

Leveraging R and Python in Tableau *with RStudio Connect*



James
Blair

Solutions Engineer @ RStudio

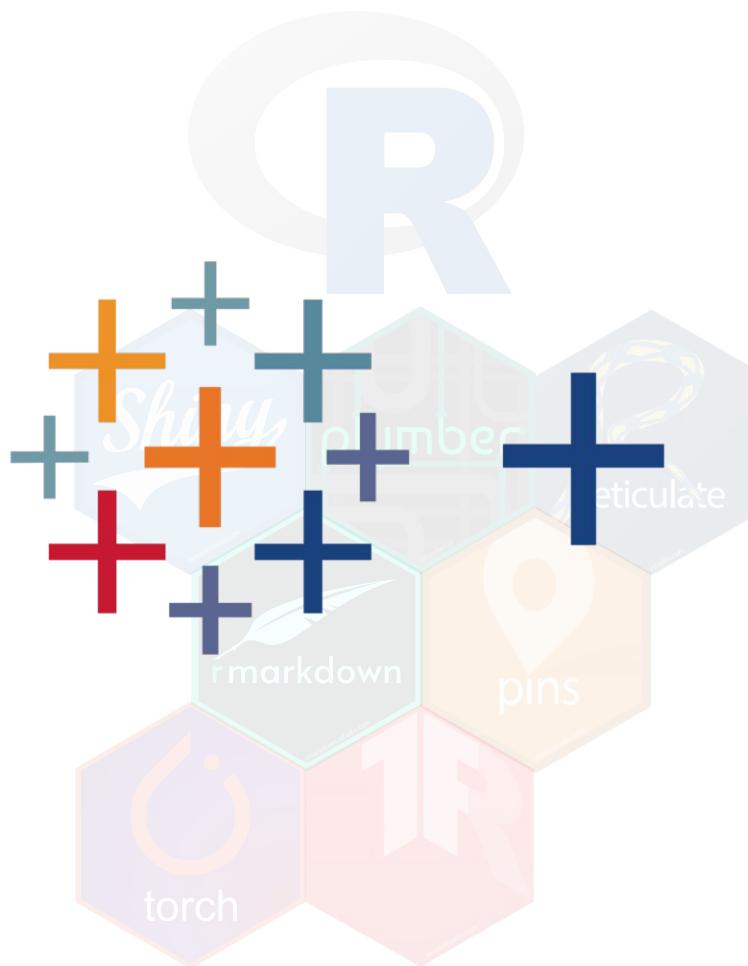
October 29, 2021

Use the right tool for the job



Photo by [Elena Rouame](#) on [Unsplash](#)





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Streamlit



Jupyter

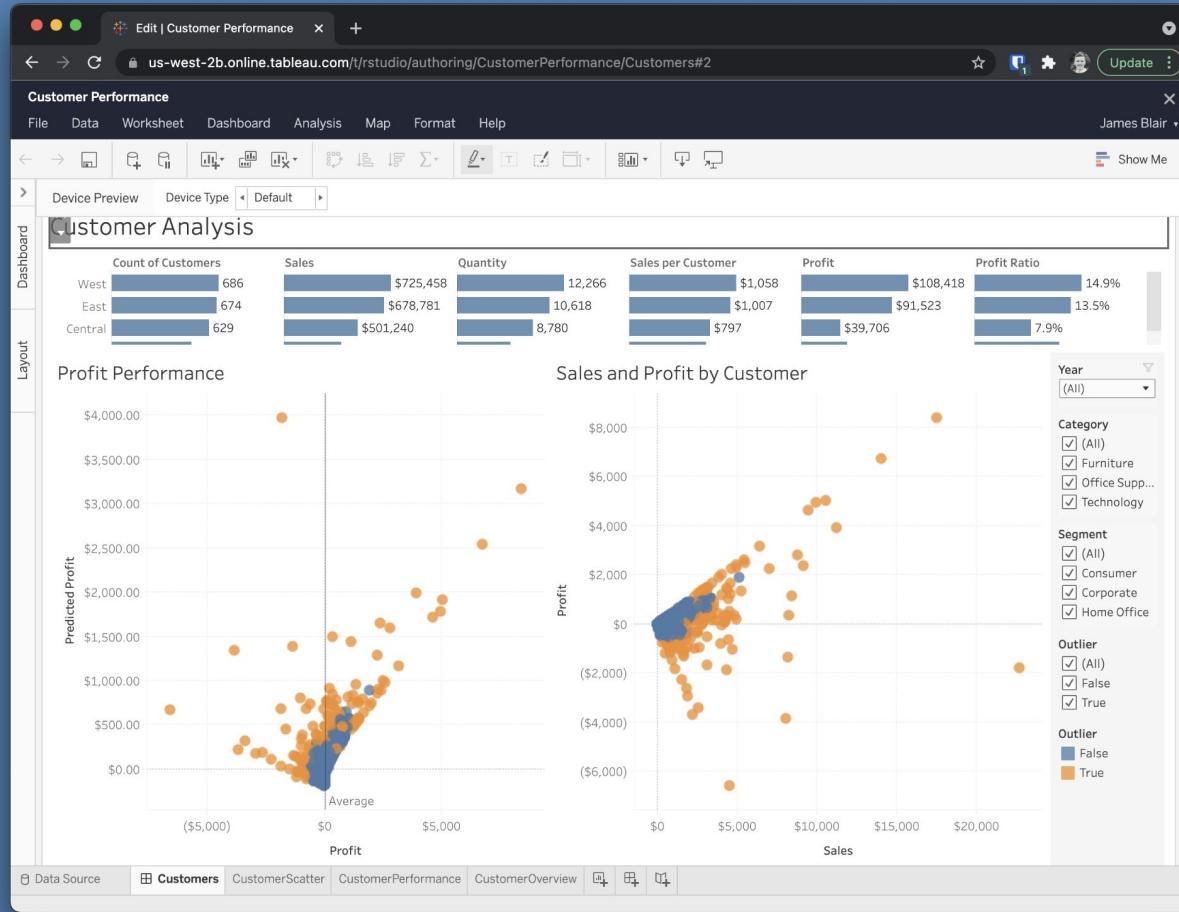


bokeh

R Studio[®]

Tableau Dashboard

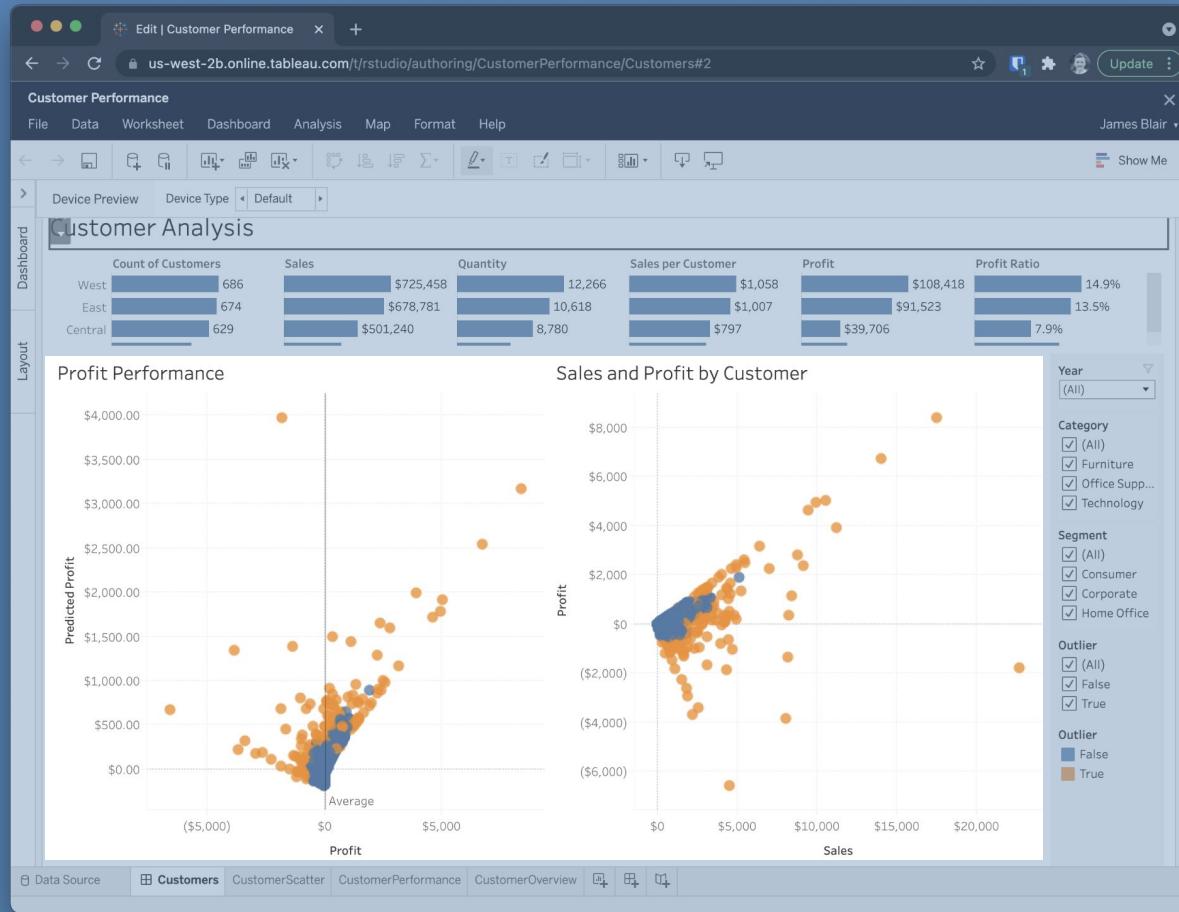
Customer sales performance evaluation



R

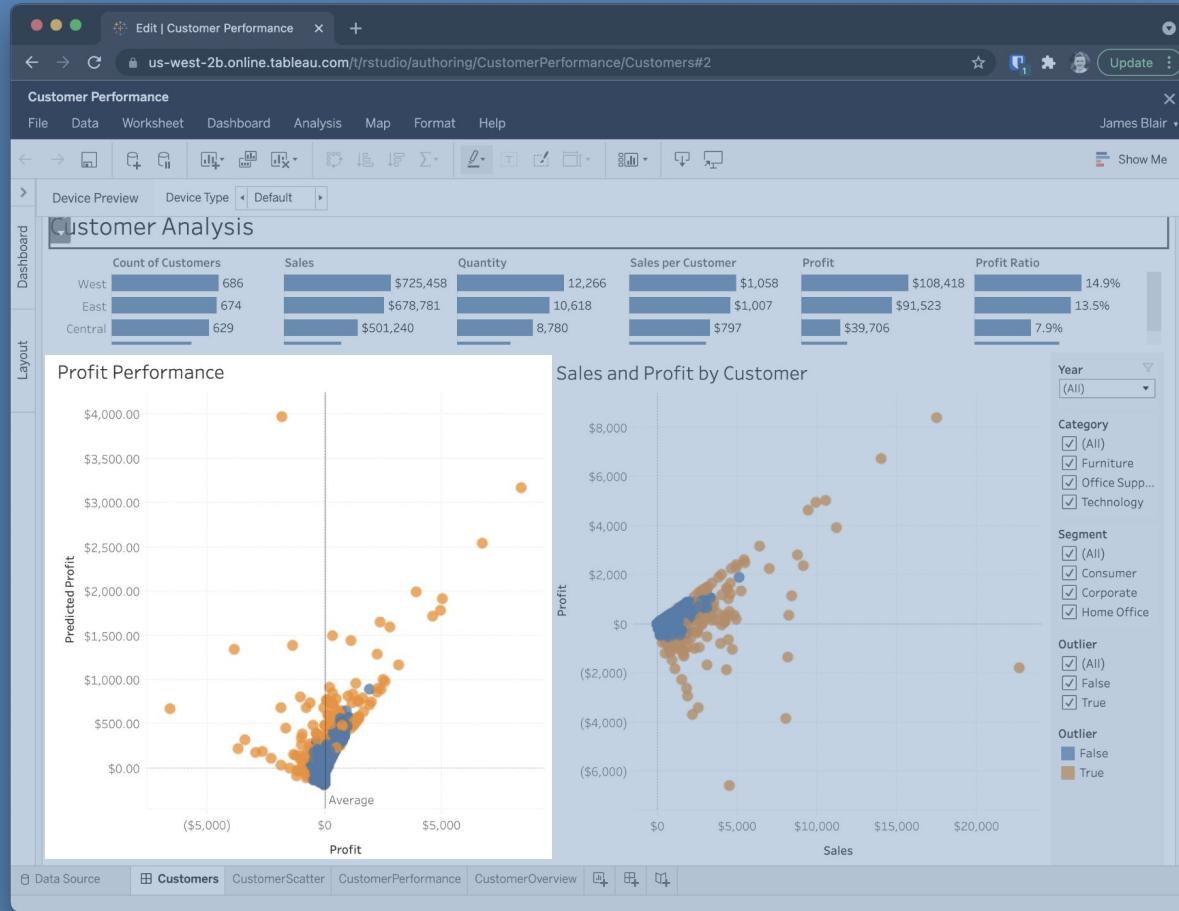
extension

Detect outliers given
a set of inputs



Python extension

Predict profit using a previously trained ML model and return predicted values to Tableau





Back to the
beginning

TabPy and Rserve

Groups

US Tornados 1950-2017

Results are computed along Table (across).

```
SCRIPT_STR("import numpy as np
from sklearn.cluster import DBSCAN
X=np.column_stack([np.radians(_arg1),np.radians(_arg2)])
db = DBSCAN(eps=_arg3[1], min_samples=_arg4[1], metric='haversine').fit(X)
return np.where(db.labels_ == np.array(-1), 'No', 'Yes').tolist()", 
AVG([Slat]),AVG([Slon]),
[Distance between incidents],[Number of Incidents per Quarter])
```

Analytics Extensions API Home +

tableau.github.io/analytics-extensions-api/ ⚙️ Update :

Tableau Analytics Extensions API Docs API Reference Forum Release Notes

Tableau Analytics Extensions API

Extend Tableau calculations to dynamically include popular data science programming languages and external tools and platforms.



Documentation

Read the docs to get started and learn key concepts for creating Tableau analytics extensions.



API Reference

Consult the Tableau Analytics Extensions API Reference while you build your integration.



Forum

Learn, connect, and enjoy Tableau with other passionate users.



Release Notes

Keep up to date with what's new in the latest release and find out about known issues.

This site is open source. Suggestions and pull requests are welcome on our [GitHub page](#).

Analytics Extensions API Home +

tableau.github.io/analytics-extensions-api/

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Update

Tableau Analytics Extensions API

Extend Tableau calculations to dynamically include popular data science programs, external tools and platforms.

/info

/evaluate

response

some service™

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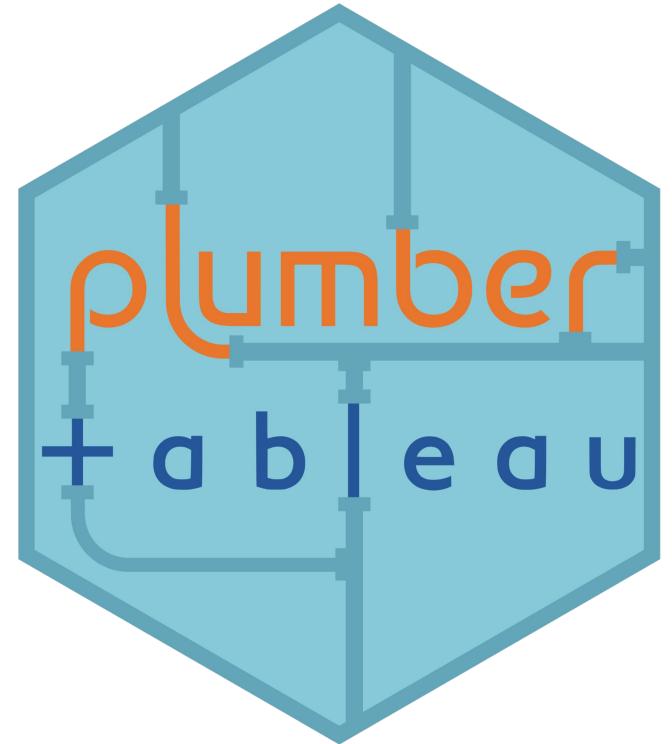
```
library(plumber)
library(plumbertableau)
library(outForest)
library(dplyr)

## @apiTitle Outlier Detection for Tableau
## @apiDescription Detect outliers in real-time on Tableau
# data using a Random Forest

## Calculate outliers on input data
## @tableauArg sales:numeric Numeric values representing
# sales for a given transaction
## @tableauArg profit:numeric Numeric values representing
# profit for a given transaction
## @tableauReturn logical A vector indicating the outlier
# status of each original observation
## @post /detect-outliers

function(sales, profit) {
  dat <- tibble(sales, profit)
  out <- outForest(dat)
  outlier_rows <- outliers(out) %>%
    select(row) %>%
    distinct()

  dat %>%
```



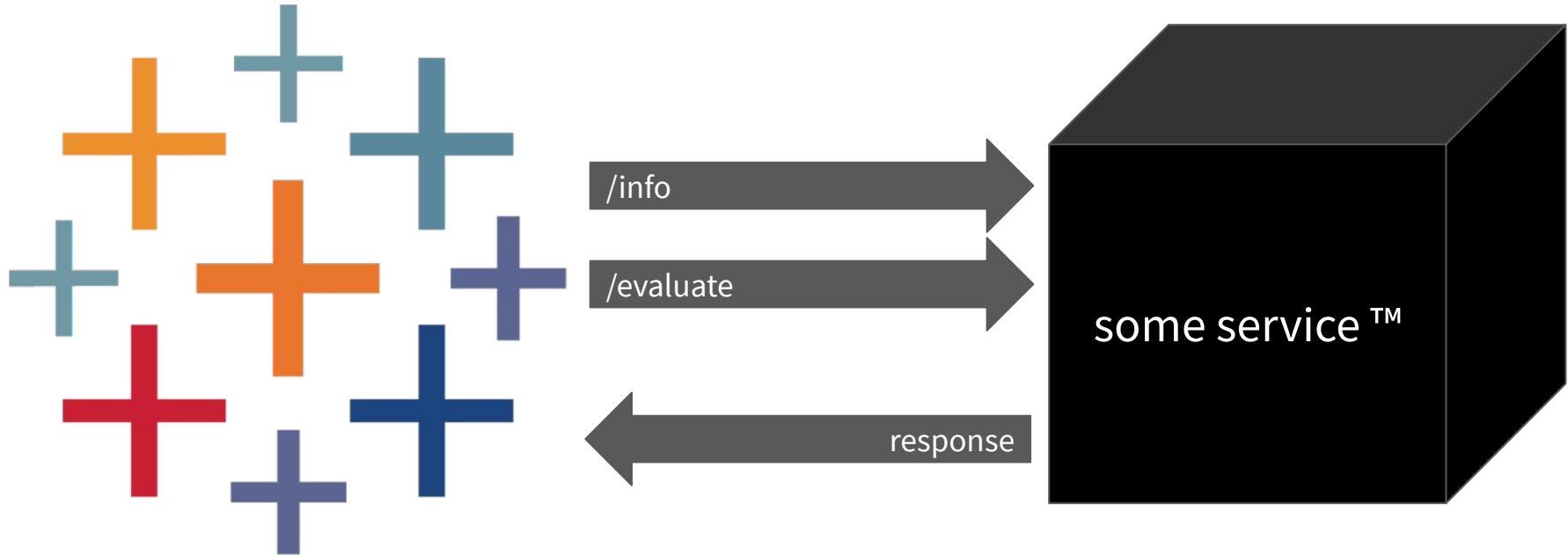
```
from fastapitableau import FastAPITableau
from joblib import load
import pandas as pd
from typing import List

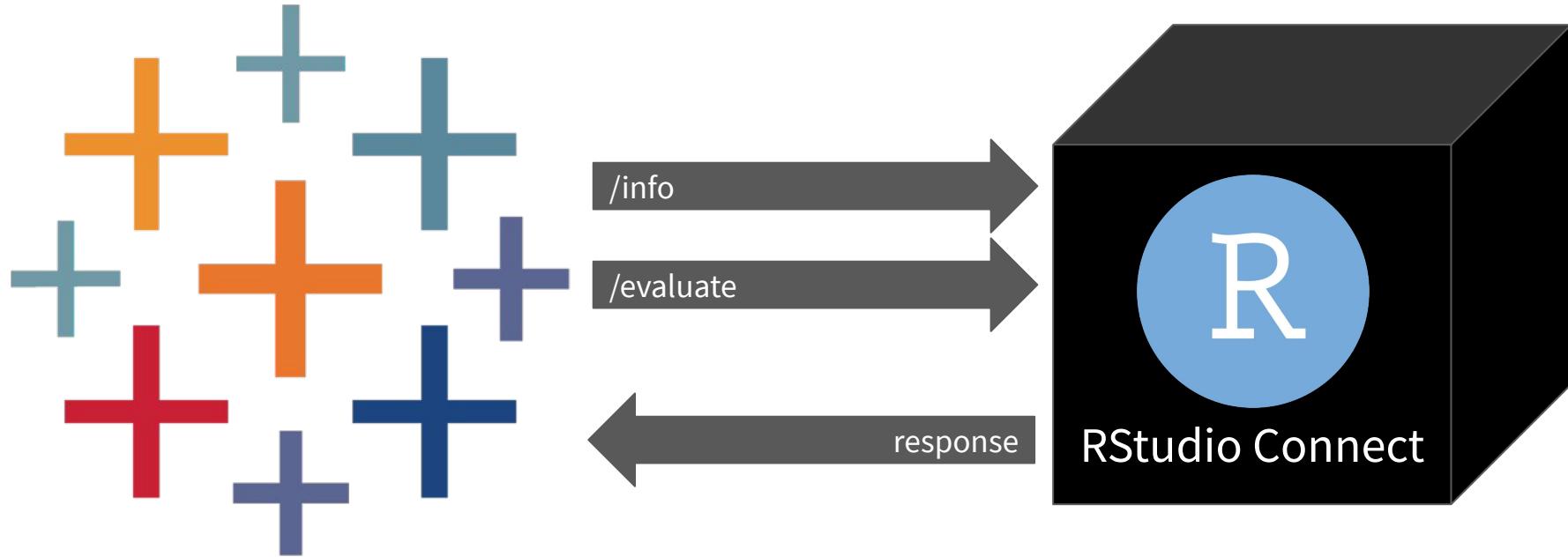
# Load model
model = load("model.joblib")

# Define model_pipeline
def model_pipeline(dict):
    model_data = pd.DataFrame(dict)
    model_data["ship_diff"] = model_data.days_to_ship_actual - model_data.days_to_ship_scheduled
    pred_columns = [
        "ship_diff",
        "quantity",
        "sales",
        "discount"
    ]
    return model.predict(model_data.loc[:, pred_columns]).tolist()

# Define the extension
app = FastAPITableau(
    title = "Predicted Profit",
    description = "A simple linear prediction of sales profit given new input data"
)
```







RStudio Connect

The screenshot shows a web browser window for RStudio Connect at the URL colorado.rstudio.com/rsc/connect/#/apps/f7371f9a-1e8c-4e33-9ee6-4231ab7496e4/access. The left side of the screen displays the 'Tableau Capitalize (Python)' app, which includes a 'Simple Example' section and documentation for using the API as a Tableau Analytics Extension or via standard API web requests. The right side shows the 'Access' tab of the app's configuration interface, where sharing settings are set to 'Anyone - no login required'. It also lists 'Who can view or change this API' as 'James Blair james', 'Who runs this content on the server' as 'The default user rstudio-connect', and provides a 'Content URL' of [/james/tableau/capitalize/python/](https://colorado.rstudio.com/rsc/james/tab...).

RStudio Connect

Content / Tableau Capitalize (Python)

FastAPI Tableau — Home

Simple Example 0.1.0

A simple example FastAPITableau app.

Documentation for this API

Learn how to use this API as a Tableau Analytics Extension or for standard API web requests.

Use in Tableau Workbooks

Documentation and Tableau-syntax examples for this API.

Test Tableau-Style Requests

OpenAPI documentation for the API that Tableau will use.

Test Standard Web Requests

OpenAPI documentation for sending standard web requests to this API.

Setup and More Information

Learn how to configure Tableau to and RStudio Connect to work together, and find out

JB james

Info Access Runtime Schedule Tags Vars Logs

Sharing settings

- Anyone - no login required
- All users - login required
- Specific users or groups

Who can view or change this API

JB James Blair james

Who runs this content on the server

The default user rstudio-connect

Content URL

/james/tableau/capitalize/python/

<https://colorado.rstudio.com/rsc/james/tab...> Copy

Tableau

Edit | Customer Performance

us-west-2b.online.tableau.com/t/rstudio/authoring/CustomerPerformance/CustomerScatter#5

Customer Performance

File Data Worksheet Dashboard Analysis Map Format Help

James Blair

Sample - Superstore

Search # Orders (Count)

People
Abc Regional Manager # People (Count)

Returns
Abc Returned # Returns (Count)

Abc Measure Names
Outlier # Profit per Order # Profit Performance # Profit Ratio
Abc! Sales above Target?... # Sales per Customer # Latitude (generated) # Longitude (generated) # Measure Values

Parameters
Base Salary # Churn Rate # Commission Rate # New Business Growth # New Quota
Abc Sort by

Pages
Columns Sales
Rows Profit

Sales and Profit by Customer

Profit Performance

SCRIPT_REAL("/james/tableau/profit/predict",
ATTR([Days to Ship Actual]),
ATTR([Days to Ship Scheduled]),
ATTR([Quantity]),
ATTR([Sales]),
ATTR([Discount]))

The calculation is valid.

2 Dependencies Apply OK

Outlier
 (All)
 False
 True

Outlier
False True

Customer Name AGG(Profit Ratio)

Sales

\$0 \$5,000 \$10,000 \$15,000 \$20,000

(\$4,000) (\$6,000)

9994 marks 1 row by 1 column SUM(Sales): \$2,297,201

Data Source Customers CustomerScatter CustomerPerformance CustomerOverview

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```

Tornados

X

```
SCRIPT_STR(
"/extensions/tornado/cluster",
AVG([Slat]),
AVG([Slon]),
[Distance between incidents],
[Number of Incidents per Quarter]
)
```

Tableau + RStudio Connect

- Use R and Python extensions from the same Tableau workbook
- Enterprise level security provided by RStudio Connect
- R/Python developers and Tableau developers can be separate
- Environment management provided by RStudio Connect

Resources

- [Blog post](#)
- [plumbertableau](#)
- [fastapitableau](#)
- [shinytableau](#)
- [Collection of examples](#)



Photo by [Ed Robertson](#) on [Unsplash](#)

bit.ly/rstudio-tableau



THANK YOU