

TABLEAU

CONFERENCE



#TC18

Accelerate Your Advanced Analytics R, Python & MATLAB

Erik Polano

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Tableau

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Team Lead, Product Consultancy

Tableau

Session Overview

Accelerate Your

Advanced anal
course of actio
learning mode
types of advan
and how to use

Speaker(s):

Erik Polano,
Erwin van La

Content Type:

Level: Advance

Track: Analytic



finding the best
stom machine
on reviews broad
possible, when



Agenda

Tableau's Built in Analytics

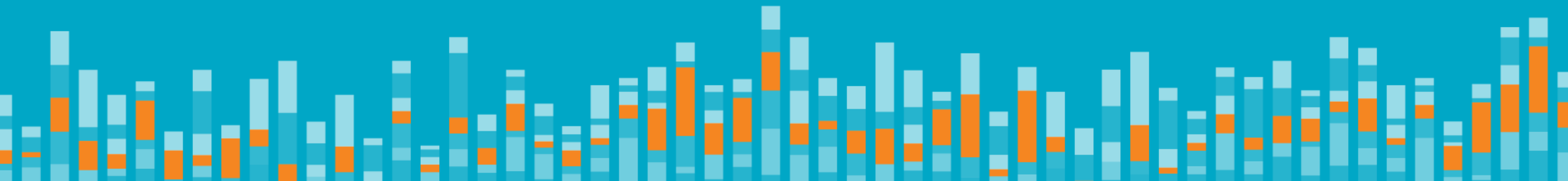
External Services Connection

Live Calculations

Materialized Calculations

Summary

Introduction

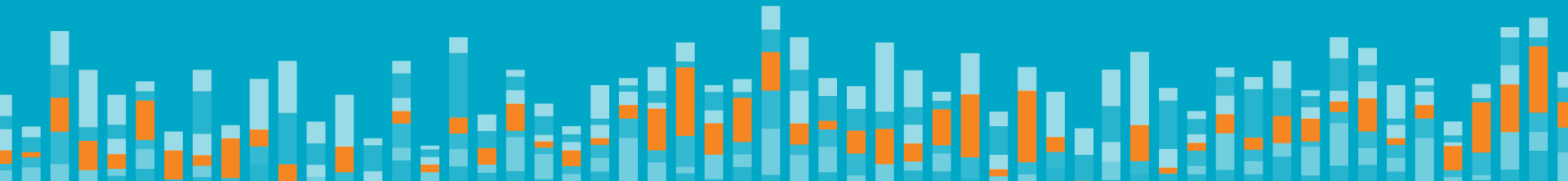


Erwin van Laar

Team Lead, Product Consultancy, Tableau

Erik Polano

Associate Solution Architect, Tableau



Objective

Create interactive dashboards...

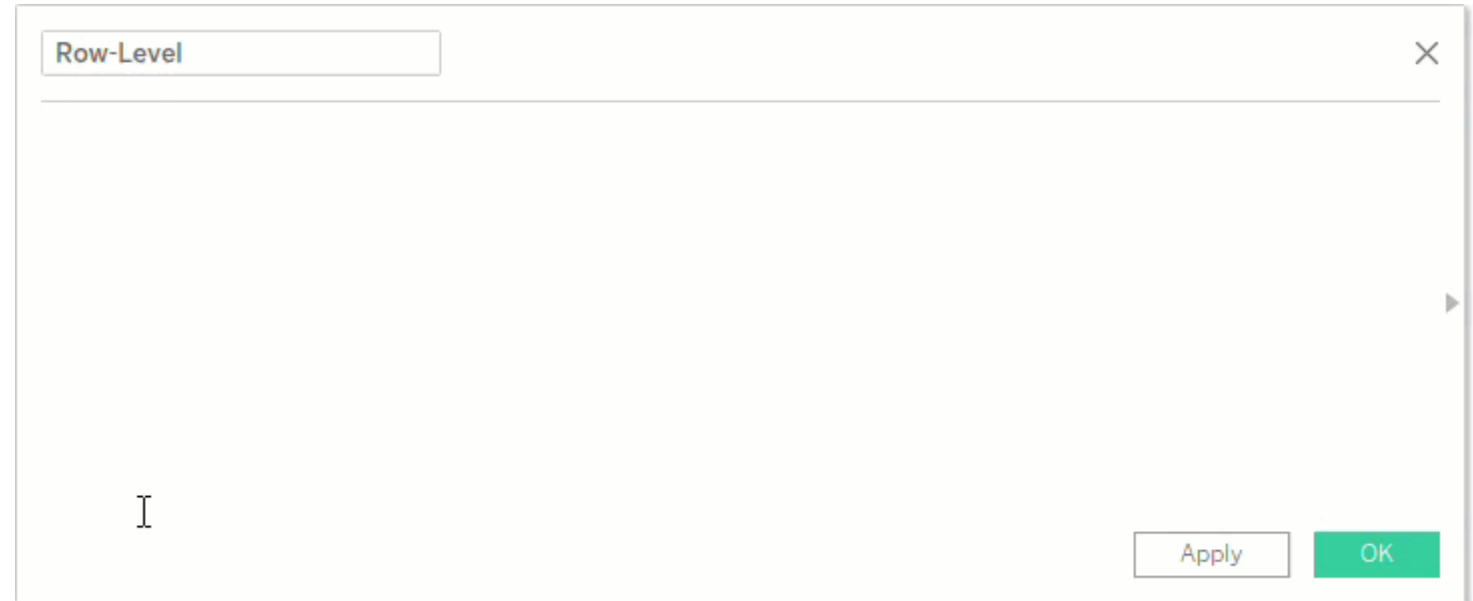
Without the consumer needing to understand code...

That enables them to answer questions...

That are not contained in the underlying data source

Built in Analytics in Tableau

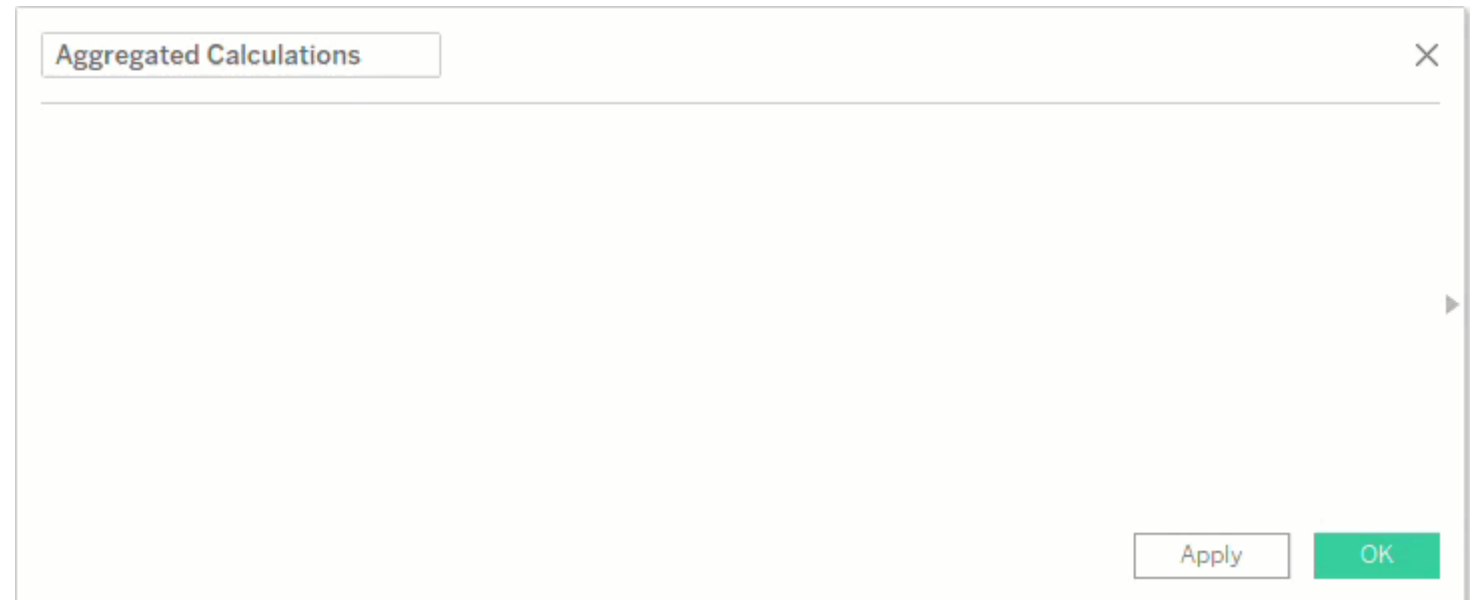
Row level calculations



Built in Analytics in Tableau

Row level calculations

Aggregated Calculations

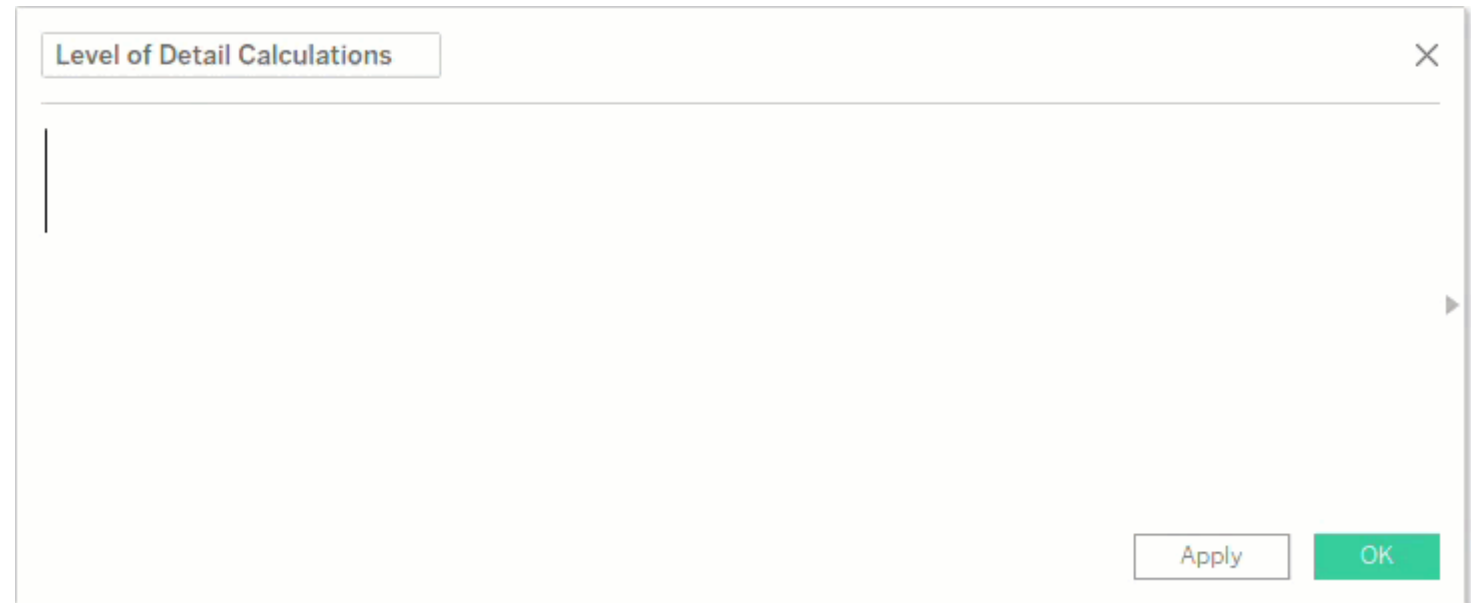


Built in Analytics in Tableau

Row level calculations

Aggregated Calculations

Level of Detail expressions



Built in Analytics in Tableau

Row level calculations

Aggregated Calculations

Level of Detail expressions

Table Calculations

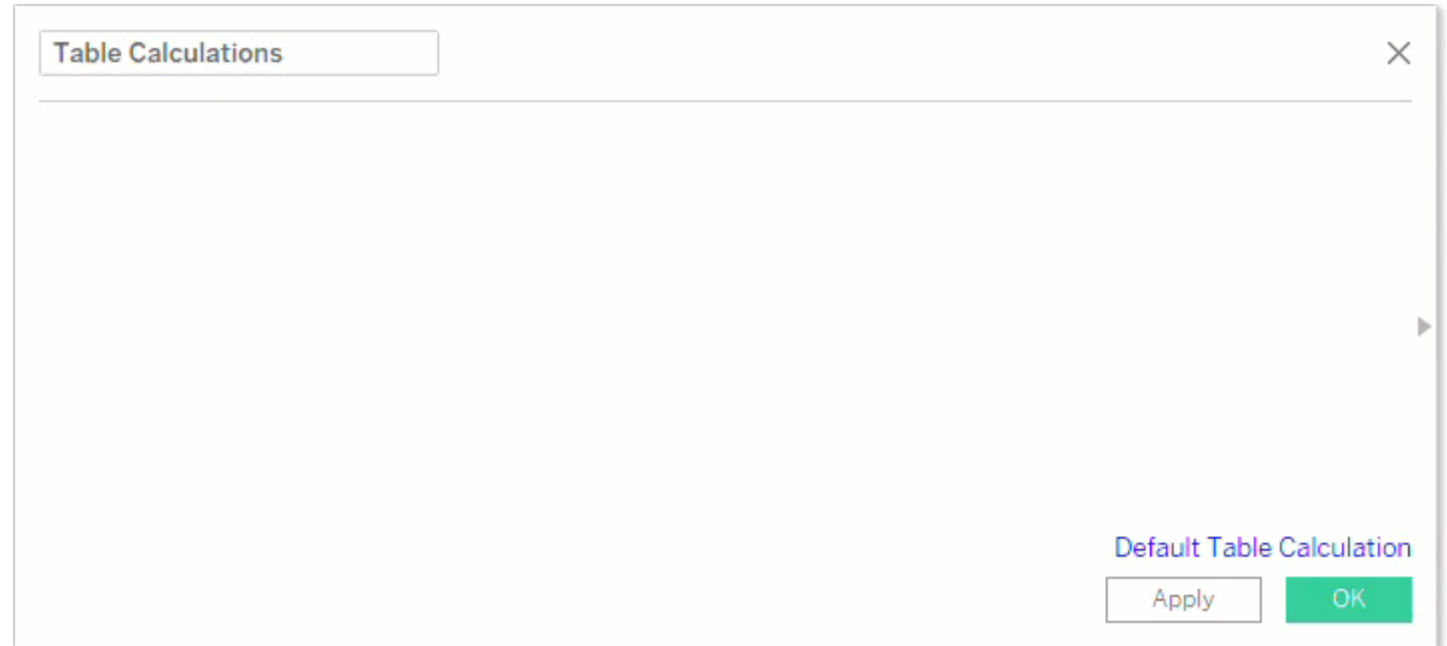
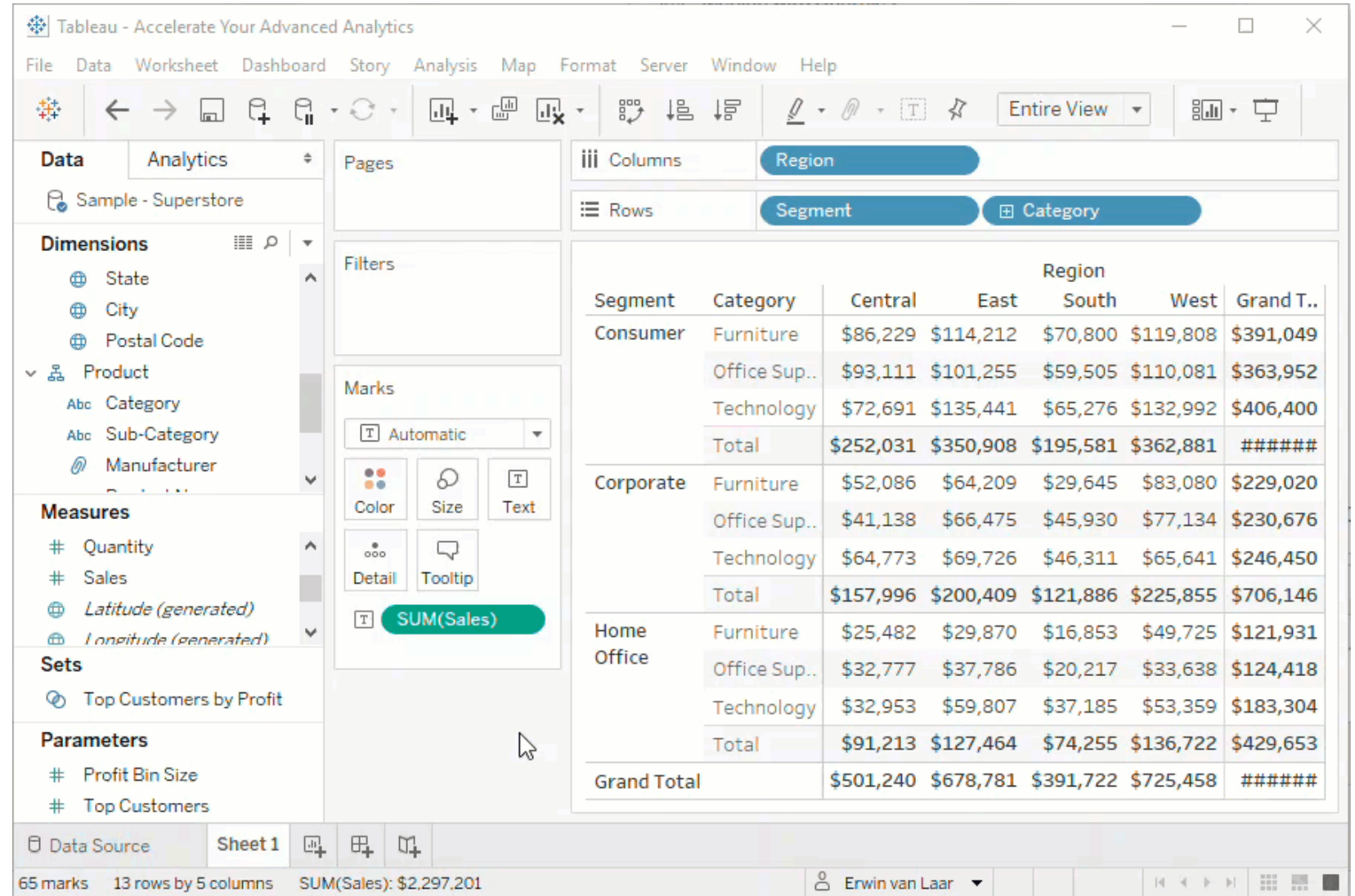


Table Calculations

Based on the
Level of
Aggregation in
the View



Built in Analytics in Tableau

Row level calculations

Aggregated Calculations

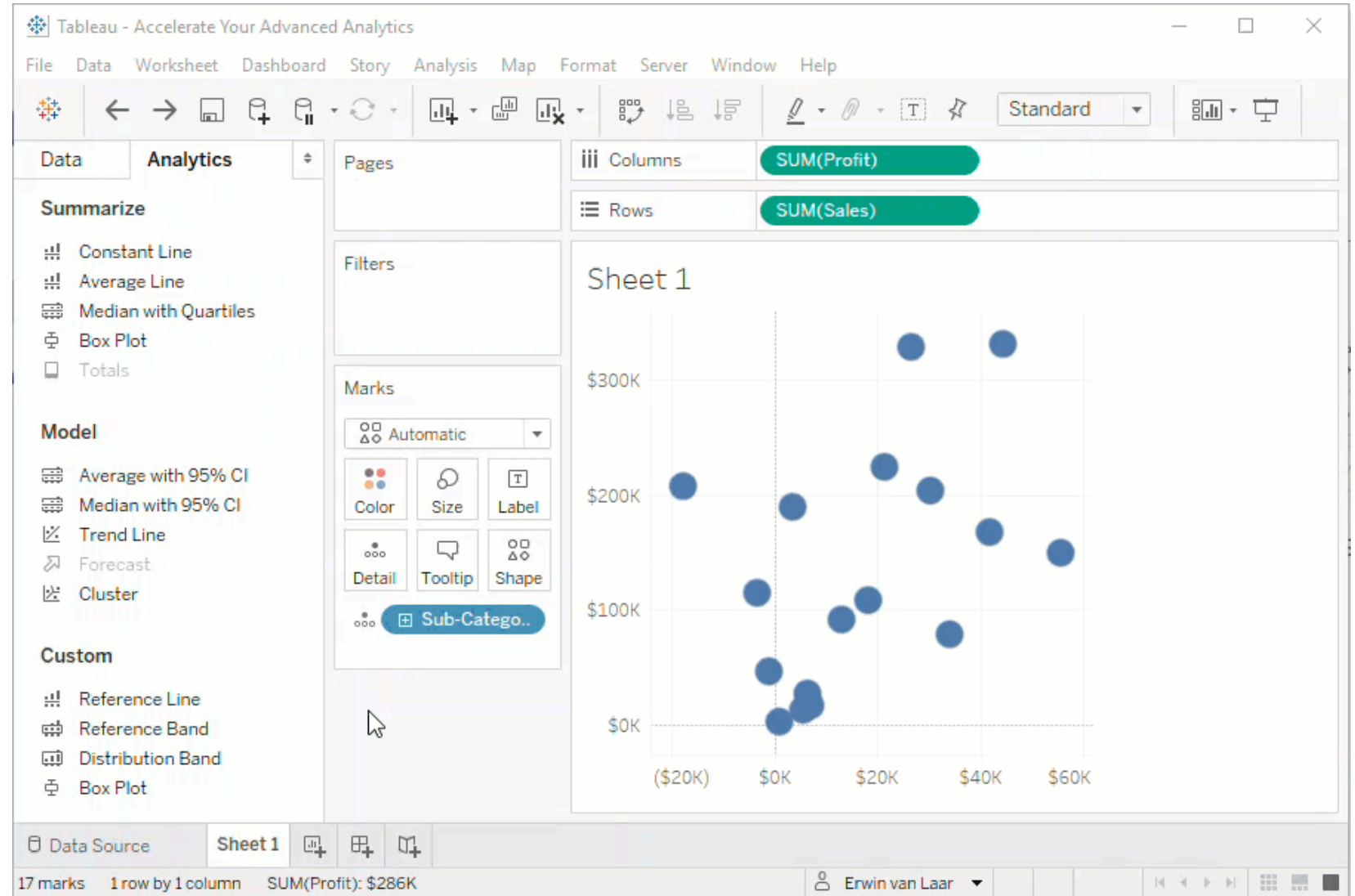
- Level of Detail expressions

- Table Calculations

- Analytics Objects (ref lines, trend lines, forecast, clusters)

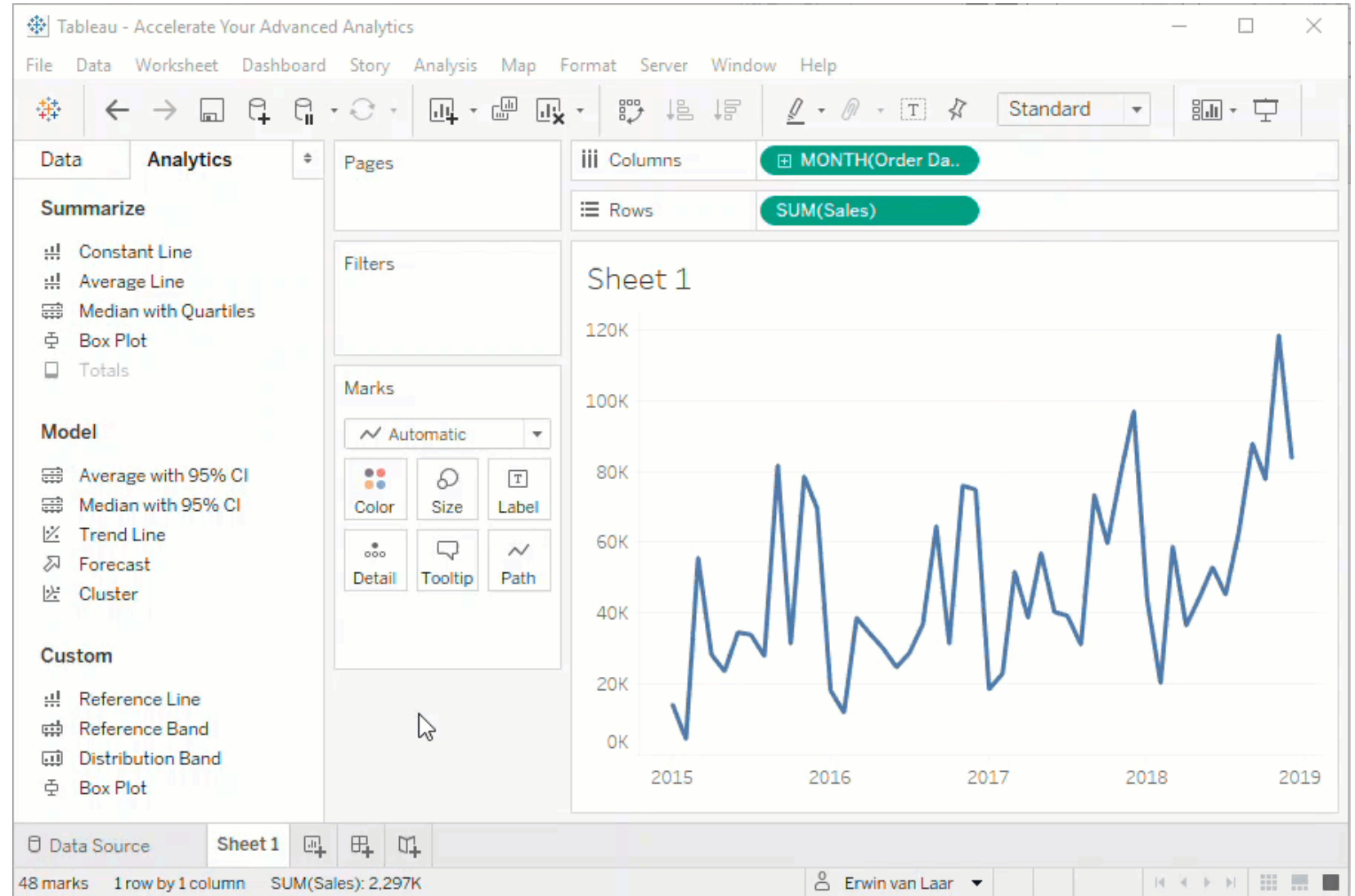
Analytic Objects

Drag & Drop Analytical features



Analytic Objects

Drag & Drop Analytical features



But what if I want more?

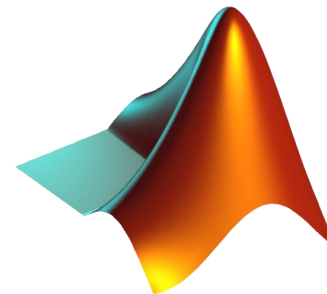
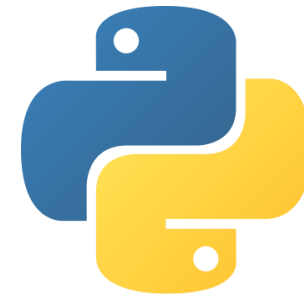
Different Model than Standard Tableau Functions

More complex models

Models trained on your data

Need more flexibility

External Services



Objective

Create interactive dashboards...

Without the consumer needing to understand code...

That enables them to answer questions...

That are not contained in the underlying data source...

By leveraging an Advanced Analytical Language

External Services

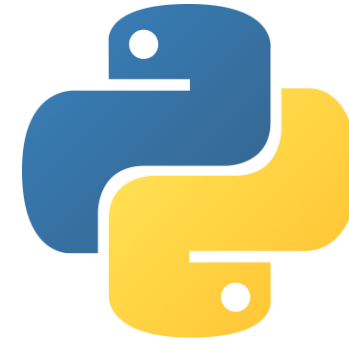


External Services Connection

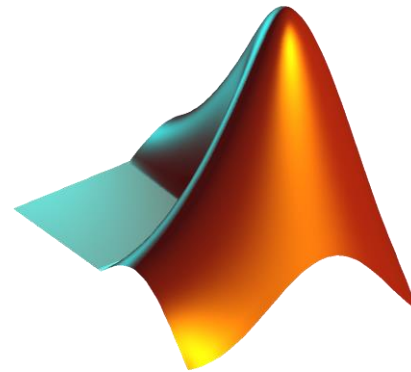
R (8.1+)



Python (10.1+)



MATLAB (10.4+)



SCRIPT functions

SCRIPT_BOOL

SCRIPT_INT

SCRIPT_REAL

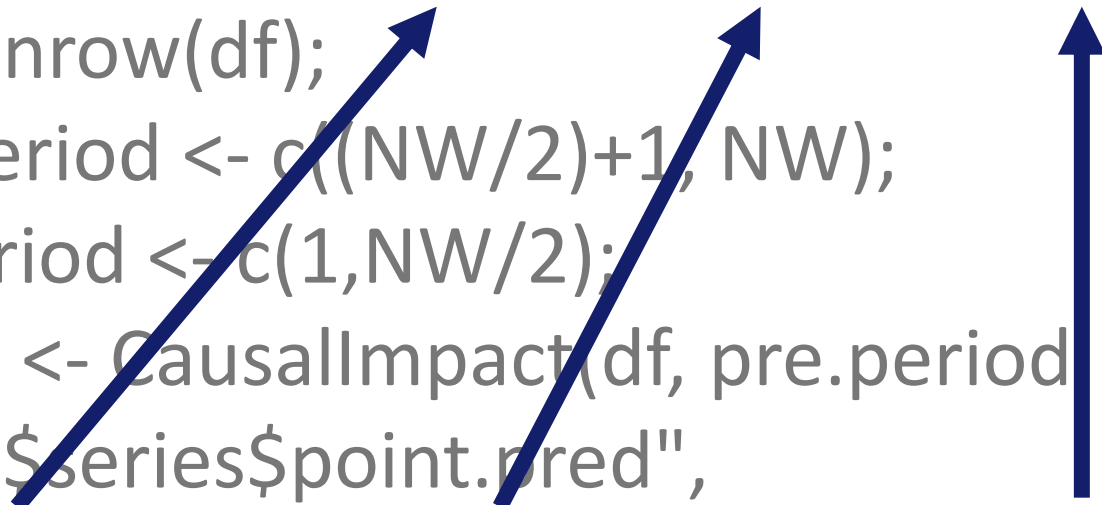
SCRIPT_STR

Script defines the type of outcome that Tableau expects

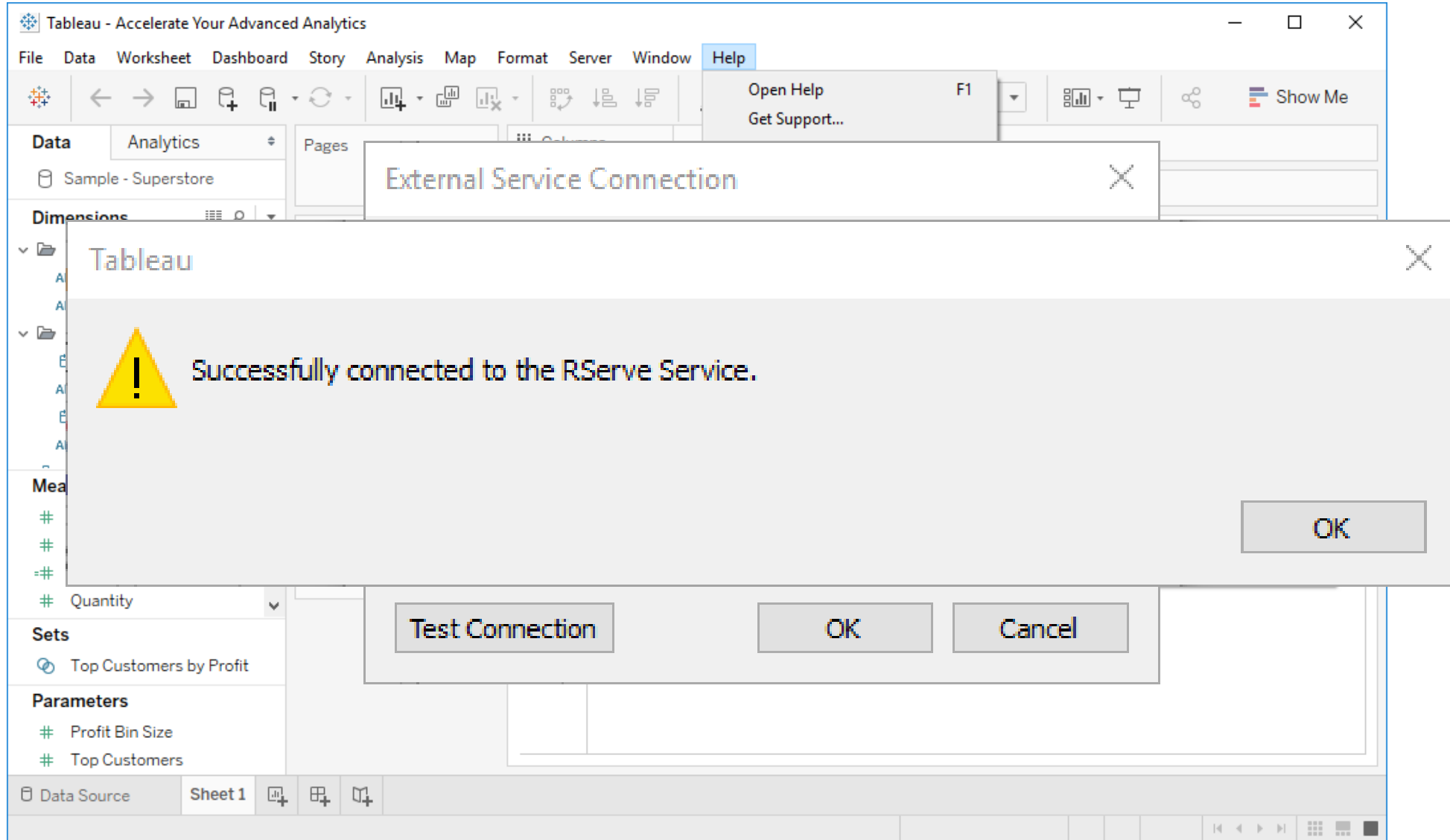
They will be run as a Table Calculation

Example

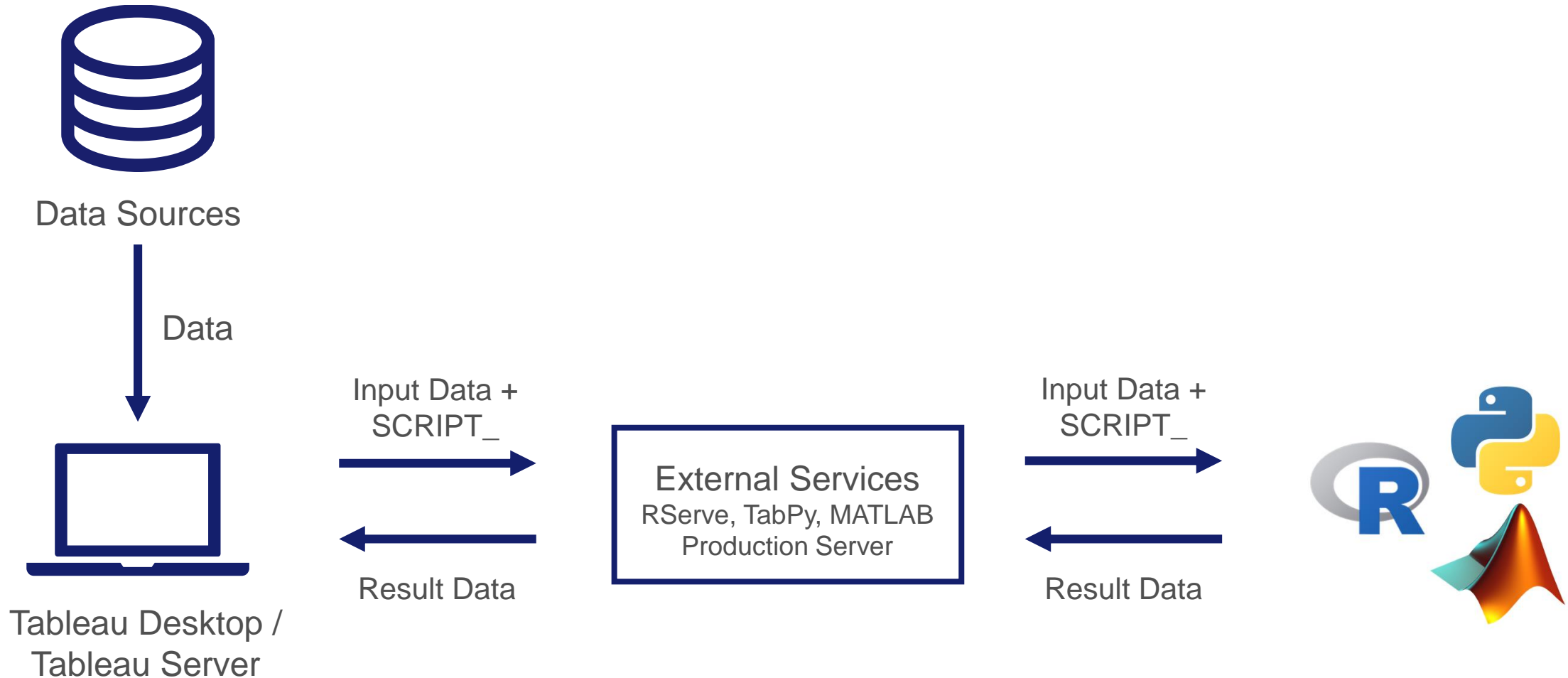
```
SCRIPT_REAL("library(CausallImpact);  
df <- data.frame(y=.arg1,x1=.arg2,x2=.arg3);  
NW <- nrow(df);  
post.period <- c((NW/2)+1, NW);  
pre.period <- c(1,NW/2);  
impact <- CausallImpact(df, pre.period, post.period);  
impact$series$point.pred",  
SUM([Profit]), SUM([Quantity]), SUM([Sales]))
```

Three blue arrows originate from the SUM functions in the final line of code. One arrow points from the first SUM([Profit]) to the 'pre.period' argument of the CausallImpact function. A second arrow points from the second SUM([Quantity]) to the 'post.period' argument. A third arrow points from the third SUM([Sales]) to the 'df' argument.

Manage External Services Connection



Connecting Tableau to an External Service



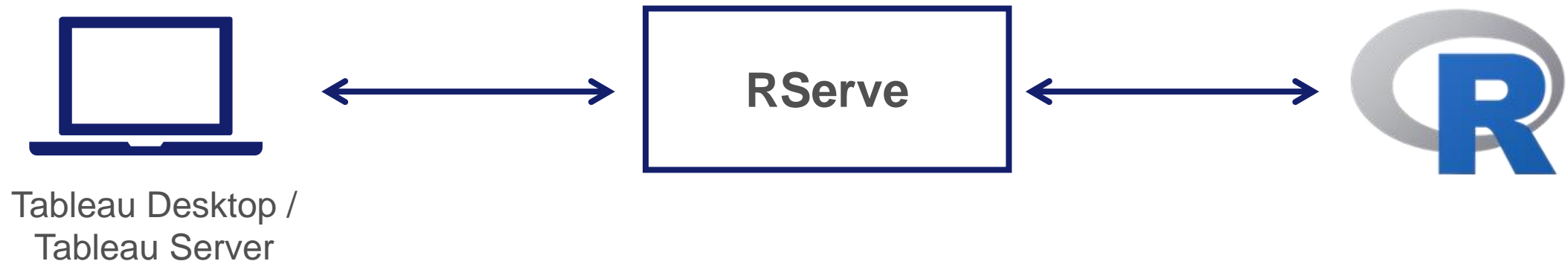
R (matey!)



R - RServe

TCP/IP server

Allows other programs to use facilities of R

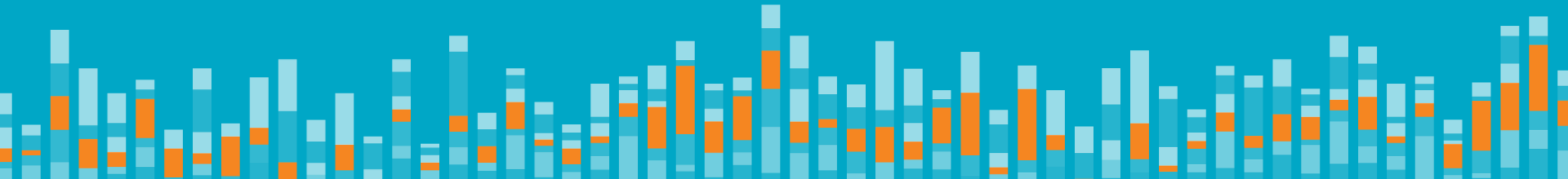


Examples

- Tableau helps you see visually identify patterns in Data
- But are those patterns significantly different?

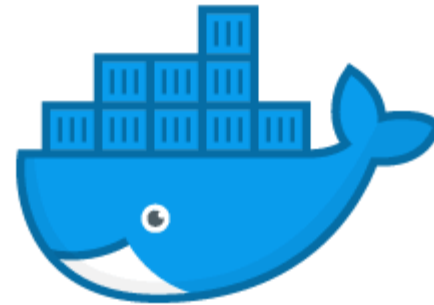
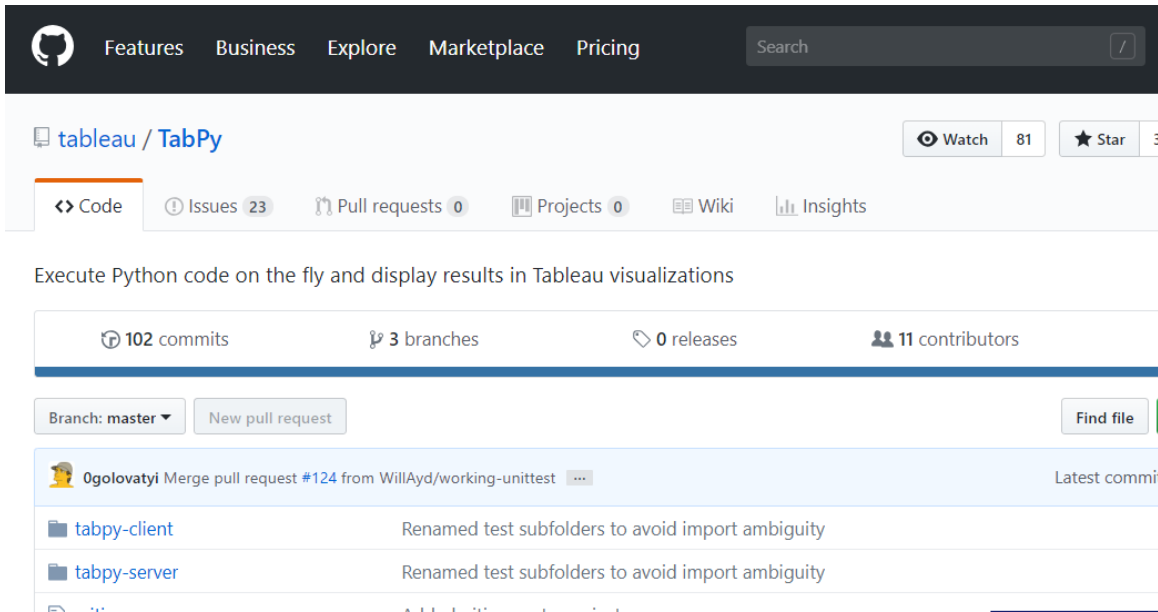
→ T-Test

Python

The Python logo, consisting of two interlocking snakes, one blue and one yellow, positioned to the right of the word "Python".

Python Set Up

Tableau Python Server (TabPy)



docker

- numpy (1.11.2)
- pandas (0.19.1)
- scikit-learn (0.17.1)
- scipy (0.18.1)
- textblob (0.11.1)
- nltk (3.2.1)
- vaderSentiment (0.5)
- geopy (1.11.0)
- requests (2.12.4)
- reverse_geocoder (1.5.1)

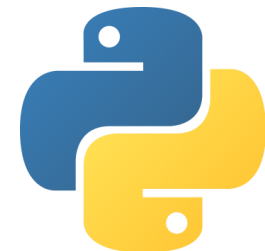


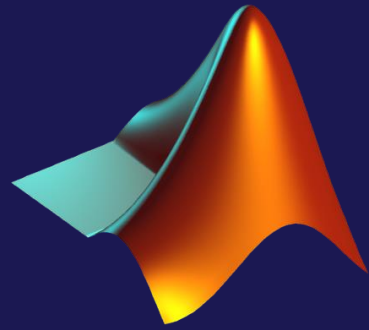
Tableau Desktop /
Tableau Server



Example

Twitter Sentiment Analysis

MATLAB



Two different options

MATLAB allows to connect to models in two different ways:

External Service Connection

Web Data Connector

Option 1: External Service Connection

Define Functions in MATLAB Production Server

Call Functions through Calculated Fields

Possible to filter and re-

Advantage: Flexibility.

The image displays two overlapping screenshots. The left screenshot shows the MATLAB R2017a editor with a script named 'GetLatLongVector.m'. The script is a MATLAB function for solving a Traveling Salesman Problem (TSP) using integer linear programming. It includes comments and code for allocating memory, setting constraints, and solving the problem. The right screenshot shows the Tableau interface with a map titled 'Shortest Flight Path'. The map displays a network of 28 numbered nodes connected by lines, representing a flight path across the United States. The Tableau interface shows calculated fields for 'AVG(Longitude)' and 'AVG(Latitude)'. A tooltip for the 'ShortestPath' calculated field is visible, showing the script used for the calculation: `SCRIPT_INT('TSP/GetLatLongVector', AVG([Longitude]), AVG([Latitude]))`. The tooltip also indicates that the calculation is valid and shows the 'Apply' button.

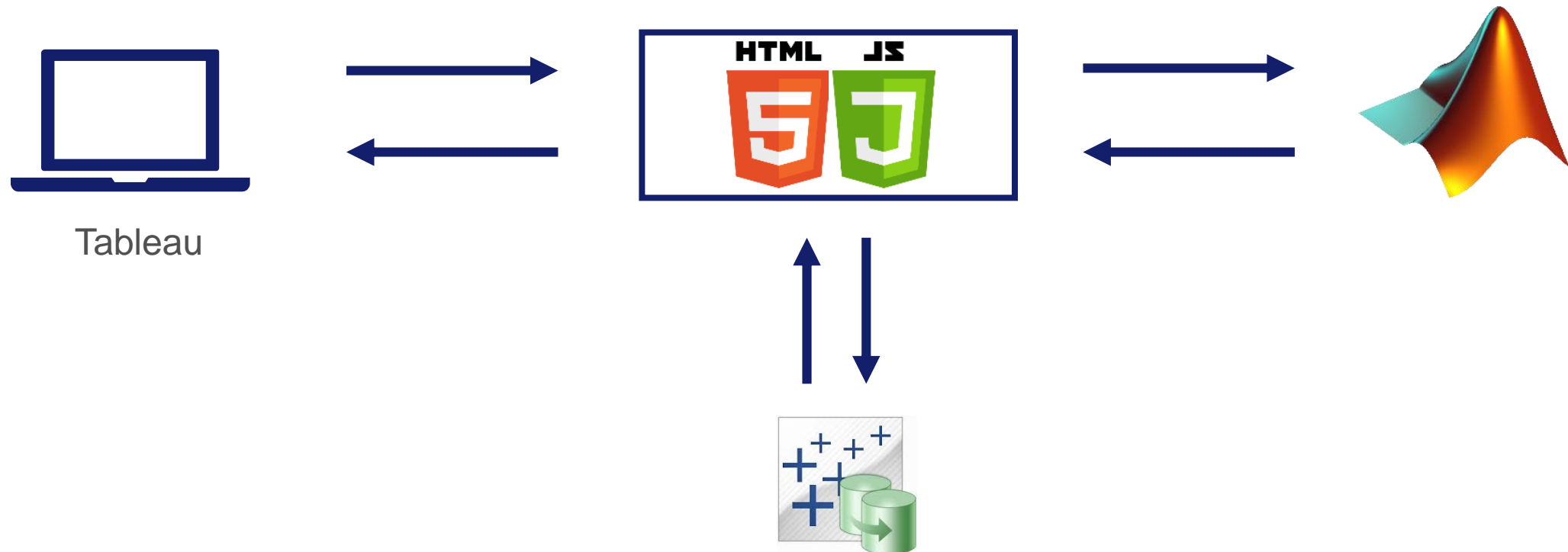
Option 2: Web Data Connector

Request Data Source at Initial Data Source Stage

Request sent once to MATLAB and all results written on row level into extract

Advantage: Performance

Advantage: All data can be used regardless of aggregation level



Example

Shortest Salesperson Route

The image shows a split-screen view of MATLAB R2017a and Tableau. On the left, the MATLAB editor displays a script for solving a Traveling Salesman Problem (TSP) using linear programming. The script includes comments and code for allocating sparse matrices, setting constraints, and using the `intlinprog` function for optimization. The MATLAB Command Window shows the `deploytool` command being executed.

On the right, the Tableau interface displays a map titled "Shortest Flight Path" of the United States. The map shows a route connecting 28 numbered cities (1-28) across the country. The Tableau view is configured with `AVG(Longitude)` on the Columns shelf and `AVG(Latitude)` on the Rows shelf. A tooltip for the `ShortestPath` calculation is visible, showing the following details:

- Calculation Name: `ShortestPath`
- Results are computed along Table (across).
- Script: `SCRIPT_INT('TSP/GetLatLongVector', AVG([Longitude]), AVG([Latitude]))`
- Default Table Calculation
- Validation: "The calculation is valid."
- Sheets Affected: 1
- Buttons: Apply, OK

Materialized Calculations



Categorization

Twitter sentiment analysis

Customer Identification

Reclassification

Row-level calculations

Large volumes - Example

- **ABN AMRO Clearing**
 - Marleen Meier, Quantitative Risk Analyst
- **Clear and finance > 16 Mio trades per day**

- **Model: Correlation Haircut Model (COH)**
- **Used on all asset-classes**
 - Equity, Commodity, Fixed Income, Currency



Tableau made our Machine Learning Project a Success

Brian Doelkahar

Head of Quantative Modelling ABN AMRO Clearing

Questions?



Summary

What do External Services bring to Tableau?

Deeper Statistics

Machine Learning

Productionalize Predictive Modeling

More Expressive Power

What does Tableau bring to External Services?

Data Connectivity

Explore at the Speed of Thought

Interactive Visual Storytelling

Conclusion



RELATED SESSIONS

Advanced Analytics at Scale

Wed | 3:30pm – 4:30pm | MCCNO – L2 – New Orleans Theater C

Tableau + Python =

Wed | 1:45pm – 2:45pm | MCCNO - L2 - 220



RELATED SESSIONS

Advanced Analytics at Scale

Wed | 3:30pm – 4:30pm | MCCNO – L2 – New Orleans Theater C

R...you ready? Jedi stats with R & Tableau

Wed | 10:15am – 12:45pm | MCCNO – L3 – 356



RELATED SESSIONS

Embedding Tableau for self-service data science

Wed | 12:00pm – 1:00pm | MCCNO – L2 – La Nouvelle Ballroom B

Data science applications with TabPy/R

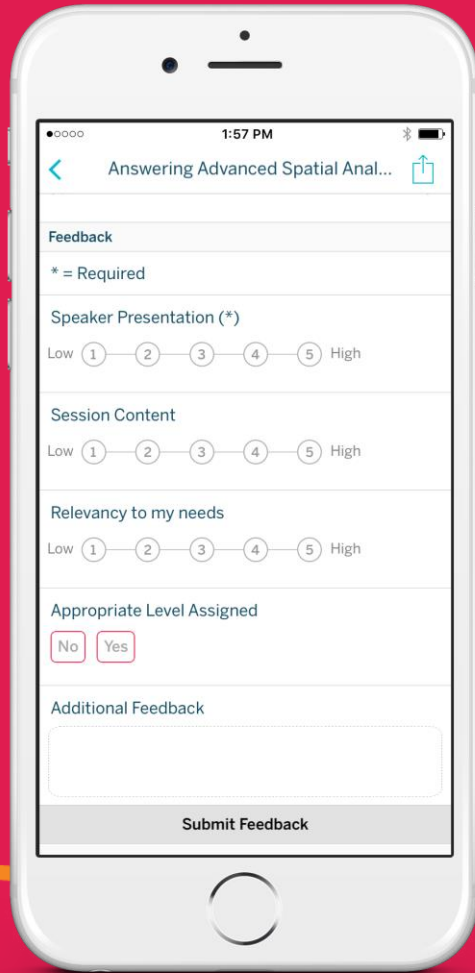
Wed | 12:00pm – 1:00pm | MCCNO – L2 – New Orleans Theater B



SESSION REPEATS

Accelerate Your Advanced Analytics R, Python & MATLAB

Wed | 10:45am – 11:45am | MCCNO – L2 – La Nouvelle Ballroom B



Please complete the
session survey from the
Session Details screen
in your TC18 app

Thank you!

Erik Polano

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Erwin van Laar

evanlaar@tableau.com

Resources

- How Tableau Brought ABN AMRO's Machine Learning Project to Life
 - <https://www.youtube.com/watch?v=mFpvf1brgN4&t=20s>
- Alteryx Analytic Templates for Tableau
 - https://pages.alteryx.com/starter-kit-Tableau-FNO.html?_ga=2.233432348.38610897.1535546581-1457225964.1534502381

TABLEAU

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