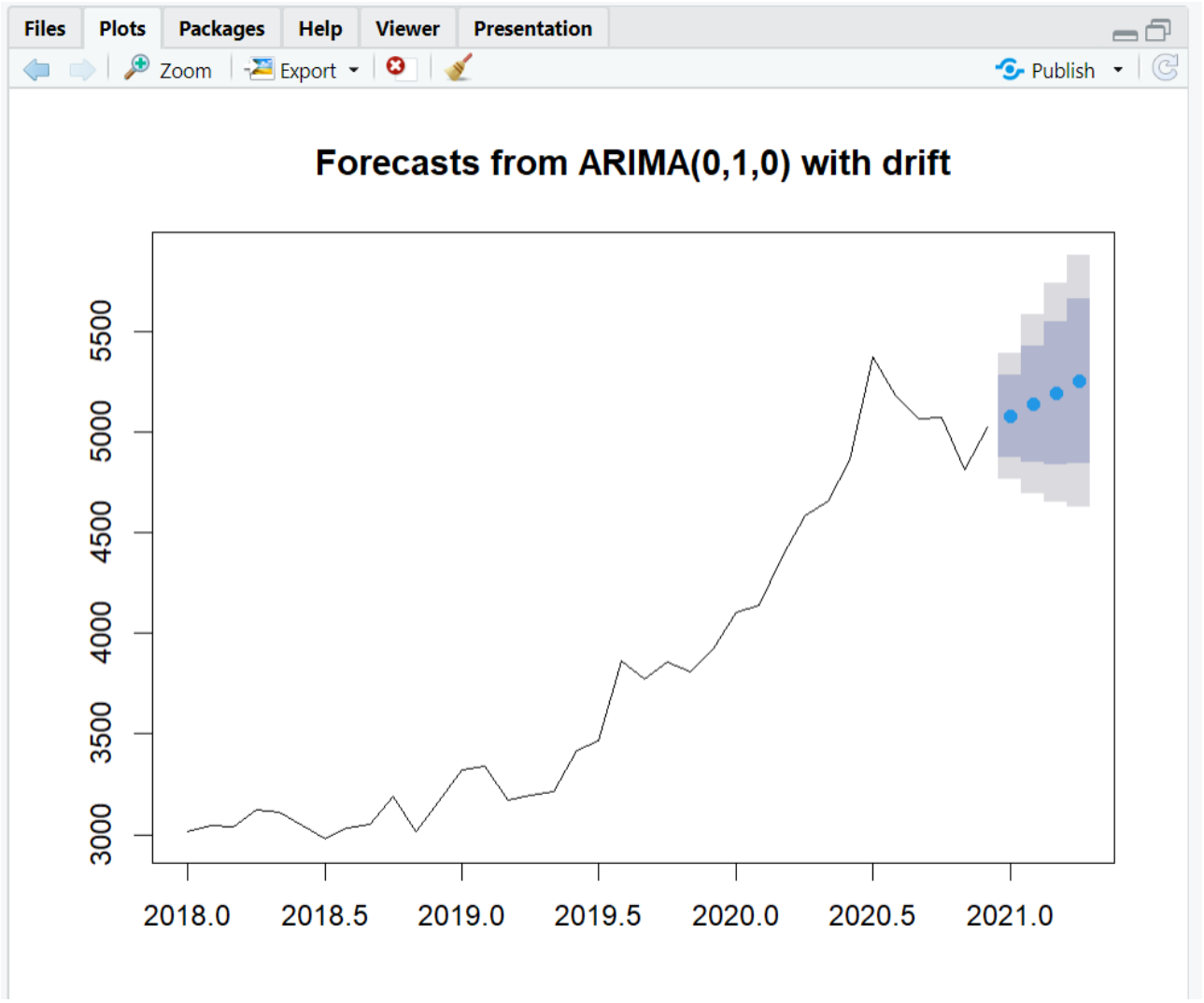

Files
Plots
Packages
Help
Viewer
Presentation
Zoom
Export
Publish
data
3000
3500
4000
4500
5000
1
2
3
4
5
6
7
8
9
10
11
12
cycle(data)


Files
Plots
Packages
Help
Viewer
Presentation
Zoom
Export
Publish
Seasonal plot: data
5000
4500
4000
3500
3000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Environment
History
Connections
Tutorial
Files
Plots
Packages
Help
Viewer
Presentation
Zoom
Export
Publish
Series data
ACF
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Lag


Files
Plots
Packages
Help
Viewer
Presentation
Zoom
Export
Publish
Series data
Partial ACF
0.8
0.6
0.4
0.2
0.0
-0.2
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Lag


Files
Plots
Packages
Help
Viewer
Presentation
Zoom
Export
Publish
Forecasts from ARIMA(3,2,2)
6000
5500
5000
4500
4000
3500
3000
2018.0
2018.5
2019.0
2019.5
2020.0
2020.5
2021.0




```
> data<- ts(vec, start=c(2018,1), end=c(2020,12), frequency=12)
> #This line converts the vector vec into a time series object (ts) with a monthly frequency.
 It specifies the start and end dates of the time series.
> start(data)
[1] 2018    1
> end(data)
[1] 2020   12
> frequency (data)
[1] 12
> cycle(data)
     Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
2018   1   2   3   4   5   6   7   8   9  10  11  12
2019   1   2   3   4   5   6   7   8   9  10  11  12
2020   1   2   3   4   5   6   7   8   9  10  11  12
> #These lines display information about the time series object data, including its start dat
e, end date, frequency (number of observations per unit of time), and the cycle length.
> summary(data)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
   2977    3118    3442    3790    4434    5373
```

```
ified maximum lag and plot option.
 #ARIMA
 fit<- arima(data, order=c(3,2,2))
 accuracy(fit)
                    ME     RMSE      MAE       MPE     MAPE      MASE        ACF1
raining set 20.49163 154.8341 114.0773 0.4894397 2.866398 0.9078461 -0.04015319
 newdata<- forecast(fit, 4)
 plot(newdata)
 #These lines fit an ARIMA (AutoRegressive Integrated Moving Average) model to the time serie
 data, compute accuracy measures, generate forecasts for the next 4 periods, and plot the for
casted values.
 #Auto ARIMA
 fit<- auto.arima(data)
 newdata<- forecast(fit, 4)
 plot(newdata)
```