PBIUG
POWER BI USER GROUP

Getting Started with R Scripting in Power BI Desktop

Presented by Ted Pattison

WELCOME TO THE POWER BI USER GROUP (PBIUG)

THE OFFICIAL USER GROUP FOR POWER BI USERS. OUR MISSION IS TO ENGAGE EVERY INDIVIDUAL USING POWER BI IN VALUE-ADDED NETWORKING, COLLABORATION AND KNOWLEDGE SHARING.

About Ted Pattison and Critical Path Training

Ted Pattison

- 25 years as an author, technical trainer & conference speaker
- Specializing in Power BI, Office 365, SharePoint & Azure
- Awarded as SharePoint MVP by Microsoft 12 years in a row

Critical Path Training

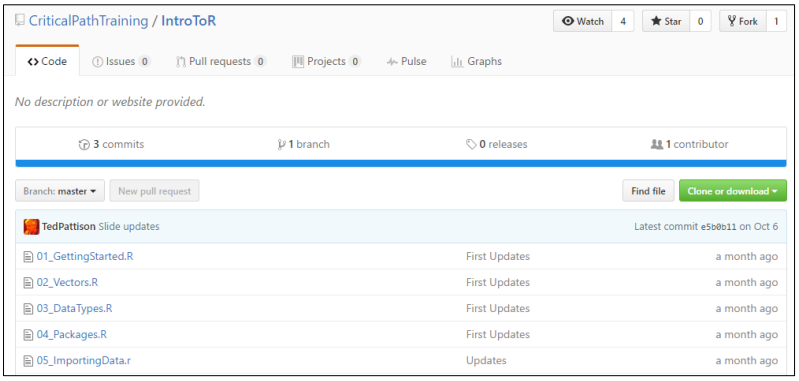
- Advanced technical training on Power BI, SharePoint & others
- Offering **Power BI Bootcamp** as 3-day deep dive into Power BI
- https://www.criticalpathtraining.com

My Upcoming Power BI Training Events

- Power BI Bootcamp in Tampa on Nov 29 and Jan 23
- Dynamic Communities Distance Learning Course
- Dynamic Communities Events (e.g. Focus, Summit)

Sample Code from the Webinar

- All code maintained in GitHub repository
  - https://github.com/CriticalPathTraining/IntroToR



Agenda

- Understanding R as an Analytics Platform
- Installing Microsoft R Open and RStudio
- Writing R Code in RStudio
- Integrating R with Power BI Desktop

What is R?

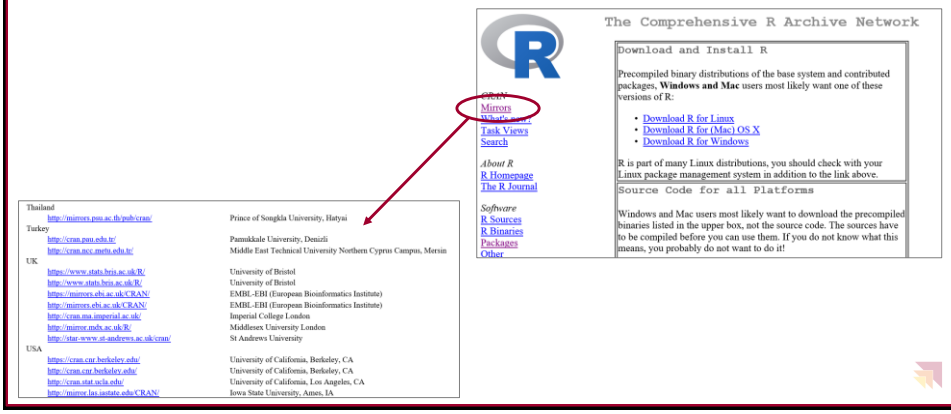
- What is R?
  - Platform for statistics, data analysis and visualization
  - Free, cross-platform, open source software
  - Programming language + Runtime layer + Libraries
  - R code distributed and versioned using packages
  - Flourishing ecosystem of R package authors
- Why do you need it?
  - Analyzing data and generating statistics
  - Creating rich graphs and charts
  - Fitting statistical models for predictive analysis

R Packages

- Package is versioned redistributable unit of code
  - Package contains functions, data and compiled code
  - R is installed with a default set of packages
  - Other packages can be downloaded and installed
- Examples of available domain-specific packages
  - Packages to download and unpack data in zip archive
  - Packages to create fancy charts and graphs
  - Packages to optimize financial portfolios
  - Packages predict component failure times
  - Packages to analyze genomic sequences

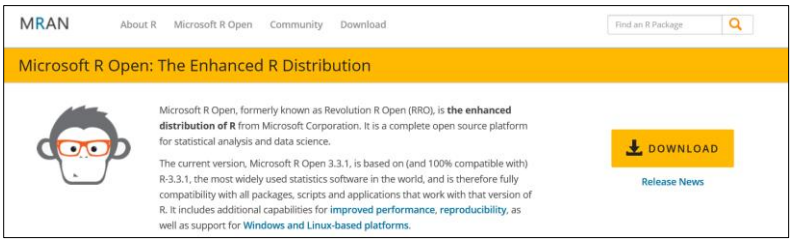
CRAN

- The Comprehensive R Archive Network
  - Public archive with over 8,000 downloadable packages
  - http://cran.us.r-project.org/



Microsoft R Open

- What is Microsoft R Open?
  - An enhanced distribution of R from Microsoft
  - Improved performance and multithreading
  - Reproducibility through package versioning stability
  - Free, cross-platform, open source software
  - Available at https://mran.microsoft.com/open/



Stages of R Awareness

- Stage 1: Standing Up
  - Installing the environment and playing with data
- Stage 2: Walking
  - Writing & testing R code and creating graphs and charts
- Stage 3: Jogging
  - Crunching numbers to generate advanced statistics
- Stage 4: Running
  - Creating a domain-specific predictive model
- Stage 5: Sprinting
  - Distributing your predictive model as a CRAN package

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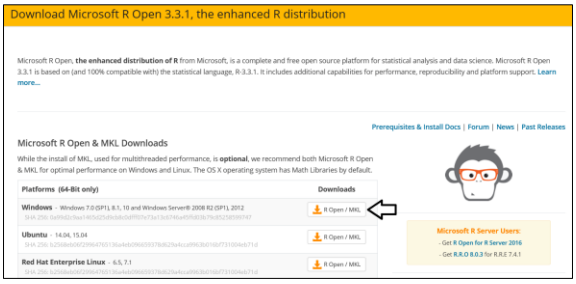
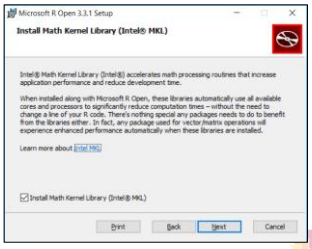
Install Microsoft R Open

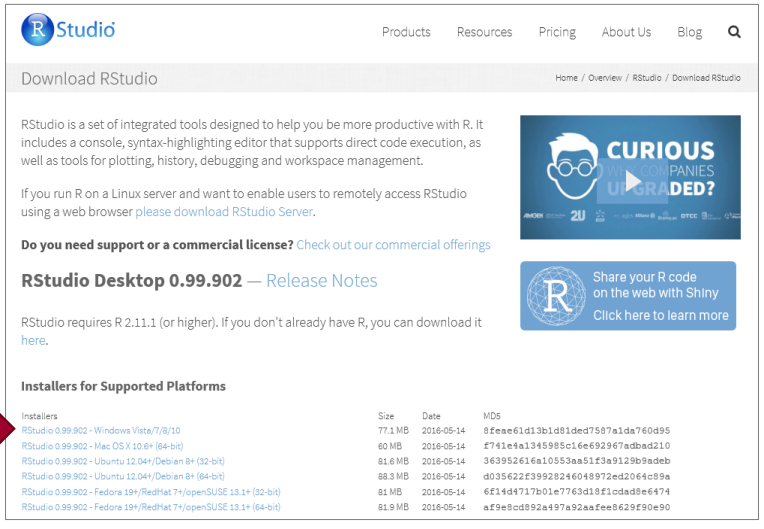
- https://mran.microsoft.com/download/



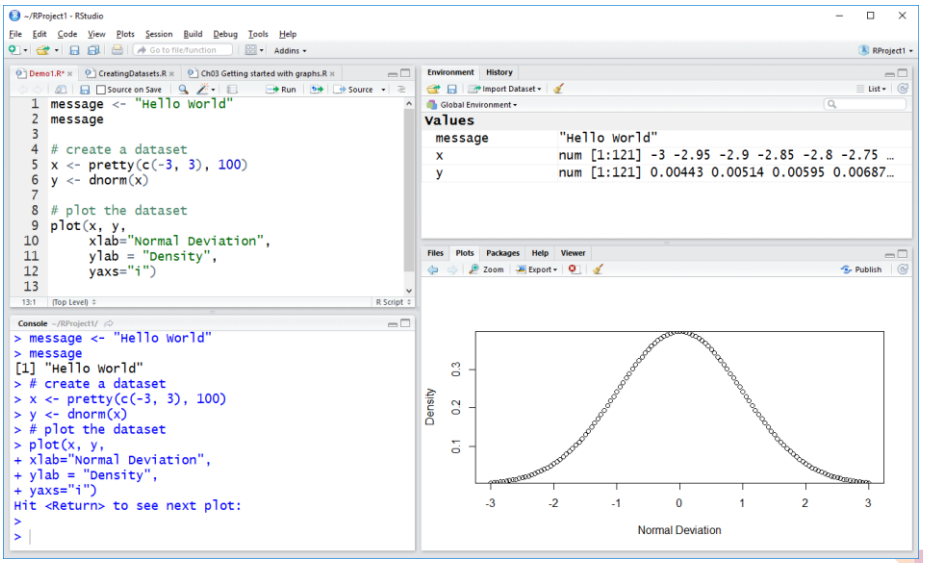


Installing R Studio

- https://www.rstudio.com/products/rstudio/download/



The RStudio IDE



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R Projects and Workspaces

- R projects based on folder structure
  - Data and scripts added to current working directory
- Each R project defines a workspace
  - Workspace tracks set of user-defined objects
  - Workspace defines set of loaded packages
  - Workspace data saved/loaded using .RData files

```
Console ~/RProject1/
> getwd()
[1] "C:/Users/Student/Documents/RProject1"
> .libPaths()
[1] "C:/Users/Student/Documents/R/win-library/3.2"
[2] "C:/Program Files/Microsoft/MRO/R-3.2.4/library"
>
```

Writing and Testing R Code in Scripts

01_GettingStarted.R

Source on Save

```
1  # use <- for variable assignment
2  message <- "Hello World"
3
4  print(message)
5
6  # create vector using the c function
7  vector1 <- c(2, 4, 6,  8)
8
9  # create vectors using sequence
10 vector2 <- 1:10
11 vector3 = letters[1:5]
12 vector4 = LETTERS[24:26]
13 vector6 = 2^(1:8)
14
15 # create vector with electin years
16 election.years <- seq(from = 1996, to = 2016, by = 4)
17
18 # enumerate through election years using for loop
19 for (year in election.years){
20     print(paste(year, "is an election year"))
21 }
22
23 # remove all objects from workspace
24 rm(list=objects())
```

R Objects

- In R, variables represent named objects
- Object names can contain
  - Letters
  - Numbers
  - Underscores (_)
  - Dots (.)

Essential Data Structures in R

- Vector
  - One-dimensional, single-mode array
- Matrix
  - Two-dimensional, single-mode array
- Array
  - N-dimensional, single-mode array
- List
  - Ordered collection of multi-mode objects
- Data frame
  - Two-dimensional, multi-mode array
- Factor
  - Integer-backed list of categorical values

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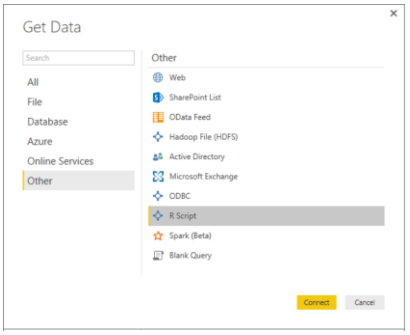
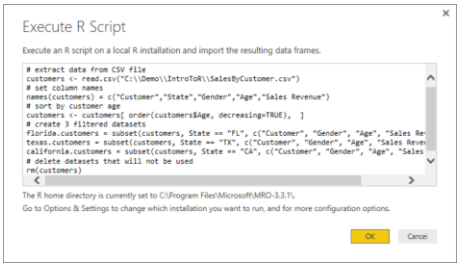
Where Can You Use R Code in PBIDT?

- As a data source to a query
  - You can use R code to import and reshape data
- Within a Query Applied Step
  - You can use R code to add transforms to a query
- Inside an R Visual in a Power BI Report
  - You can use R code to creates charts from your data

Using R Code as a Query Data Source

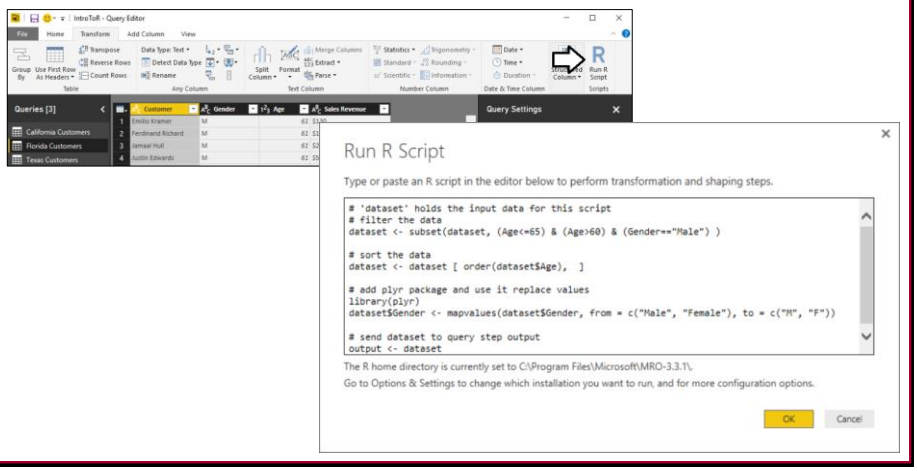
- Create new query based on R script
  - Copy and paste code from RStudio into PBIDT



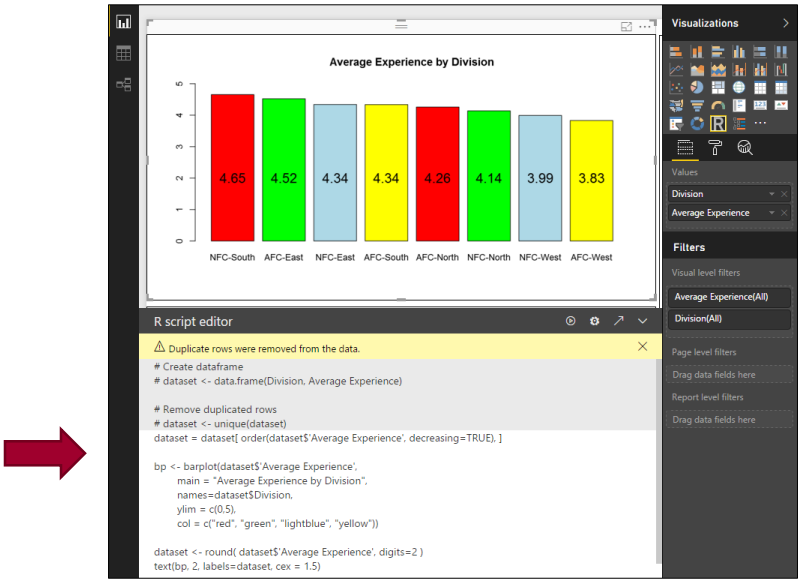


Using R Code as an Applied Query Step

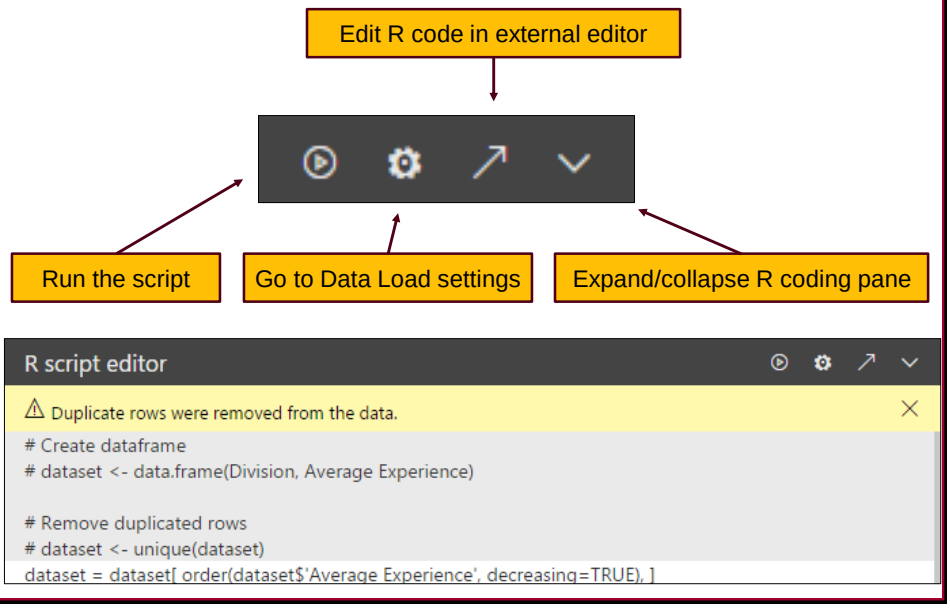
- Add new Run R Script step to query
  - Use R code and R packages to transform data



R Visuals in Power BI



New R Features in September Release



R Integration Limitations with Power BI

- Power BI Desktop R Limitations
  - Only data frames are imported
  - Complex columns and Vector columns are not imported
  - Values that are N/A are translated to NULL values
  - Prompting for user input halts script
  - R visual data for plotting is limited to 150,000 rows
  - R visual calculation times out with error after 5 minutes
  - R visual is not interactive – no highlighting support
  - Plots can only be displayed to R default display device

Summary

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- ✓ Writing R Code in RStudio
- ✓ Integrating R with Power BI Desktop

- ❑ GitHub repository with code for this webinar
  - ➢ https://github.com/CriticalPathTraining/IntroToR

- ❑ Check out Power BI training at **Critical Path Training**
  - ➢ https://www.criticalpathtraining.com