

Tableau AI

Professor Ernesto Lee



Basic forecasting and statistical inference

Forecasting on a dataset with outliers

Using R within Tableau (Optional)

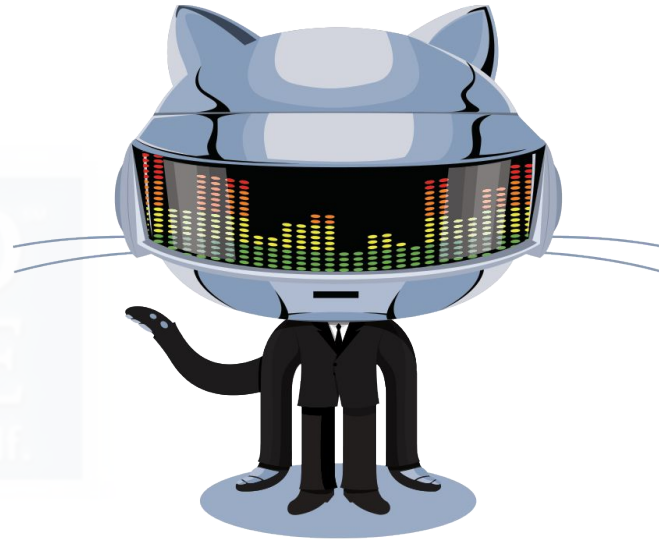
Forecasting based on multiple regression (Optional)

Regression with random forest

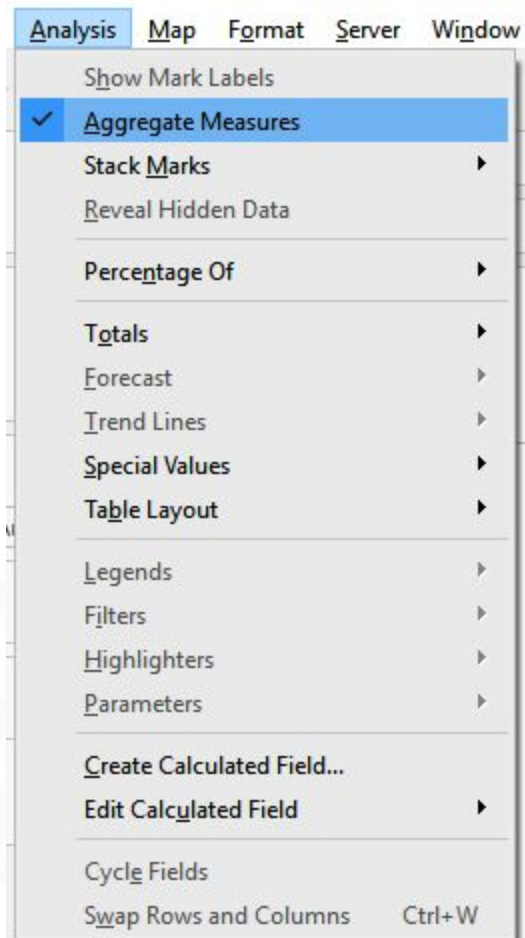
Time series forecasting

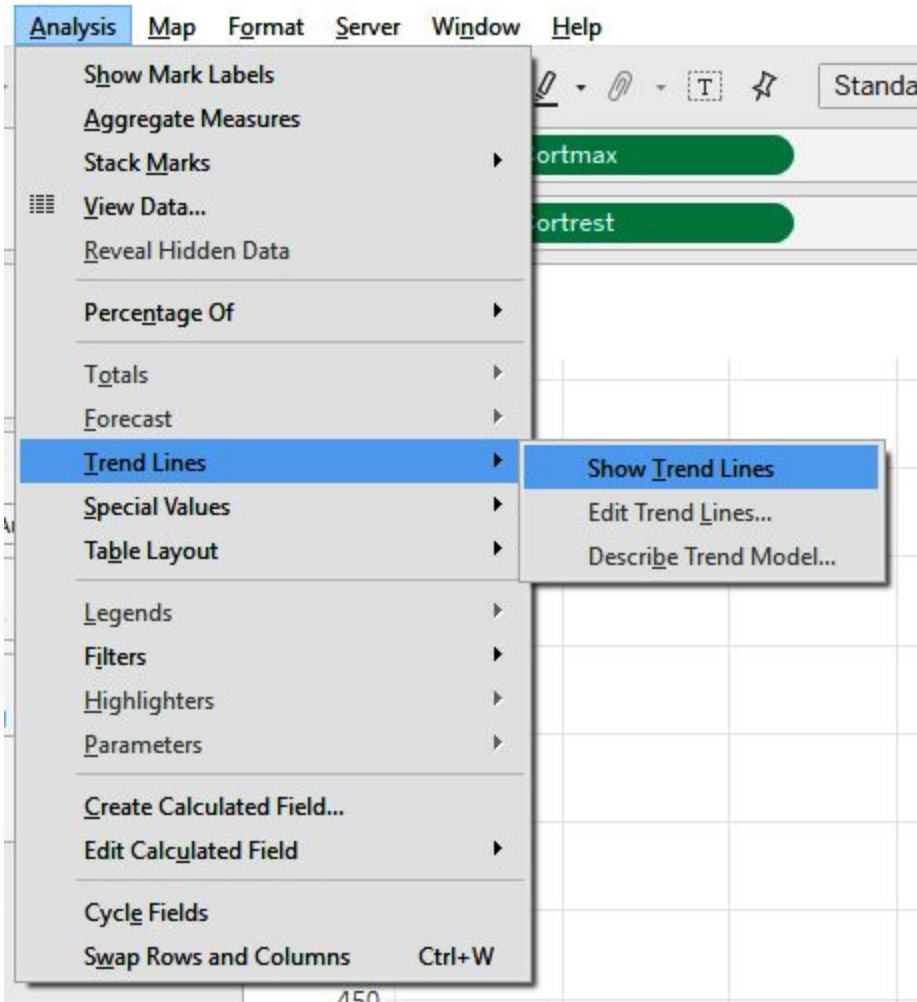
Define yourself.

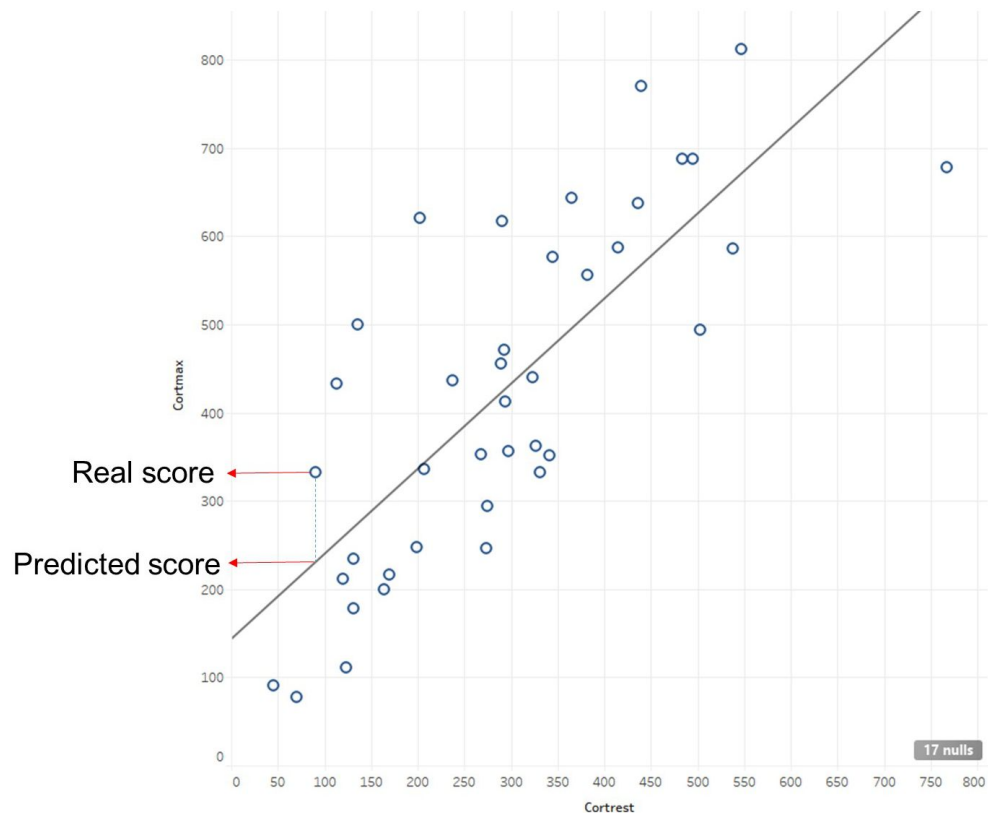
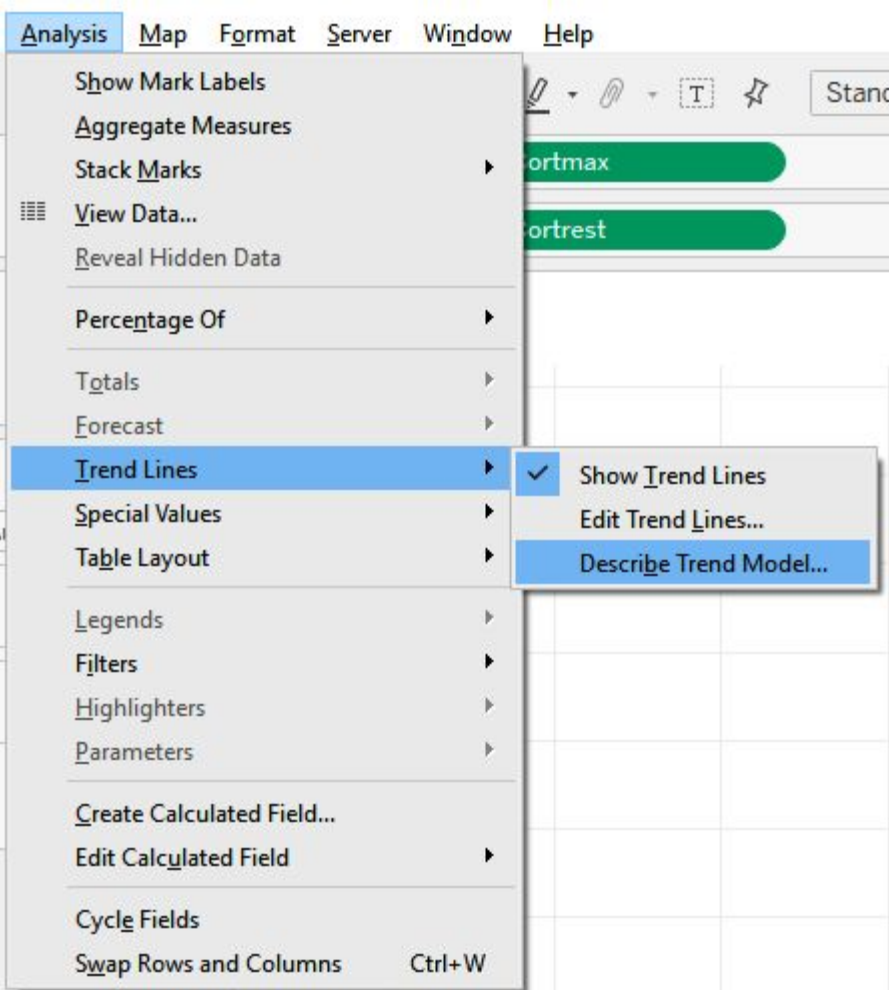
<https://github.com/fenago/tableau2019/tree/main/Chapter%2011>











Trend Lines Model

A linear trend model is computed for Cortmax given Cortrest. The model may be significant at $p \leq 0.05$.

Model formula: (Cortrest + intercept)

Number of modeled observations: 39

Number of filtered observations: 17

Model degrees of freedom: 2

Residual degrees of freedom (DF): 37

SSE (sum squared error): 573484

MSE (mean squared error): 15499.6

R-Squared: 0.601255

Standard error: 124.497

p-value (significance): < 0.0001

Individual trend lines:

Panels		Line		Coefficients				
<u>Row</u>	<u>Column</u>	<u>p-value</u>	<u>DF</u>	<u>Term</u>	<u>Value</u>	<u>StdErr</u>	<u>t-value</u>	<u>p-value</u>
Cortmax	Cortrest	< 0.0001	37	Cortrest	0.964381	0.129112	7.46935	< 0.0001
				intercept	143.28	42.8355	3.34489	0.0018966

Copy

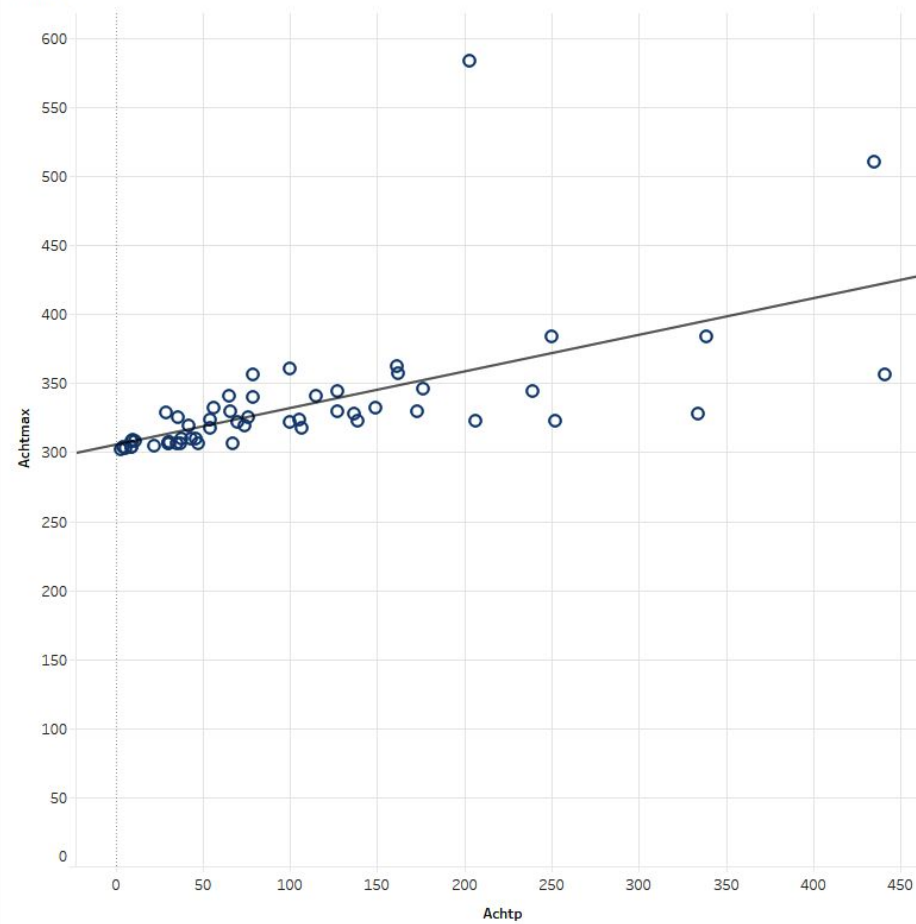
Close

Outliers



iii Columns	Achtp
Rows	Achtmax

Sheet 2



WINDOW_AVG(SUM([Achtmax]))

Average

×

WINDOW_AVG(SUM([Achtmax]))

The calculation is valid.

Default Table Calculation

Apply

OK

$[Average] - 2.5 * WINDOW_STDEV(SUM([Achtmax]))$

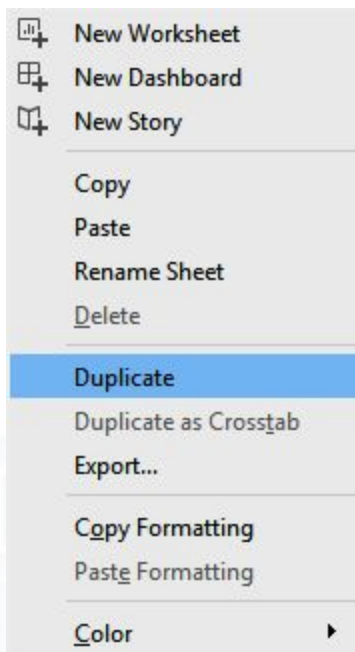


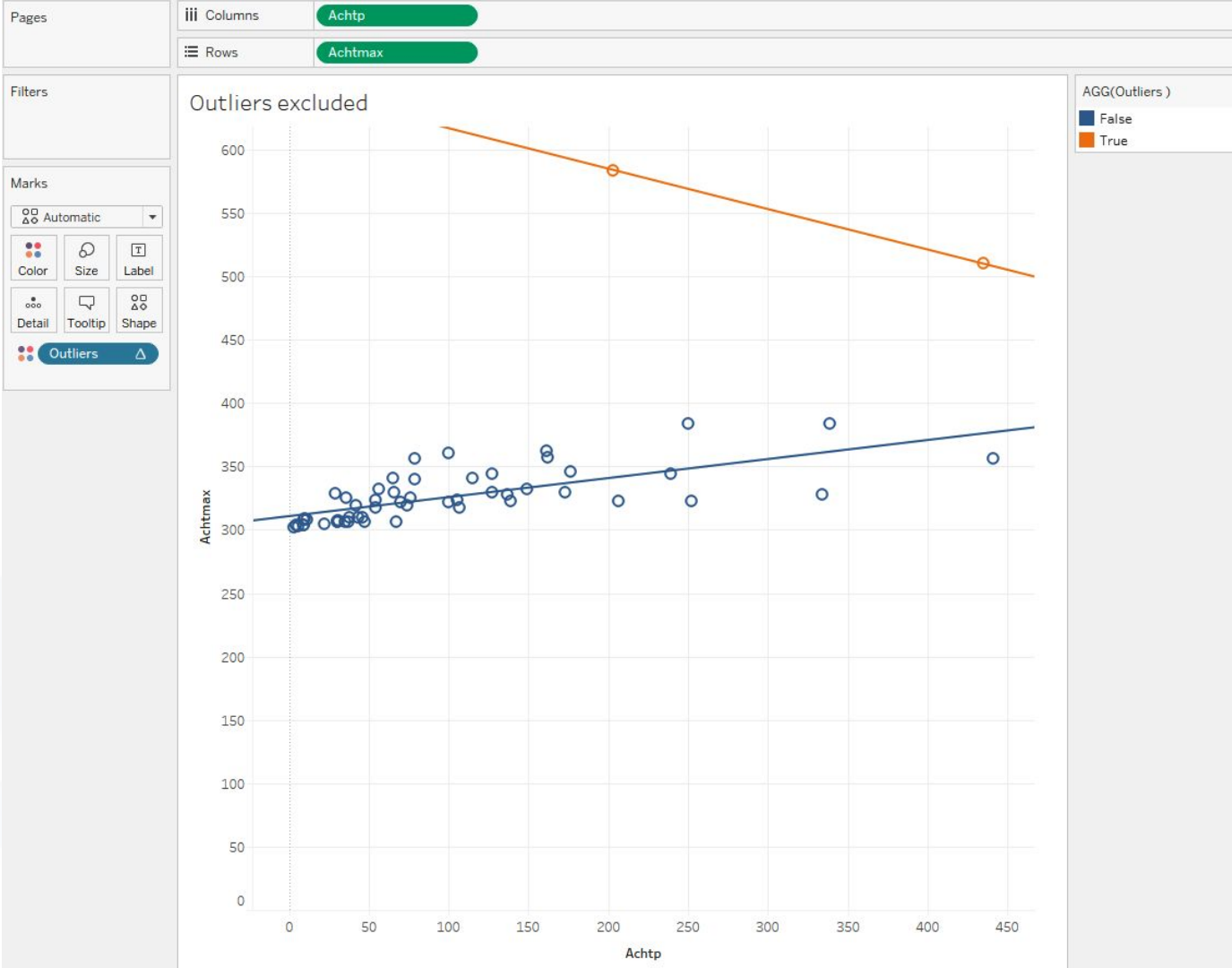
$[Average] + 2.5 * WINDOW_STDEV(SUM([Achtmax]))$



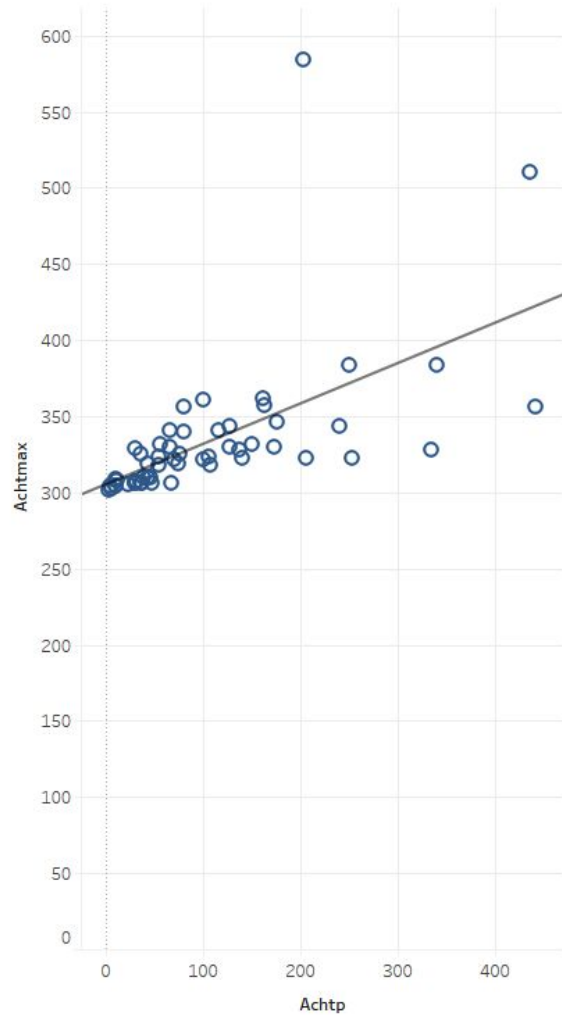
$\text{SUM}([\text{Achtmax}]) > [\text{Upper}]$ or $\text{SUM}([\text{Achtmax}]) < [\text{Lower}]$



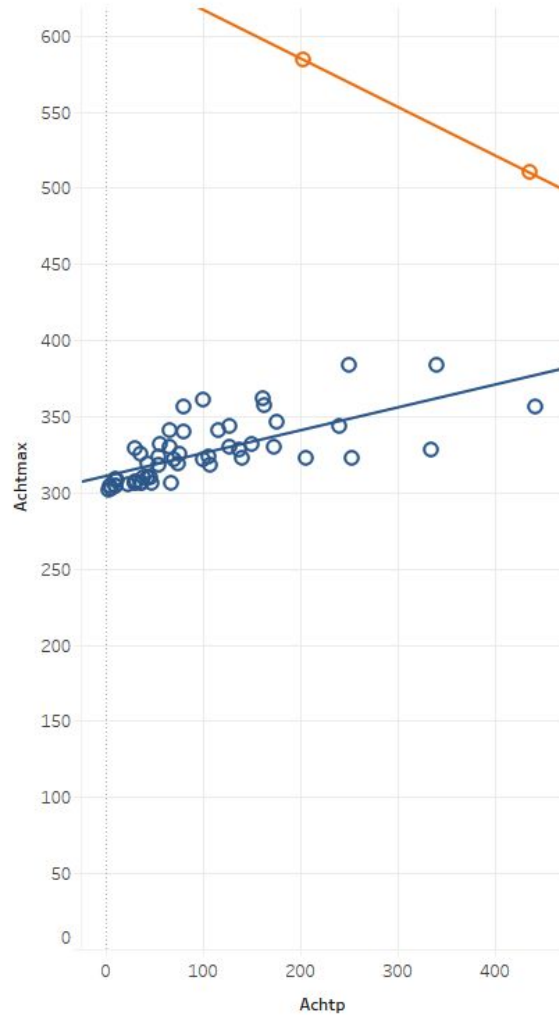




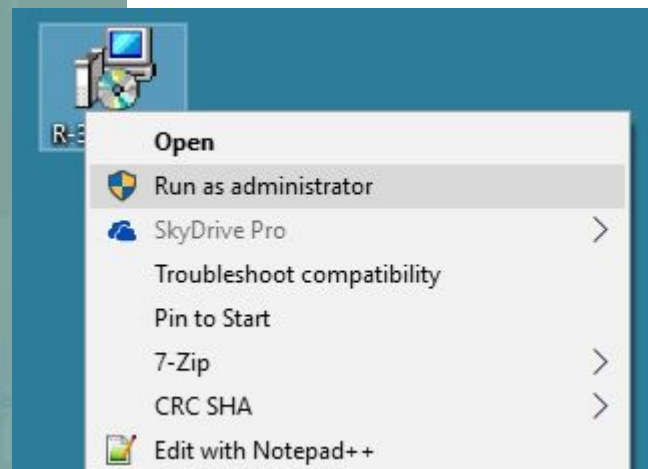
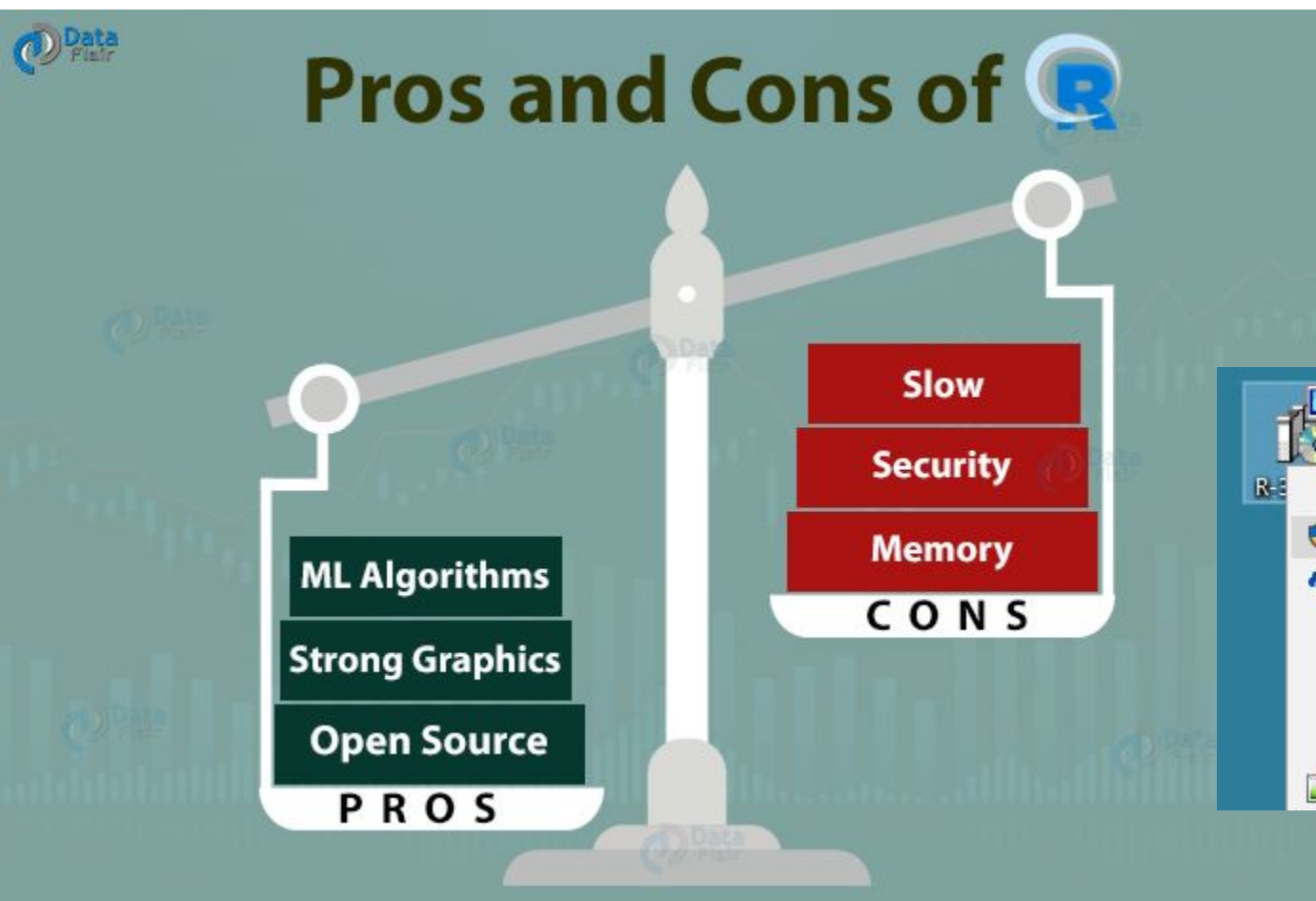
Outliers included



Outliers excluded



R and Tableau



Source R code...

New script

Open script...

Display file(s)...

Load Workspace...

Save Workspace... Ctrl+S

Load History...

Save History...

Change dir...

Print... Ctrl+P

Save to File...

Exit

```
2) -- "Feather Spray"  
Foundation for Statistical Computing  
32/x64 (64-bit)
```

```
es with ABSOLUTELY NO WARRANTY.  
tribute it under certain conditions.  
ce()' for distribution details.
```

```
but running in an English locale
```

```
ct with many contributors.  
more information and  
e R or R packages in publications.
```

```
Type 'demo()' for some demos, 'help()' for on-line help, or  
'help.start()' for an HTML browser interface to help.  
Type 'q()' to quit R.
```

```
> |
```



```
install.packages("Rserve", repos='http://cran.us.r-project.org')
```



Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

```
> install.packages("Rserve", repos='http://cran.us.r-project.org')
Installing package into 'C:/Users/Slaven/Documents/R/win-library/3.5'
(as 'lib' is unspecified)
trying URL 'http://cran.us.r-project.org/bin/windows/contrib/3.5/Rserve_1.7-3.zip'
Content type 'application/zip' length 638205 bytes (623 KB)
downloaded 623 KB
```

package 'Rserve' successfully unpacked and MD5 sums checked

The downloaded binary packages are in

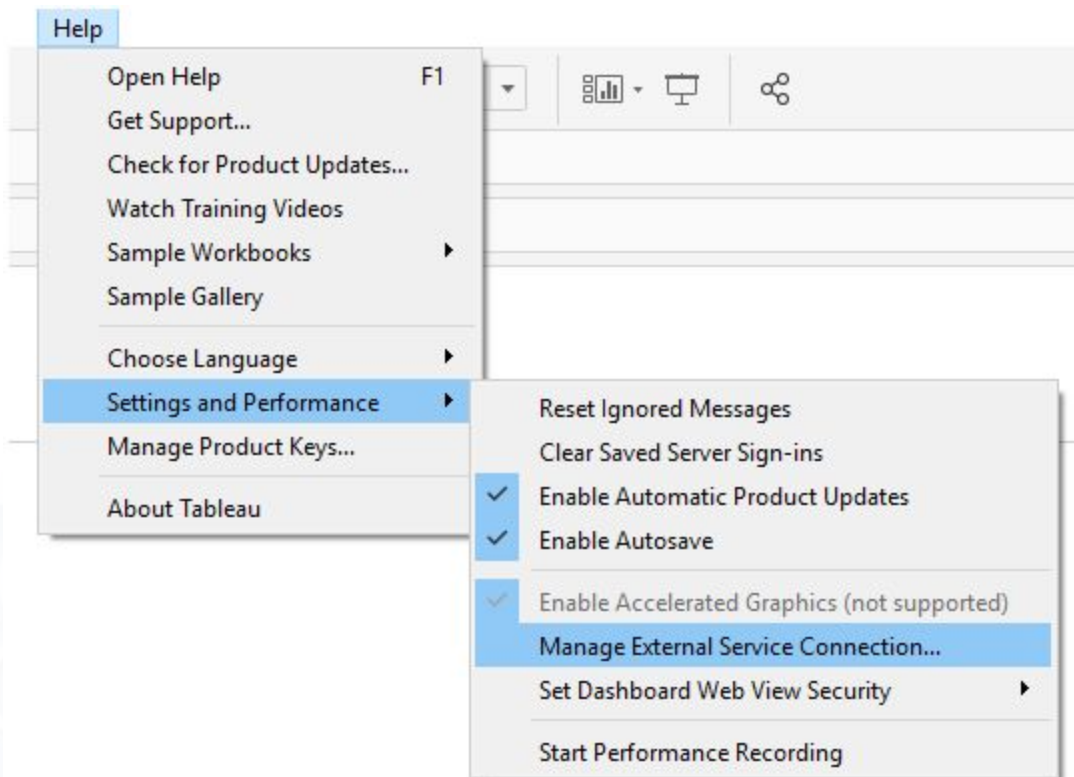
C:\Users\Slaven\AppData\Local\Temp\Rtmps3yCfk\downloaded_packages

```
> |
```

Define yourself.

```
library(Rserve)  
Rserve()
```





External Service Connection

Specify a server name and a port

Server: Port:

☐ Sign in with a username and password

Username:

Password:

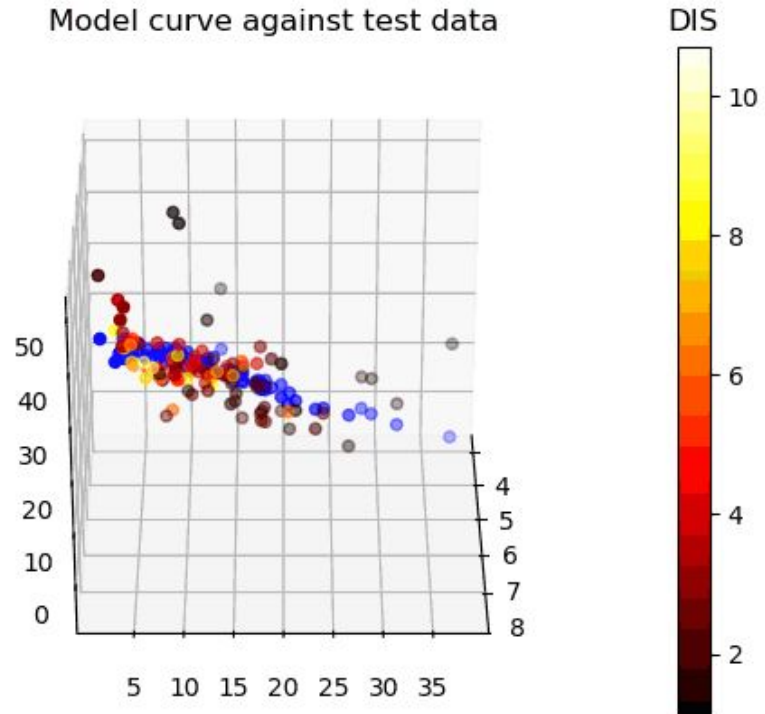
Test Connection OK Cancel

Tableau

 Successfully connected to the RServe service.

OK

Multiple Regression



```
SCRIPT_REAL('
mydata <- data.frame(y=.arg1, x1=.arg2, x2=.arg3);
reg <- lm(y ~ x1 + x2, data = mydata);
save(reg, file = "C:/Users/eleee/Documents/mymodel.rda")
prob <- predict(reg, newdata = mydata, type = "response")
,
AVG([Cortmax]),AVG([Cortrest]), AVG([Cortp]))
```

Results are computed along Table (across).

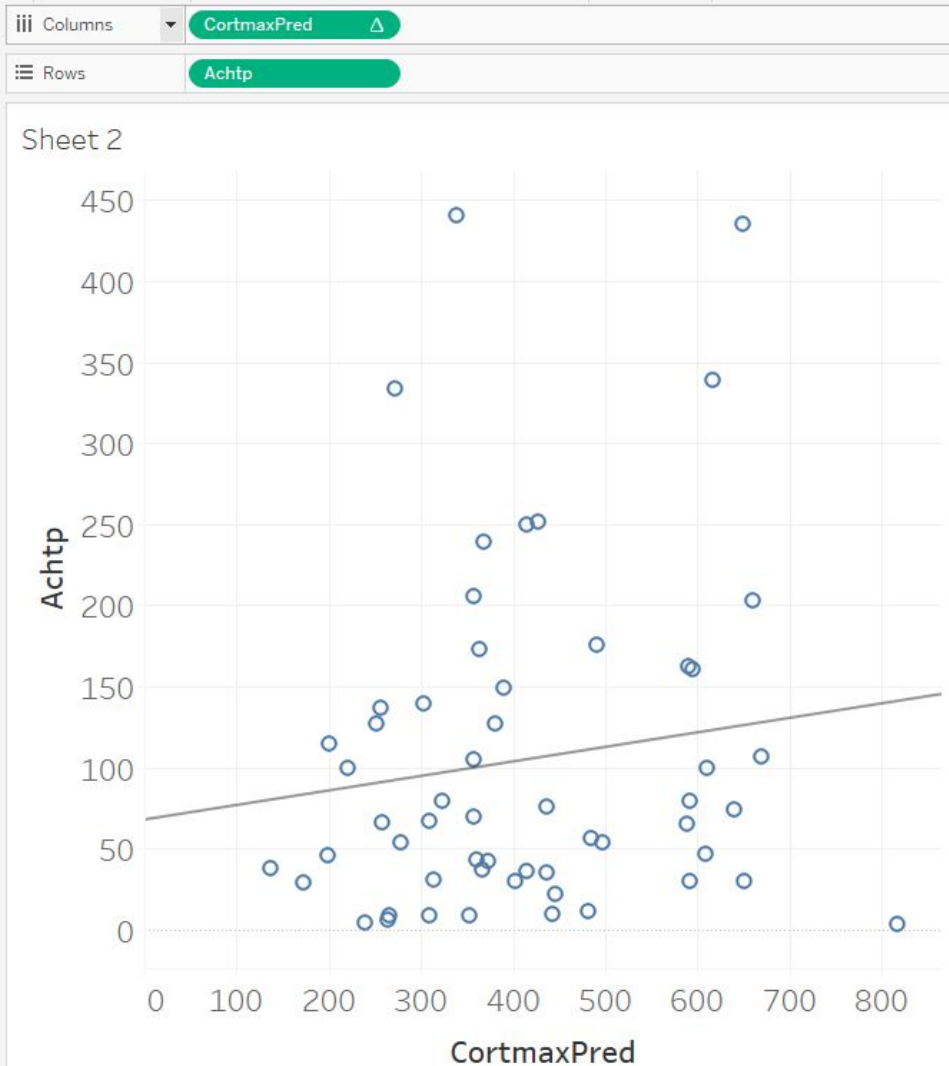
SCRIPT_REAL(

,

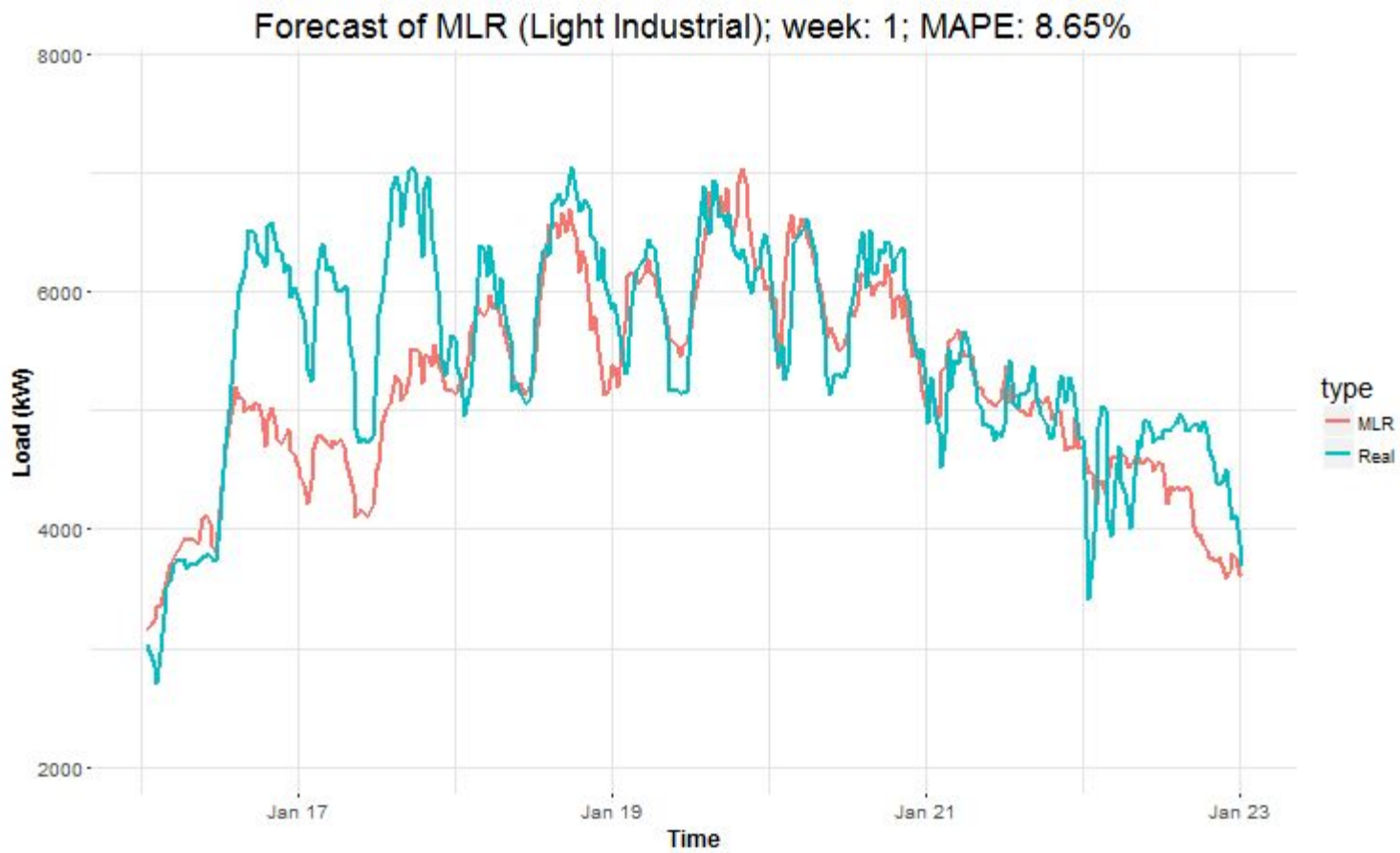
```
mydata <- data.frame(y=.arg1, x1=.arg2, x2=.arg3);
```

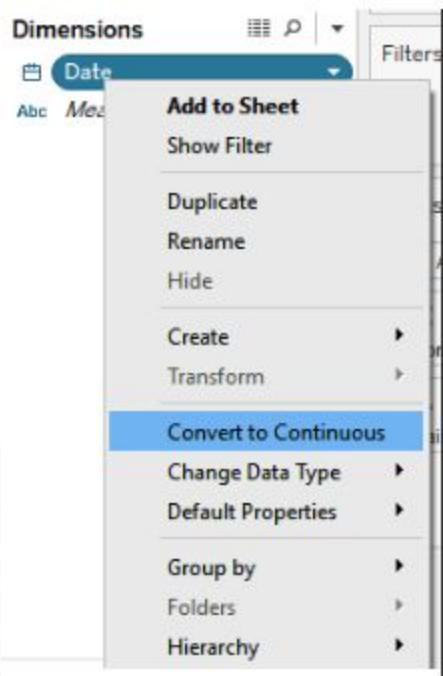
```
reg <- lm(y ~ x1 + x2, data = mydata);
```

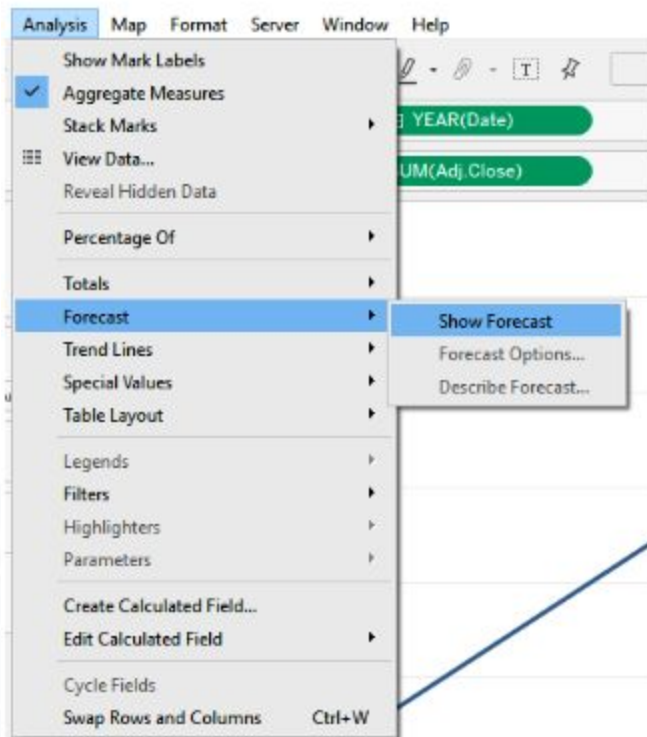




TSD







Marks

Automatic



Color



Size



Label



Detail



Tooltip



Path



Forecast indicator



Forecast Length

- ☒ Automatic Next 5 quarters
- ☐ Exactly
- ☐ Until

Source Data

- Aggregate by:
- Ignore last: Quarters
- ☐ Fill in missing values with zeroes

Forecast Model

-
- Automatically selects an exponential smoothing model for data that may have a trend and may have a seasonal pattern.
- ☒ Show prediction intervals
- Currently using source data from Q1 2006 to Q3 2013 to create a forecast through Q4 2014. Looking for potential seasonal patterns every 4 Quarters.

[Learn more about forecast options](#)

OK

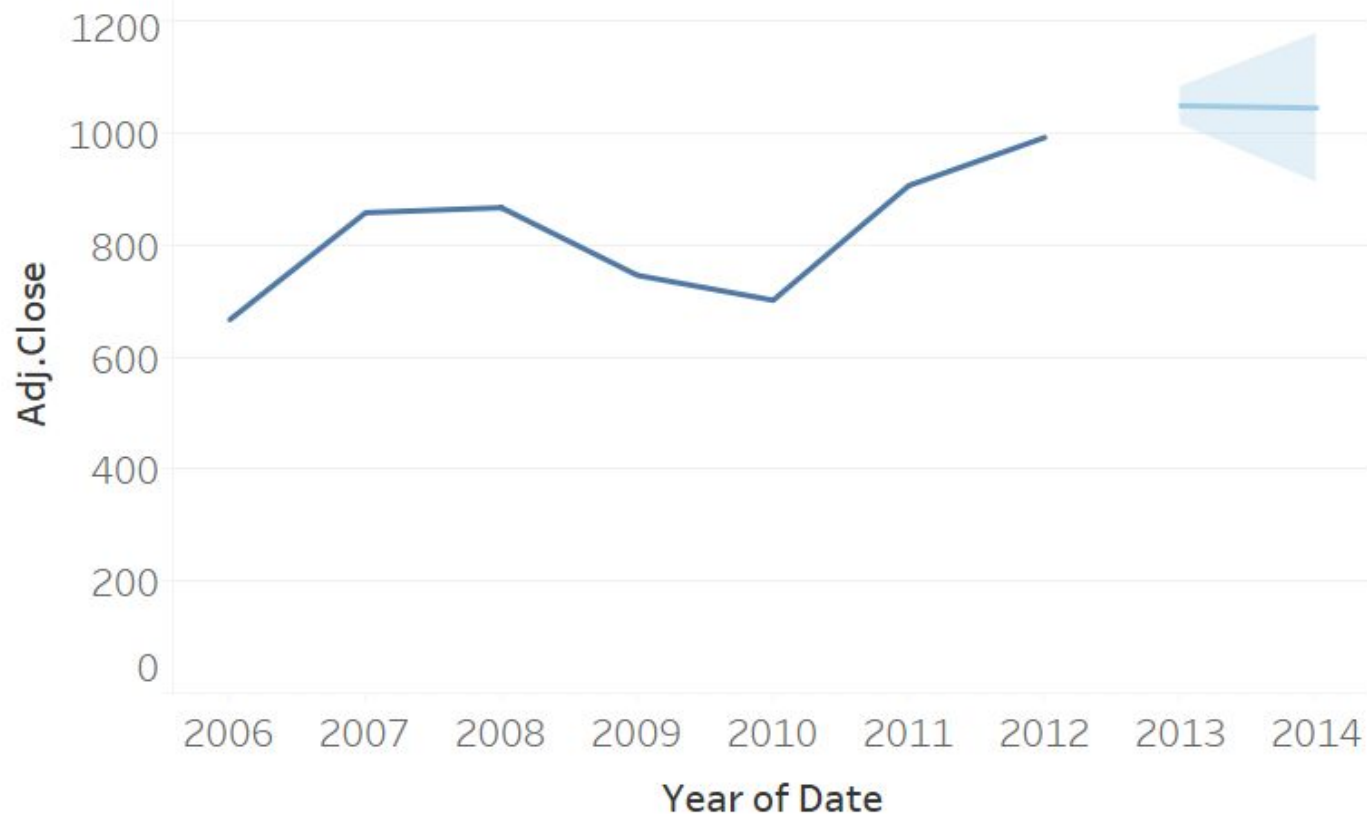
Columns

YEAR(Date)

Rows

SUM(Adj.Close)

Sheet 1



Forecast indicator

Actual

Estimate

Options Used to Create Forecasts

Time series: Year of Date

Measures: Sum of Adj.Close

Forecast forward: 5 quarters (Q4 2013 – Q4 2014)

Forecast based on: Q1 2006 – Q3 2013

Ignore last: 1 quarter (Q4 2013)

Seasonal pattern: None (Not enough data to search for a seasonal pattern recurring every 4 Quarters)

Sum of Adj.Close

Initial Q4 2013	Change From Initial Q4 2013 – Q4 2014	Seasonal Effect	
		High	Low
261.3 ± 36.6	0.0	None	

[Copy to Clipboard](#)[Learn more about the forecast summary](#)

Describe Forecast

All forecasts were computed using exponential smoothing.

Sum of Adj.Close

Model			Quality Metrics					Smoothing Coefficients		
Level	Trend	Season	RMSE	MAE	MASE	MAPE	AIC	Alpha	Beta	Gamma
Additive	None	None	18.7	15.7	1.32	7.6%	188	0.500	0.000	0.000

[Copy to Clipboard](#)[Learn more about the forecast models](#)[Close](#)