R Meetup
3 Lightning Topics

23 Oct 2018

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THE FOLLOWING **PRESENTATION** HAS BEEN RATED

R	**RESTRICTED**
	95% Confidence Interval of less than 213 slides

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cran.r-project.org

www.bioconductor.org

3 Lightning Topics

- What’s new in R 3.5
- R and Bert
- R and PowerBI

About Me – Michael Mooney

Data Analyst

Using R for a long time

Not an expert in anything

Shouldn’t be let outside alone

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What’s new in R 3.5

NOT MUCH!

- Implementation of ALTREP project
- Packages are byte-complied on installation
- readLines and scan are quicker

What’s new in R 3.5

- Implementation of ALTREP project

Initialization of vectors is faster. Doesn’t allocate memory just start and end values

Keeps track if vector is already sorted, won’t try and re-sort

Deferred coercion, until needed. Converting vector from numeric to character. i.e. as.character(numeric_vector)

What’s new in R 3.5

- Packages are byte-complied on installation

Base and others like dpylr were already

However now github packages will be too

What’s new in R 3.5

- readLines and scan are quicker

Text buffering allows faster reading.

R and Bert – Sleeping with the Enemy

julia
roberts
She is a stranger
in a small town.
She changed her name.
Her looks. Her life.
All to escape
the most dangerous man
she's ever met.
Her husband.
sleeping with the enemy
15
TWENTIETH CENTURY FOX presents a LEONARD GOLDBERG production
a JOSEPH RUBEN film JULIA ROBERTS PATRICK BERGIN KEVIN ANDERSON SLEEPING WITH THE ENEMY music by JERRY GOLDSMITH film editor GEORGE BOWERS production designer DOUG KRANER
director of photography JOHN W. LINDLEY executive producer JEFFREY CHERNOV produced by LEONARD GOLDBERG screenplay by RONALD BASS based upon the novel by NANCY PRICE directed by JOSEPH RUBEN
Prints by DELUXE
20th Century Fox

Excel

R and Bert

BERT

Bert: Basic Excel R Toolkit

Allowing almost seamless interoperability

between Excel and R

https://bert-toolkit.com

R and Bert

Open Source: https://bert-toolkit.com/

Developed by Structured Data LLC

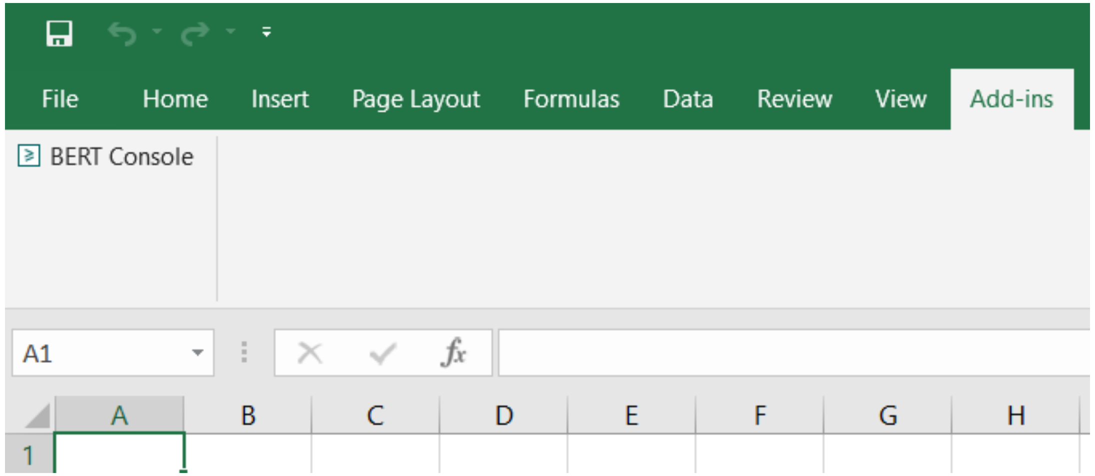
Github Repo: https://github.com/sdllc/Basic-Excel-R-Toolkit

R and Bert

Installing

Get file, Install, next, next, next….

After Install – Excel Add In



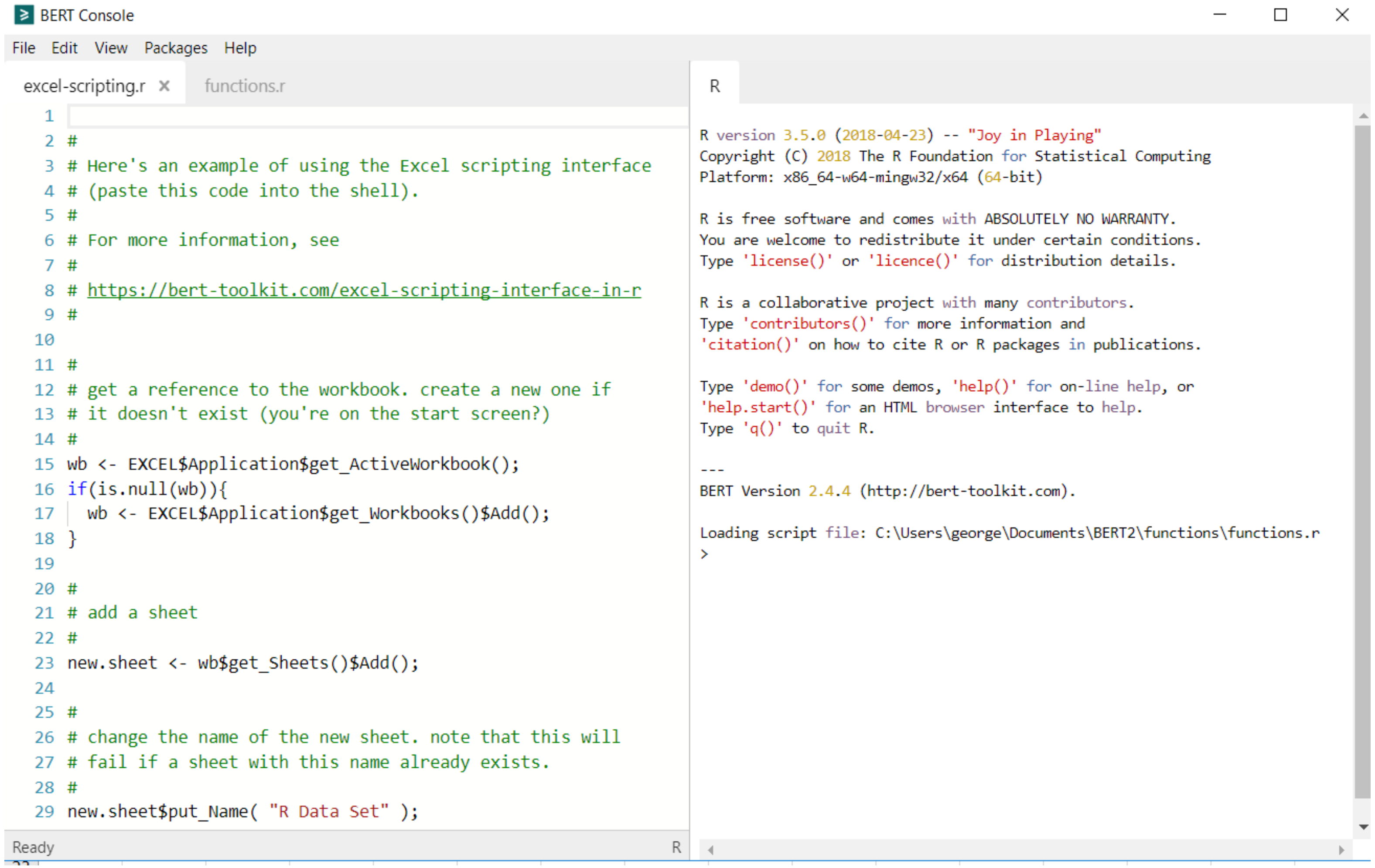
R and Bert

Bert’s R

Console Window

Script file on Left

R Console on Right



```

#
# Here's an example of using the Excel scripting interface
# (paste this code into the shell).
#
# For more information, see
#
# https://bert-toolkit.com/excel-scripting-interface-in-r
#

#
# get a reference to the workbook. create a new one if
# it doesn't exist (you're on the start screen?)
#
wb <- EXCEL$Application$get_ActiveWorkbook();
if(is.null(wb)){
  wb <- EXCEL$Application$get_Workbooks()$Add();
}

#
# add a sheet
#
new.sheet <- wb$get_Sheets()$Add();

#
# change the name of the new sheet. note that this will
# fail if a sheet with this name already exists.
#
new.sheet$put_Name( "R Data Set" );
```

```
R version 3.5.0 (2018-04-23) -- "Joy in Playing"
Copyright (C) 2018 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite 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.

---
BERT Version 2.4.4 (http://bert-toolkit.com).

Loading script file: C:\Users\george\Documents\BERT2\functions\functions.r
>
```

R and Bert - Sending from R to Excel

```
wb <- EXCEL$Application$get_ActiveWorkbook();
if(is.null(wb))
{
  wb <- EXCEL$Application$get_Workbooks()$Add();
}
new.sheet <- wb$get_Sheets()$Add();
new.sheet$put_Name( "R Data Set" );
range$put_Value( iris );
```

R and Bert – f(x)

R processing inside of Excel

Save R script file in ..\Documents\BERT2\functions

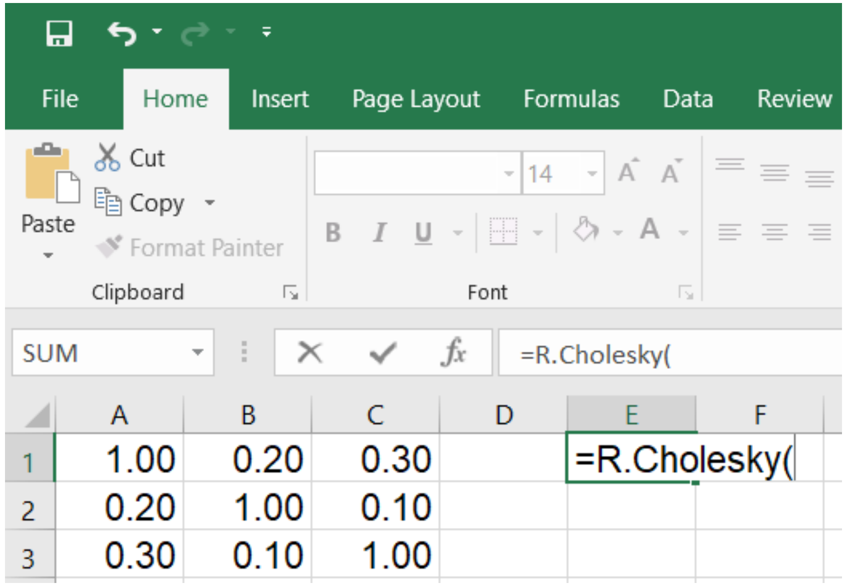
Encapsulate the Function: Choelsky decomposition of a matrix

```
#add the Cholesky decomposition of a matrix
Cholesky <- function(mat)
{
  chol(mat);
}
```

R and Bert – f(x)

Save the R script file.

Functions automagically available in Excel; with “R.” prefix



=R.Cholesky(

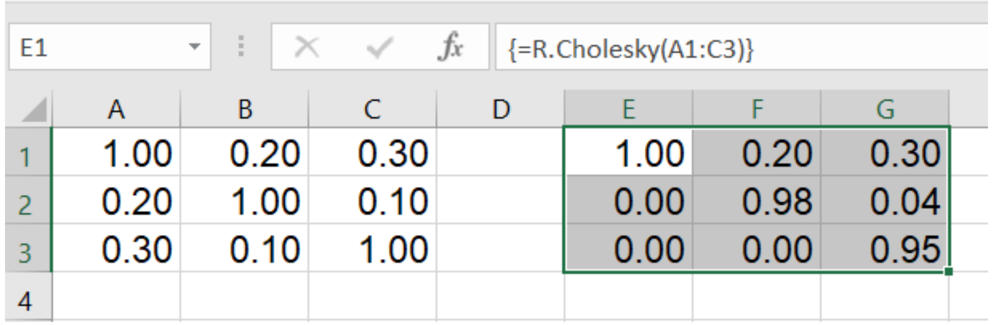
	A	B	C	D	E	F
1	1.00	0.20	0.30		=R.Cholesky(	
2	0.20	1.00	0.10			
3	0.30	0.10	1.00			

R and Bert – f(x)

R processes function

Results returned to Excel.

R returns a matrix; so formula needs to be entered as ctrl-shift-enter to put braces around formula {}



E1

{=R.Cholesky(A1:C3)}

	A	B	C	D	E	F	G
1	1.00	0.20	0.30		1.00	0.20	0.30
2	0.20	1.00	0.10		0.00	0.98	0.04
3	0.30	0.10	1.00		0.00	0.00	0.95
4							

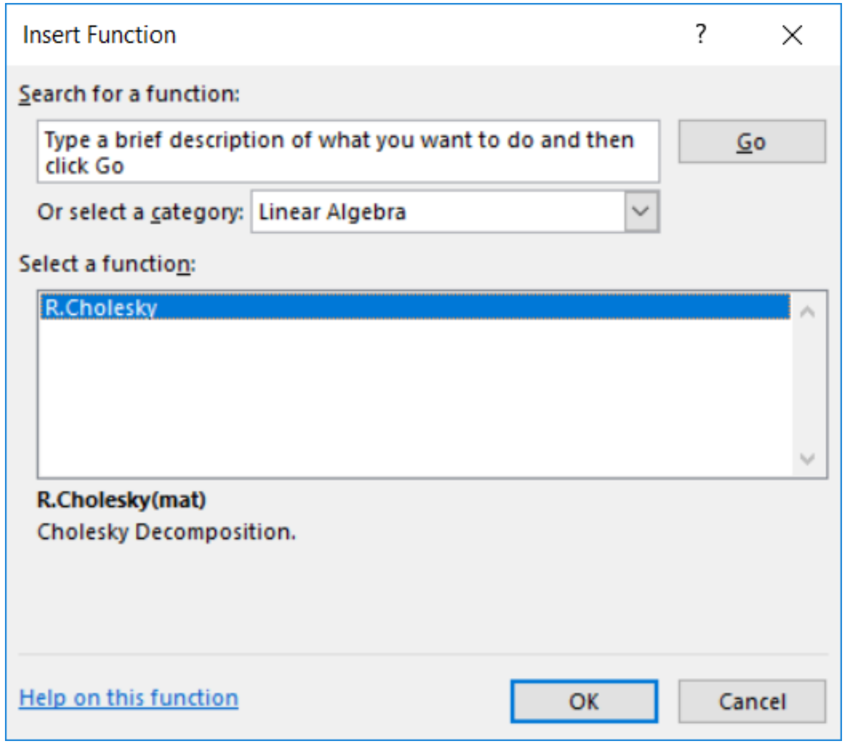
R and Bert – f(x)

Add Category for the R function

```
# put the function into a category for
Excel Functions
attr( Cholesky, "category" ) <- "Linear
Algebra";
```

Add help description for R function

```
# Add a description for the added
function for helpness
attr( Cholesky, "description" ) <-
list( "Cholesky Decomposition",
mat="Input matrix (must be positive-
definite)" );
```



Search for a function:

Type a brief description of what you want to do and then click Go

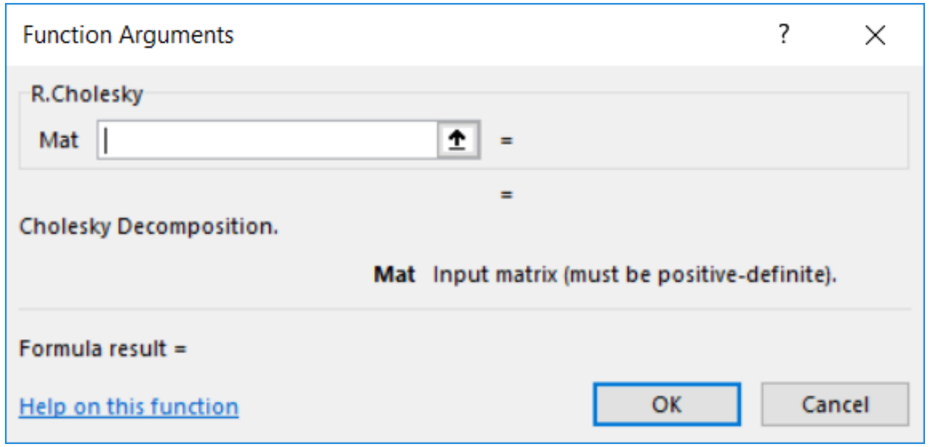
Or select a category: Linear Algebra

Select a function:

R.Cholesky

R.Cholesky(mat)

Cholesky Decomposition.



R.Cholesky

Mat =

=

Cholesky Decomposition.

Mat Input matrix (must be positive-definite).

Formula result =

R and Bert - R Plot in Excel – WHAT??!?!?

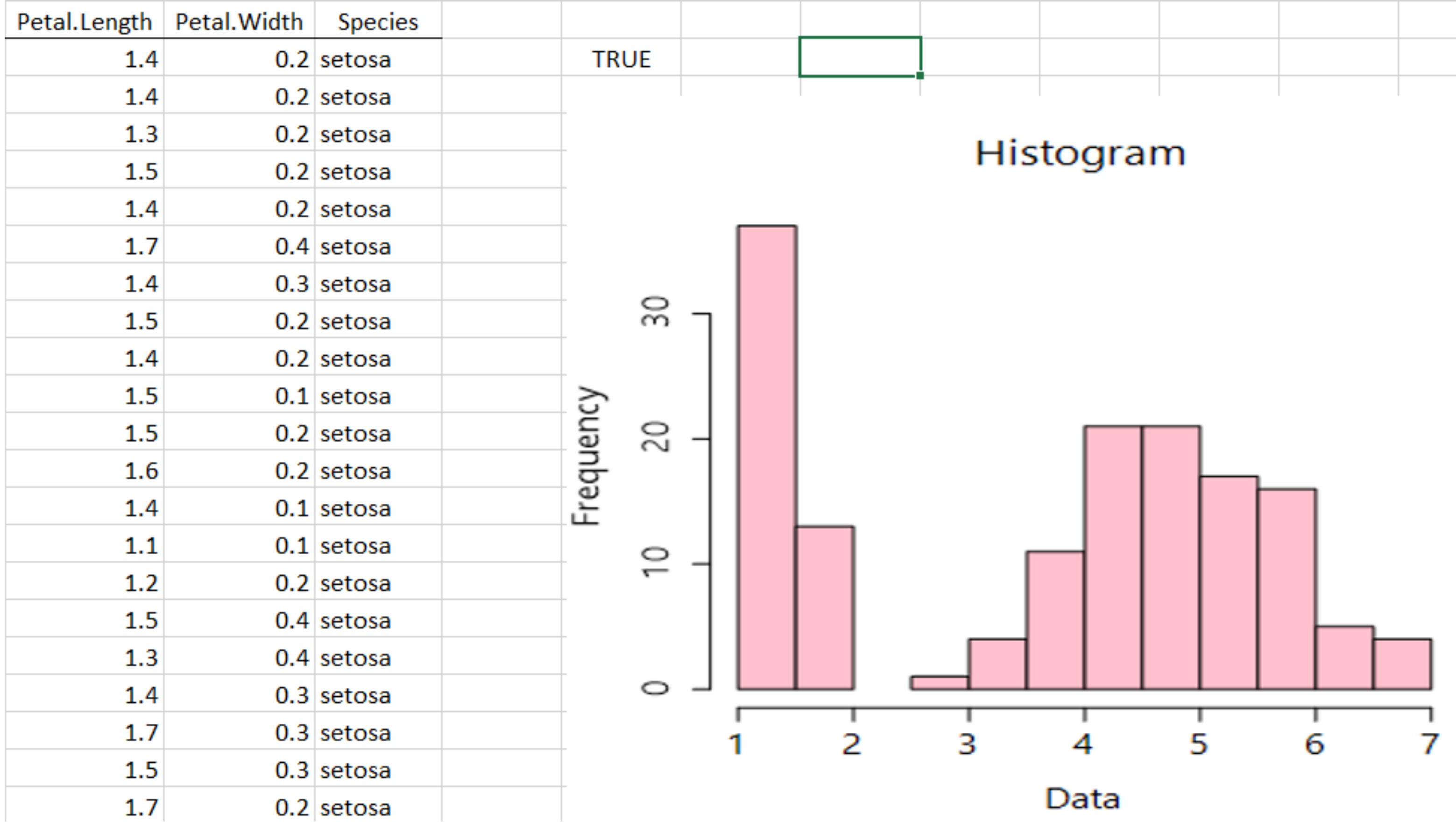
```
graph.histogram <- function(data, main="Histogram", xlabel="Data")
{
# passing cell=T means "use the cell address as a unique identifier".
# otherwise, use the name parameter to identify target shape.
  BERT.graphics.device(cell=T);

# scrub the data (slightly) then generate a histogram
  x <- unlist( as.numeric( data ));
  hist( x, xlab=xlabel, main=main, col="pink", breaks=13,font.main=1);

# we're done with the graphics device; we can shut it off, limit of 63
# active devices so it's a good idea.
  dev.off();

# returning TRUE indicates everything succeeded.
  TRUE
}
```

R and Bert - R Plot in Excel – WHAT??!?!?



Petal.Length	Petal.Width	Species
1.4	0.2	setosa
1.4	0.2	setosa
1.3	0.2	setosa
1.5	0.2	setosa
1.4	0.2	setosa
1.7	0.4	setosa
1.4	0.3	setosa
1.5	0.2	setosa
1.4	0.2	setosa
1.5	0.1	setosa
1.5	0.2	setosa
1.6	0.2	setosa
1.4	0.1	setosa
1.1	0.1	setosa
1.2	0.2	setosa
1.5	0.4	setosa
1.3	0.4	setosa
1.4	0.3	setosa
1.7	0.3	setosa
1.5	0.3	setosa
1.7	0.2	setosa

TRUE

R and PowerBI

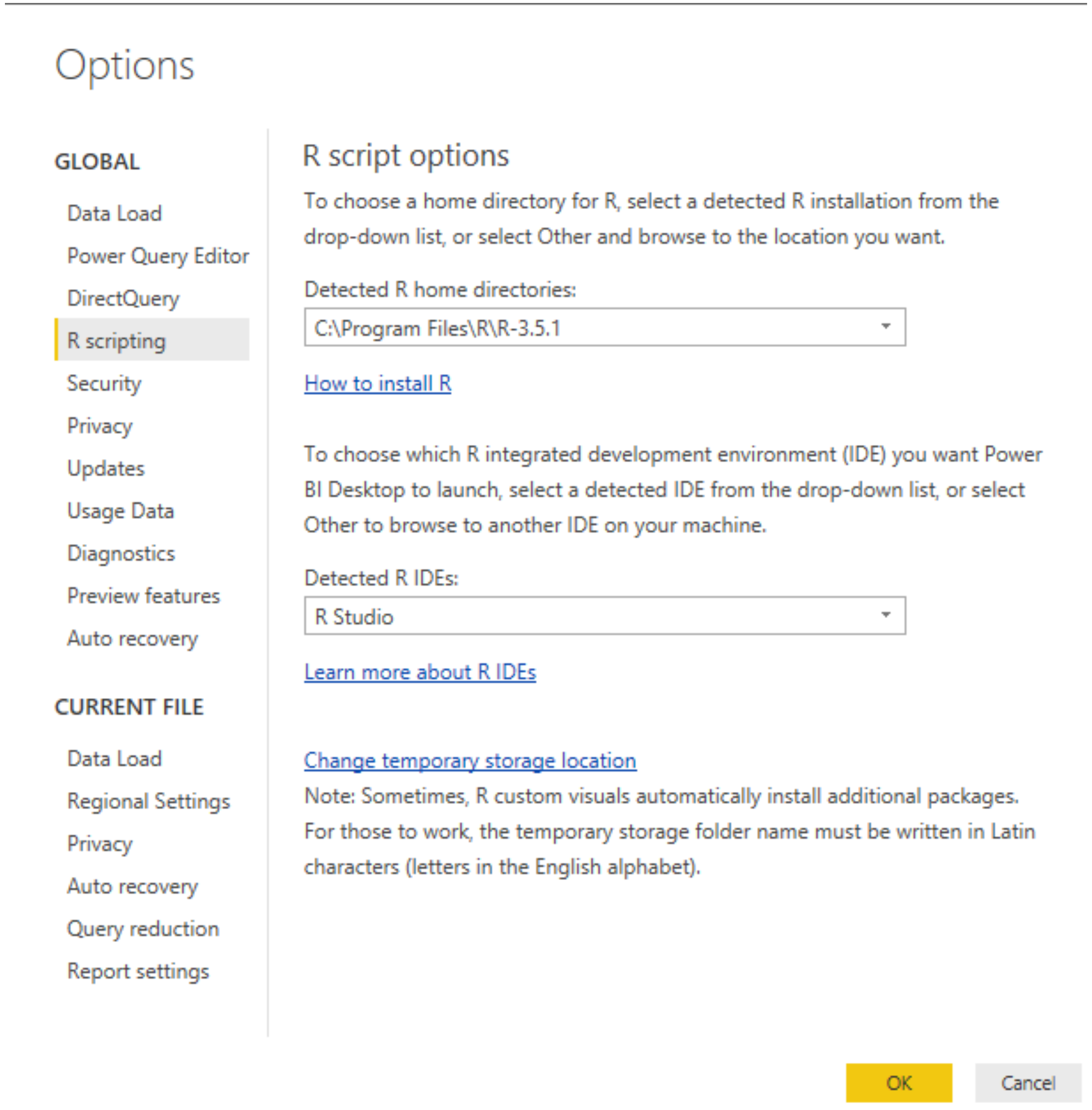
R and PowerBI

After starting PowerBI

File – Options

R Scripting

And the directories are set correctly



R script options

To choose a home directory for R, select a detected R installation from the drop-down list, or select Other and browse to the location you want.

Detected R home directories: C:\Program Files\R\R-3.5.1

How to install R

To choose which R integrated development environment (IDE) you want Power BI Desktop to launch, select a detected IDE from the drop-down list, or select Other to browse to another IDE on your machine.

Detected R IDEs: R Studio

Learn more about R IDEs

Change temporary storage location

Note: Sometimes, R custom visuals automatically install additional packages. For those to work, the temporary storage folder name must be written in Latin characters (letters in the English alphabet).

R and PowerBI – Pull Data From R

Get Data via R Script

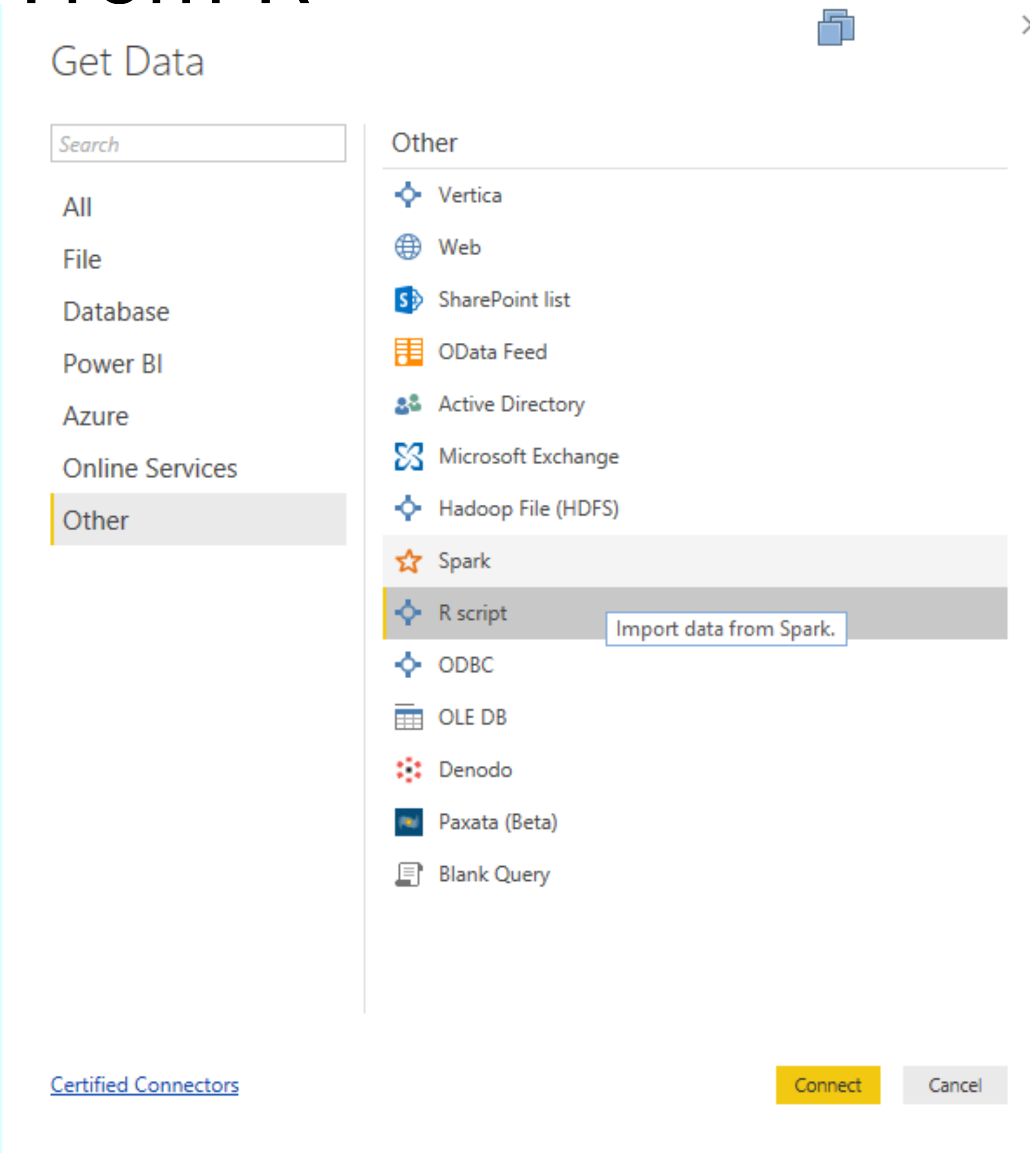
Get Data -> More… ->

Other ->R Script -> Connect Button

Must return a data frame

Can return multiple, and then select which one to use

Complex and Vector types are not supported

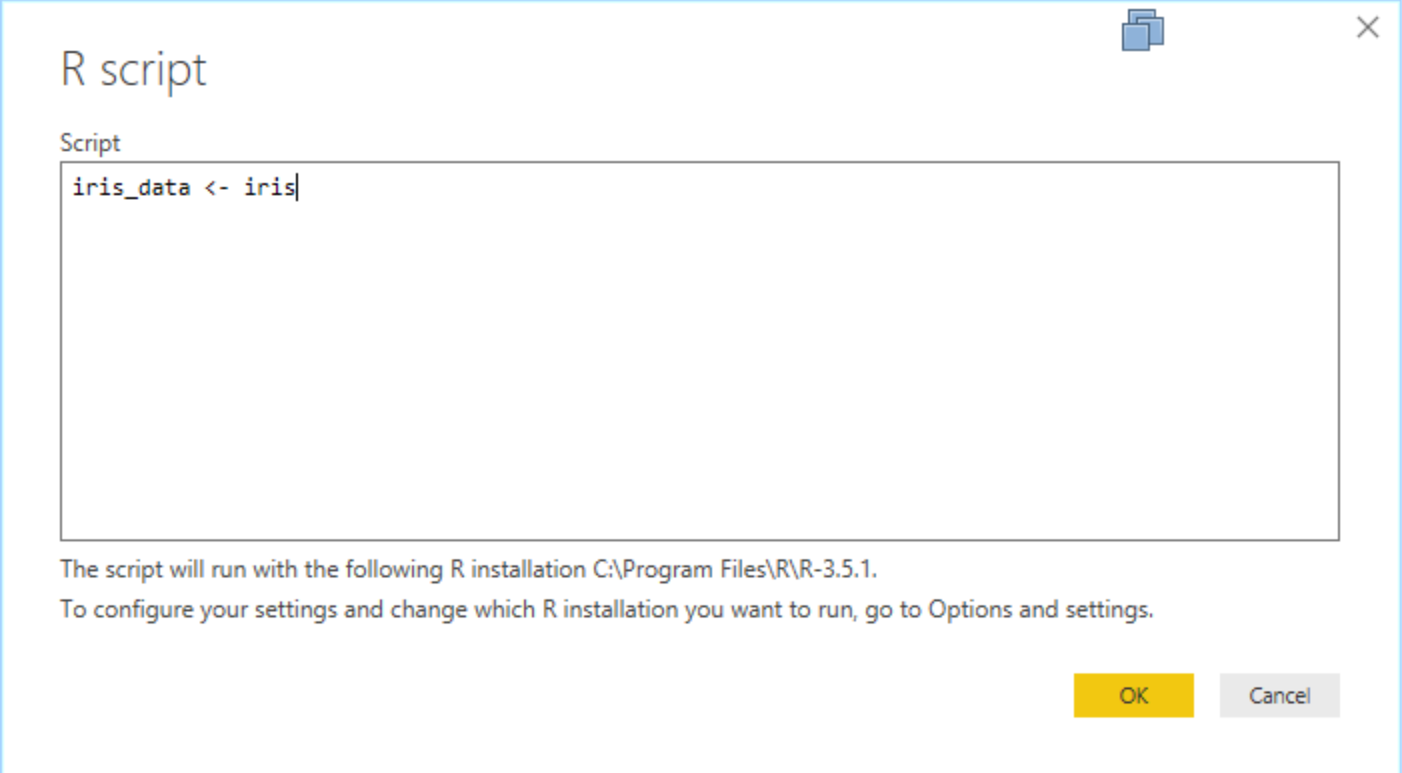


R and PowerBI – Pull Data From R

```
iris_data <- data
```

Must assign the data to a variable for PowerBI to pick it up

Click OK



R script

Script

```
iris_data <- iris
```

The script will run with the following R installation C:\Program Files\R\R-3.5.1.

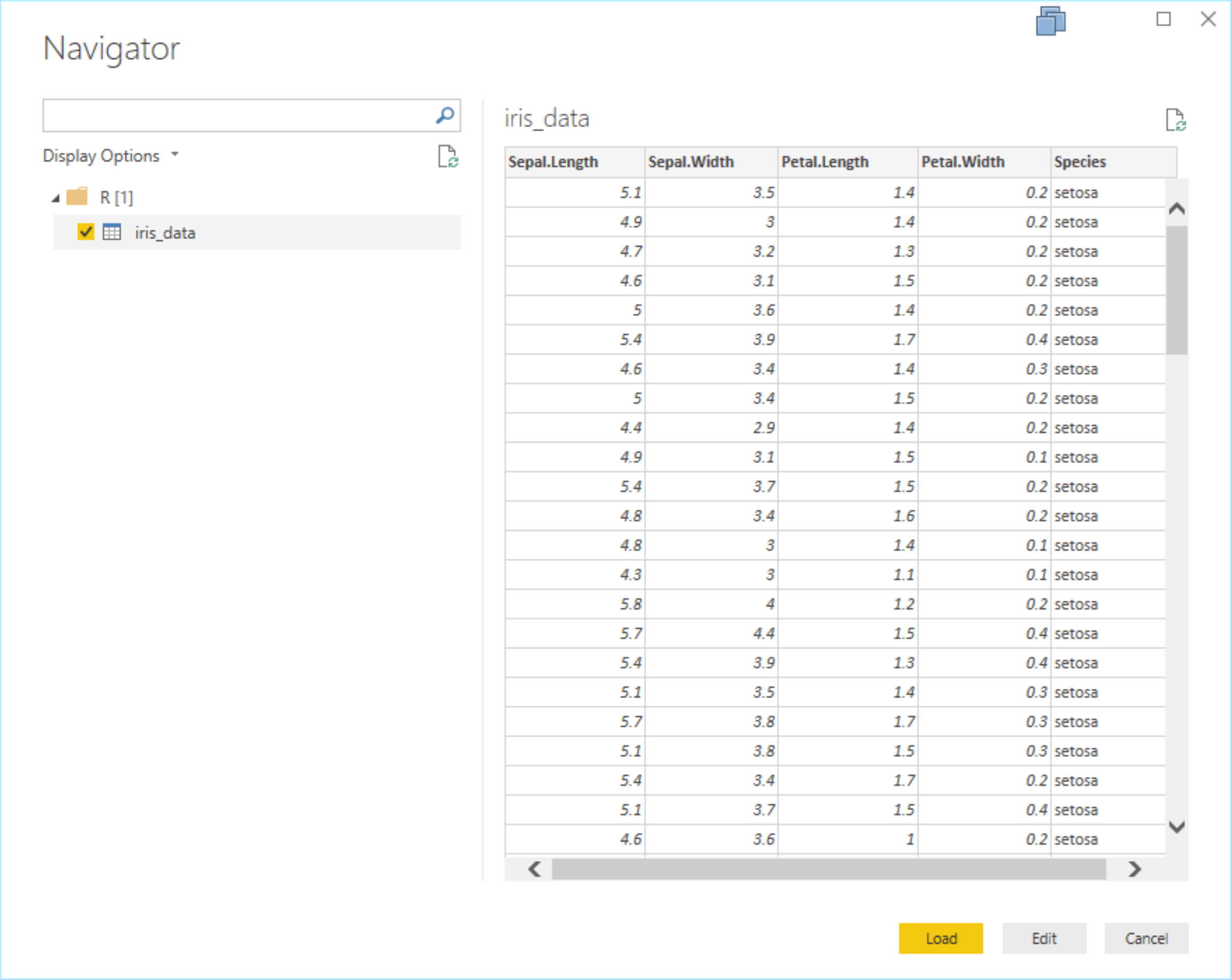
To configure your settings and change which R installation you want to run, go to Options and settings.

R and PowerBI – Pull Data From R

Data Frame on left

Click the box, and preview

Click Load



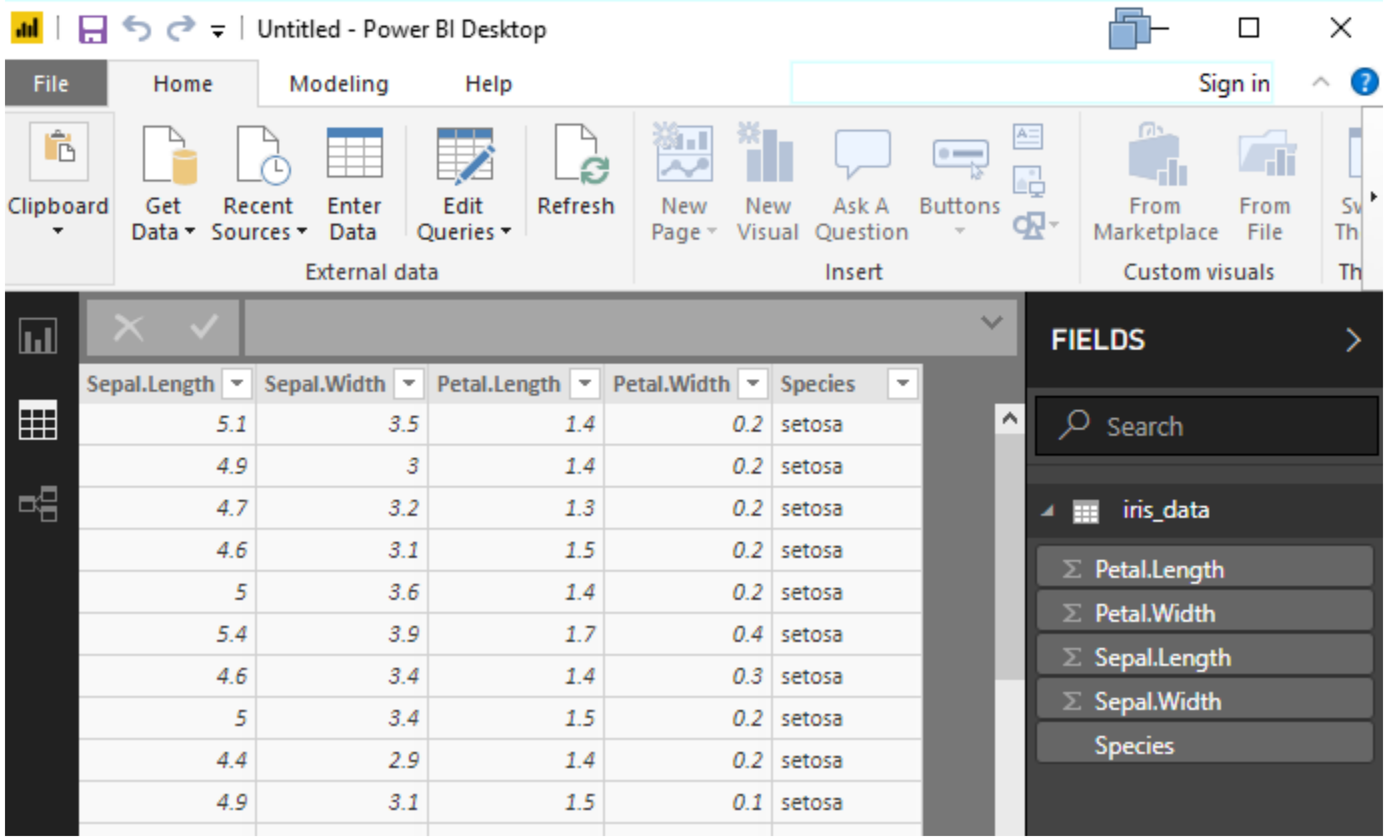
iris_data

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.1	3.5	1.4	0.2	setosa
4.9	3	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa
4.6	3.1	1.5	0.2	setosa
5	3.6	1.4	0.2	setosa
5.4	3.9	1.7	0.4	setosa
4.6	3.4	1.4	0.3	setosa
5	3.4	1.5	0.2	setosa
4.4	2.9	1.4	0.2	setosa
4.9	3.1	1.5	0.1	setosa
5.4	3.7	1.5	0.2	setosa
4.8	3.4	1.6	0.2	setosa
4.8	3	1.4	0.1	setosa
4.3	3	1.1	0.1	setosa
5.8	4	1.2	0.2	setosa
5.7	4.4	1.5	0.4	setosa
5.4	3.9	1.3	0.4	setosa
5.1	3.5	1.4	0.3	setosa
5.7	3.8	1.7	0.3	setosa
5.1	3.8	1.5	0.3	setosa
5.4	3.4	1.7	0.2	setosa
5.1	3.7	1.5	0.4	setosa
4.6	3.6	1	0.2	setosa

R and PowerBI – Pull Data From R

Navigator Window

Shows data and field names

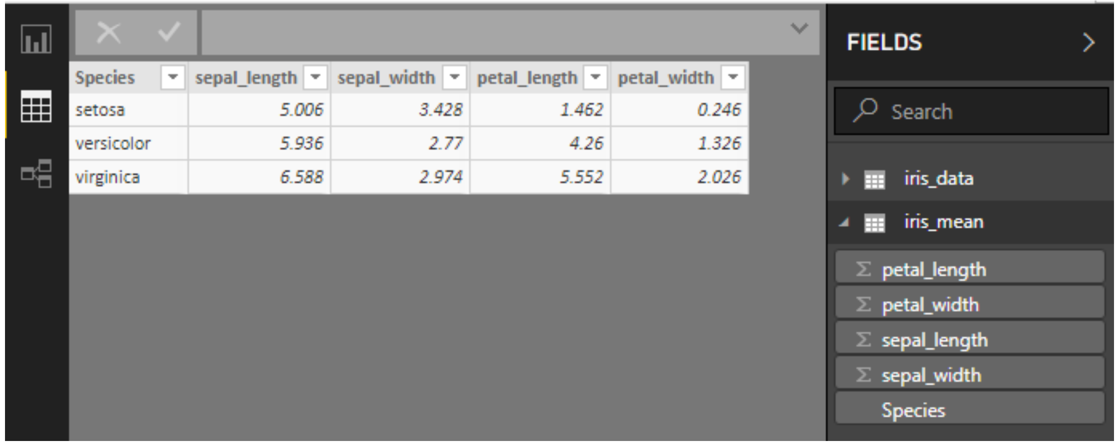


Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.1	3.5	1.4	0.2	setosa
4.9	3	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa
4.6	3.1	1.5	0.2	setosa
5	3.6	1.4	0.2	setosa
5.4	3.9	1.7	0.4	setosa
4.6	3.4	1.4	0.3	setosa
5	3.4	1.5	0.2	setosa
4.4	2.9	1.4	0.2	setosa
4.9	3.1	1.5	0.1	setosa

R and PowerBI – Pull Data From R

Make R do the scrubbing

```
library(dplyr)
iris_mean <- summarize(group_by(iris, Species)
                , sepal_length = mean(Sepal.Length)
                , sepal_width = mean(Sepal.Width)
                , petal_length = mean(Petal.Length)
                , petal_width = mean(Petal.Width)
                )
```



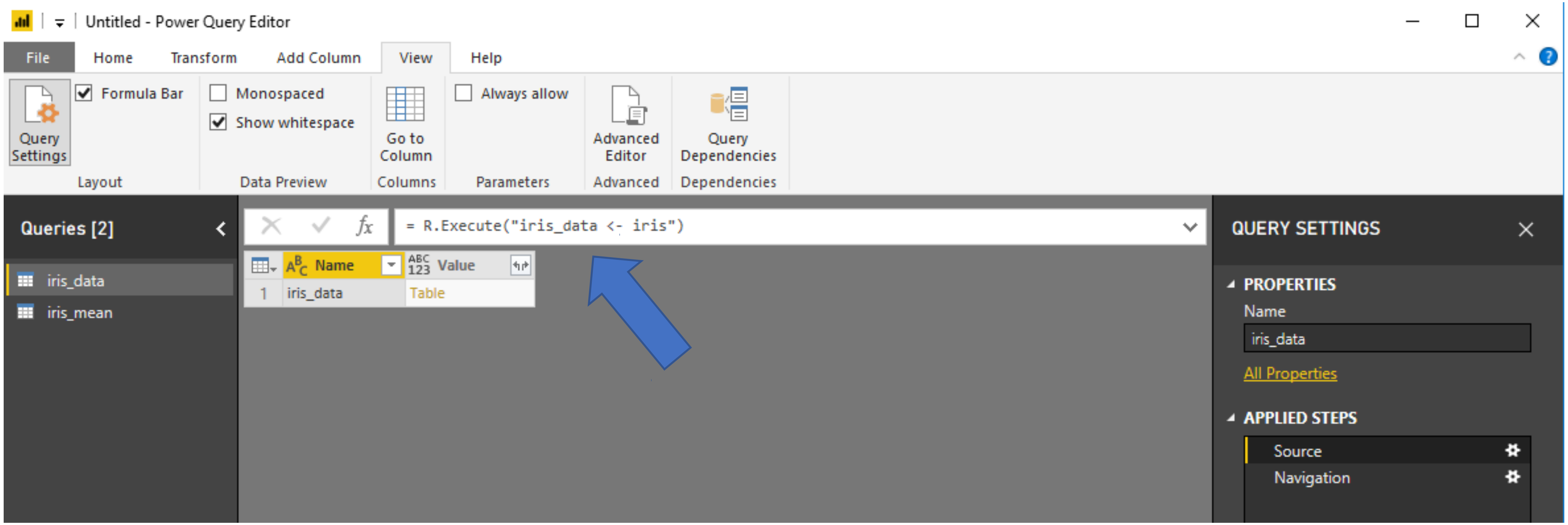
Species	sepal_length	sepal_width	petal_length	petal_width
setosa	5.006	3.428	1.462	0.246
versicolor	5.936	2.77	4.26	1.326
virginica	6.588	2.974	5.552	2.026

R and PowerBI - Unleash the R

Unleash the R

R and PowerBI - Unleash the R

PowerBI adds Source and Navigation Steps



```
= R.Execute("iris_data <- iris")
```

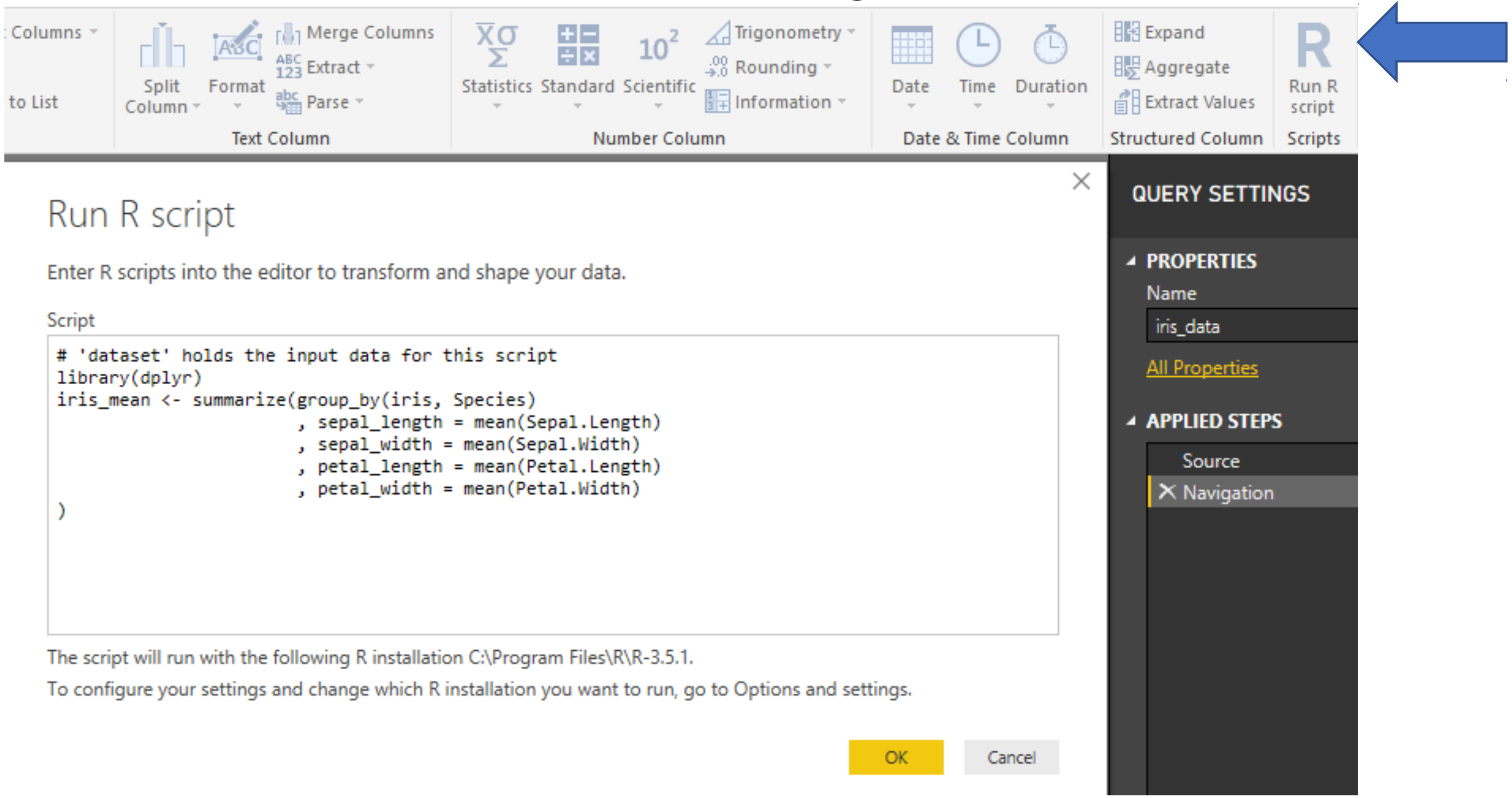
	Name	Value
1	iris_data	Table

Name: iris_data

R and PowerBI - Unleash the R

From the query editor window

Click Run R Script button top Right



Run R script

Enter R scripts into the editor to transform and shape your data.

Script

```
# 'dataset' holds the input data for this script
library(dplyr)
iris_mean <- summarize(group_by(iris, Species)
                        , sepal_length = mean(Sepal.Length)
                        , sepal_width = mean(Sepal.Width)
                        , petal_length = mean(Petal.Length)
                        , petal_width = mean(Petal.Width)
)
```

The script will run with the following R installation C:\Program Files\R\R-3.5.1.

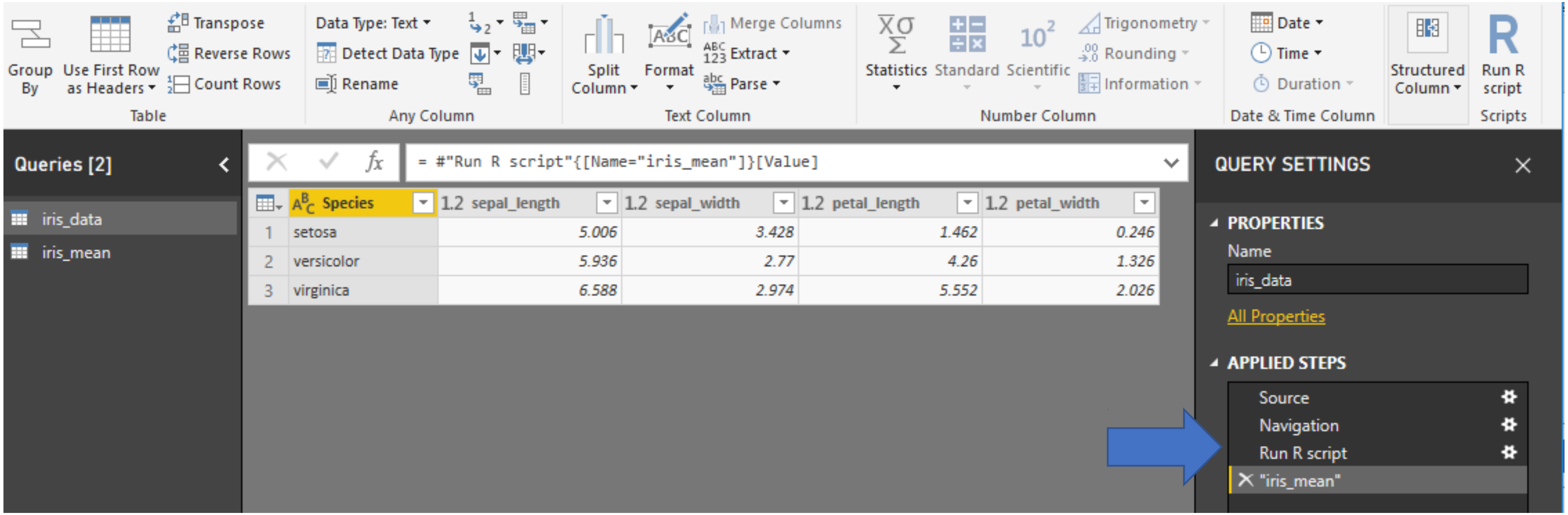
To configure your settings and change which R installation you want to run, go to Options and settings.

Name: iris_data

R and PowerBI - Unleash the R

Two Steps added:

- Run R Script
- iris_mean



```
= #"Run R script"{[Name="iris_mean"]}[Value]
```

	Species	sepal_length	sepal_width	petal_length	petal_width
1	setosa	5.006	3.428	1.462	0.246
2	versicolor	5.936	2.77	4.26	1.326
3	virginica	6.588	2.974	5.552	2.026

Name: iris_data

Applied steps:

- Source
- Navigation
- Run R script
- "iris_mean"

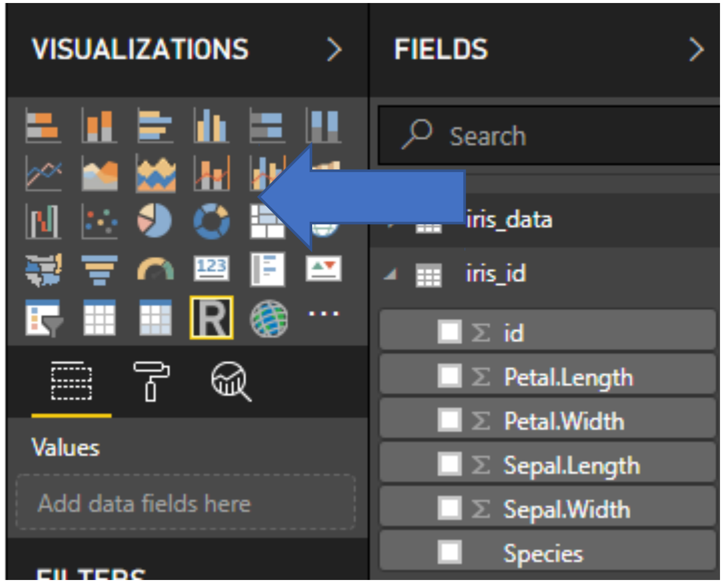
R and PowerBI – Pretty Pictures Please

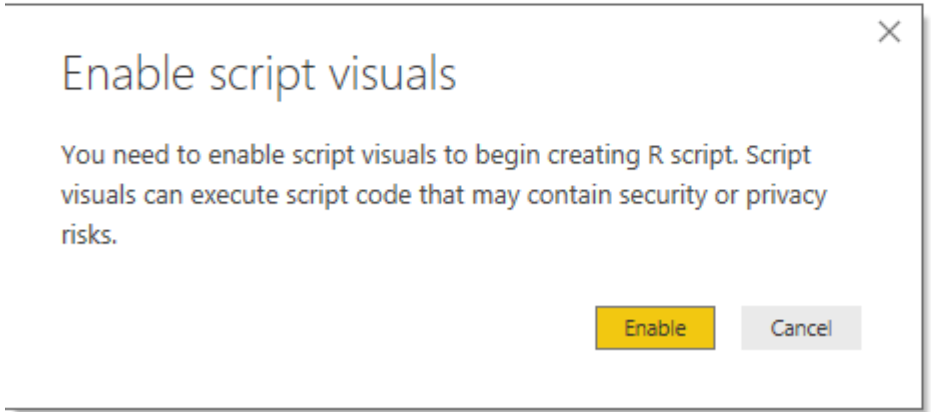
R and PowerBI – Pretty Pictures Please

Load another data frame with the iris data set

Report view and click the R button on the Visualizations pane.

Click Enable for the pop up window





Enable script visuals

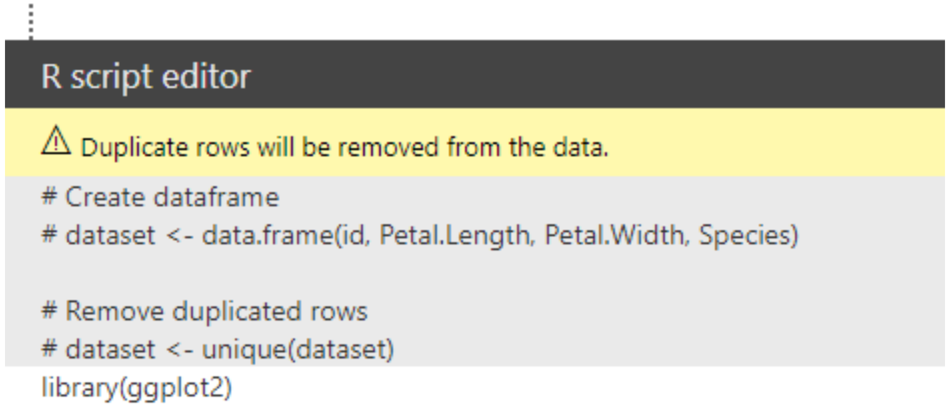
You need to enable script visuals to begin creating R script. Script visuals can execute script code that may contain security or privacy risks.

R and PowerBI – Pretty Pictures Please

Copy you code to R script editor

Place code after the comments

You must refer to the data frame as **dataset**



R script editor

⚠ Duplicate rows will be removed from the data.

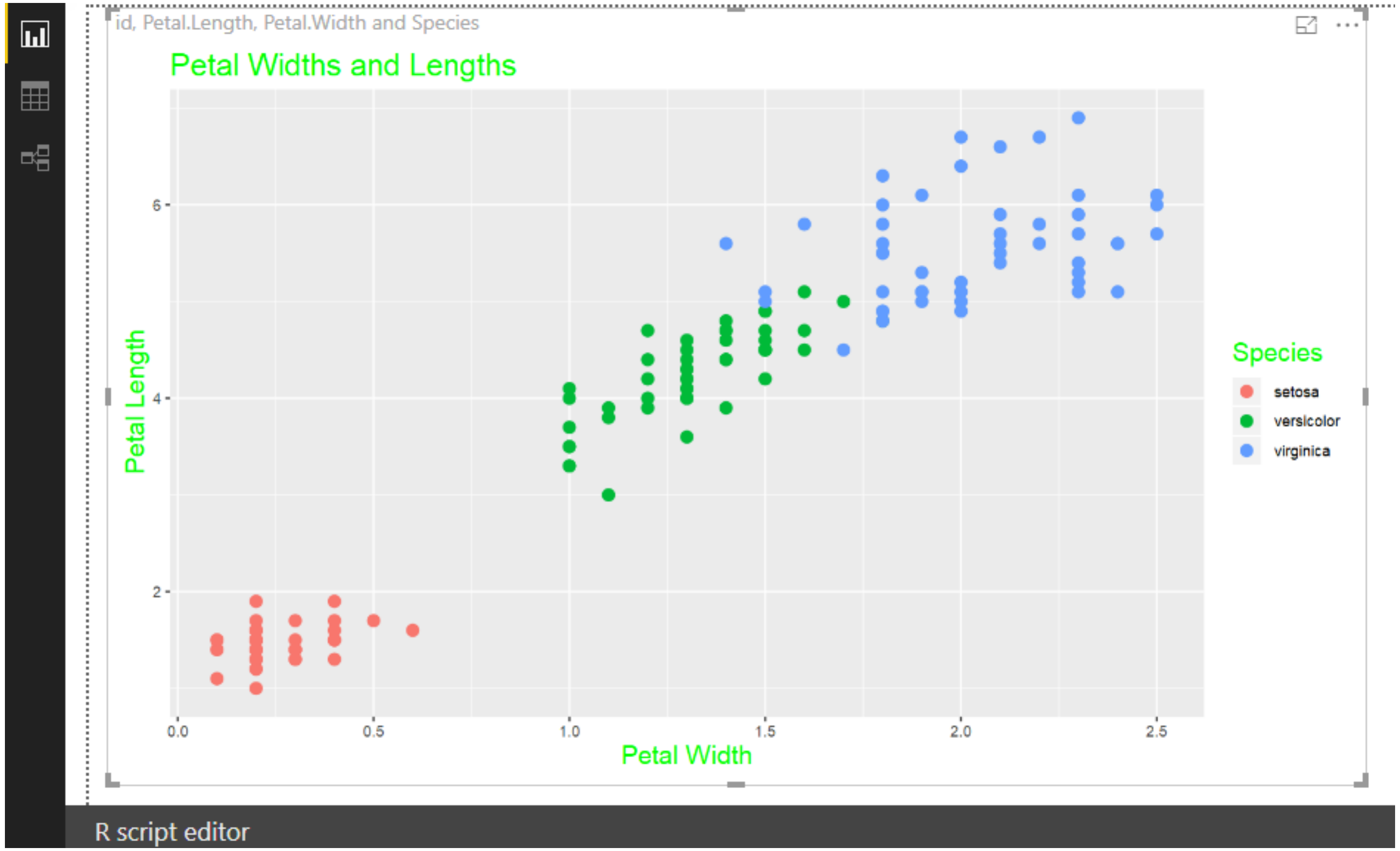
```
# Create dataframe
# dataset <- data.frame(id, Petal.Length, Petal.Width, Species)

# Remove duplicated rows
# dataset <- unique(dataset)
library(ggplot2)
```

R and PowerBI – Pretty Pictures Please

Click – Run Script button

After re-sizing the graph, ctrl-r to refresh

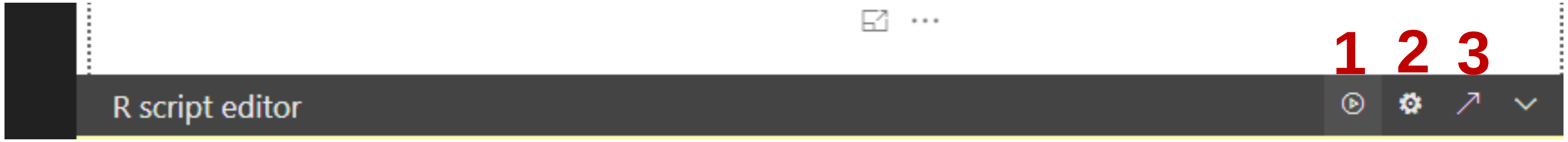


R and PowerBI – Pretty Pictures Please

1. Run Script

2. Script Options

3. Edit in IDE



R and PowerBI – Pretty Pictures Please

Custom Visualizations

Click ellipses in visualization pane and can import R visualizatons

3 Lightning Topics

References

Excel and R

https://bert-toolkit.com/

R and PowerBI

https://powerbi.microsoft.com/en-us/downloads/

https://www.red-gate.com/simple-talk/sql/bi/power-bi-introduction-working-with-r-scripts-in-power-bi-desktop-part-3/

https://community.powerbi.com/t5/R-Script-Showcase/bd-p/RVisuals