tableau®

# Your Model Will Probably Fail

AND HOW TO PREVENT IT

Alyssa Peck
Data Scientist
Tableau Software

- Data Scientist
- National Parks Enthusiast
- Hobbyist cyclist, gardener, and more

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- Triplet

# Your Model Will Probably Fail

# Statistics show that your data science model won’t make it into production

“

# 87% of data science projects never make it into production

- VentureBeat AI

77% of businesses say that business adoption of big data and AI initiatives represent a challenge for their organizations

- NewVantage

“

**80% of AI projects will remain alchemy, run by wizards whose talents will not scale in the organization**

- Gartner

# Why Do Data Science Projects Fail?

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Sometimes they should fail

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Lack of leadership buy-in/understanding

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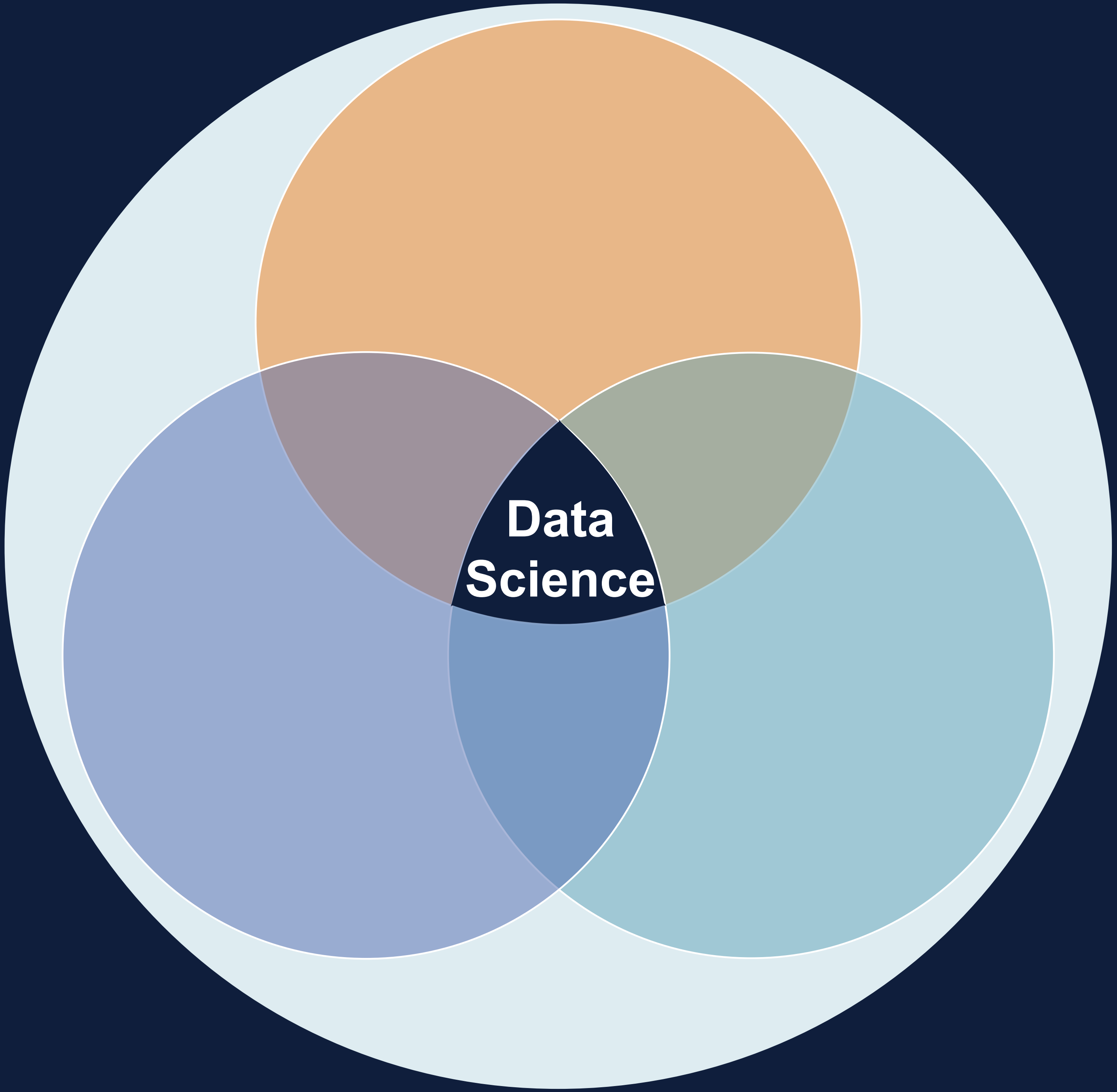
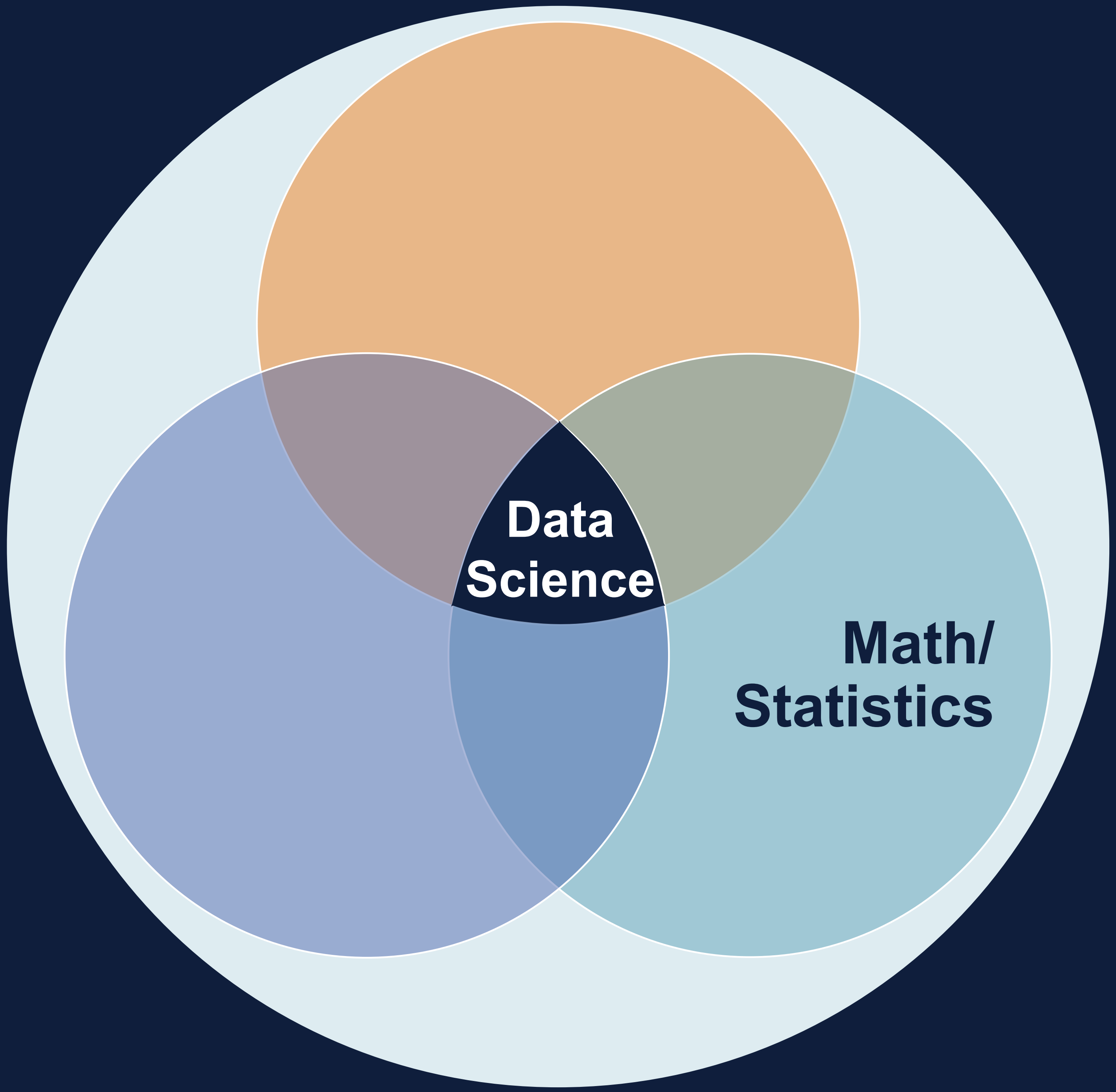
Can’t get model into production


Data
Science


Data
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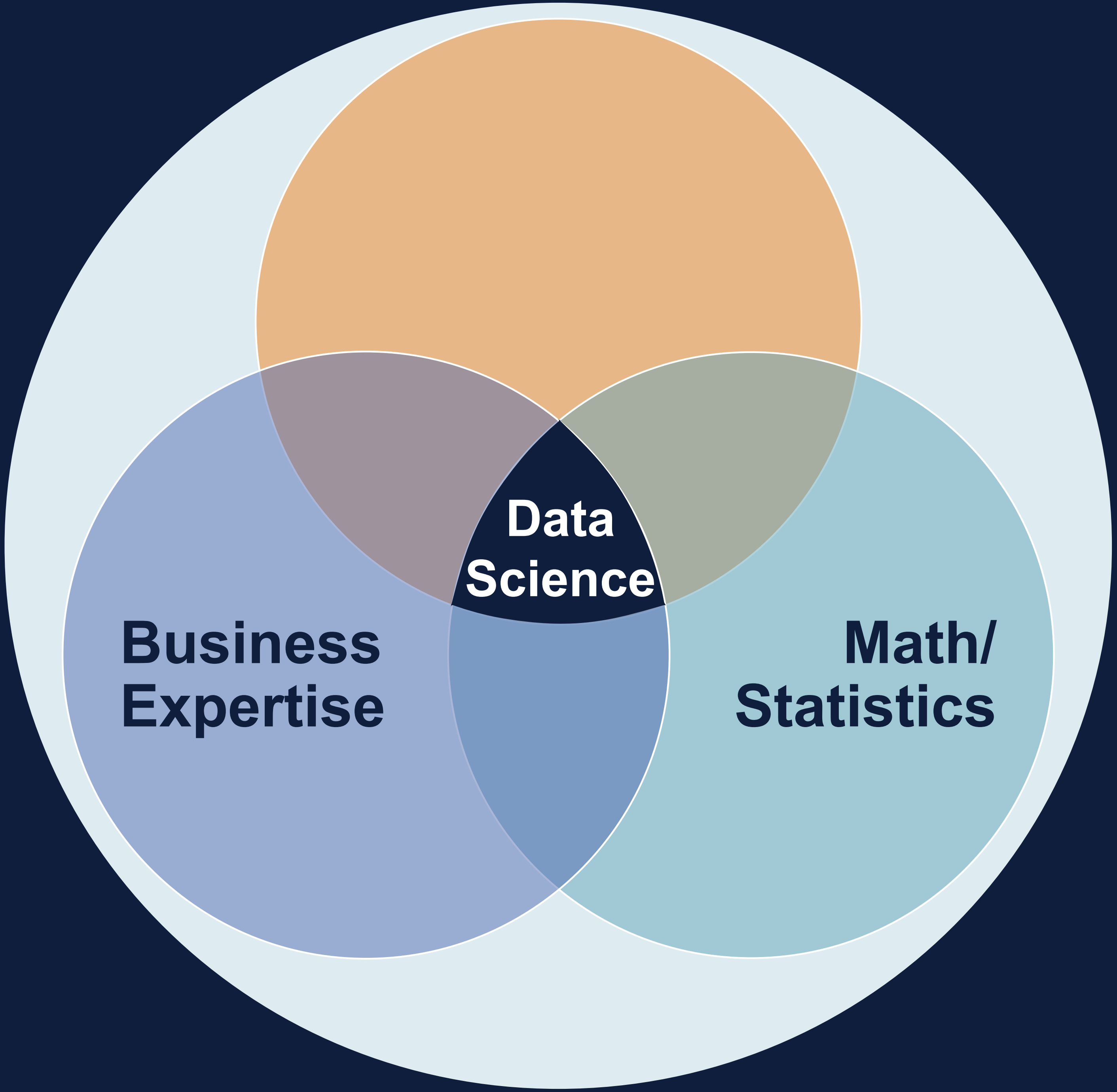
Statistics


Data
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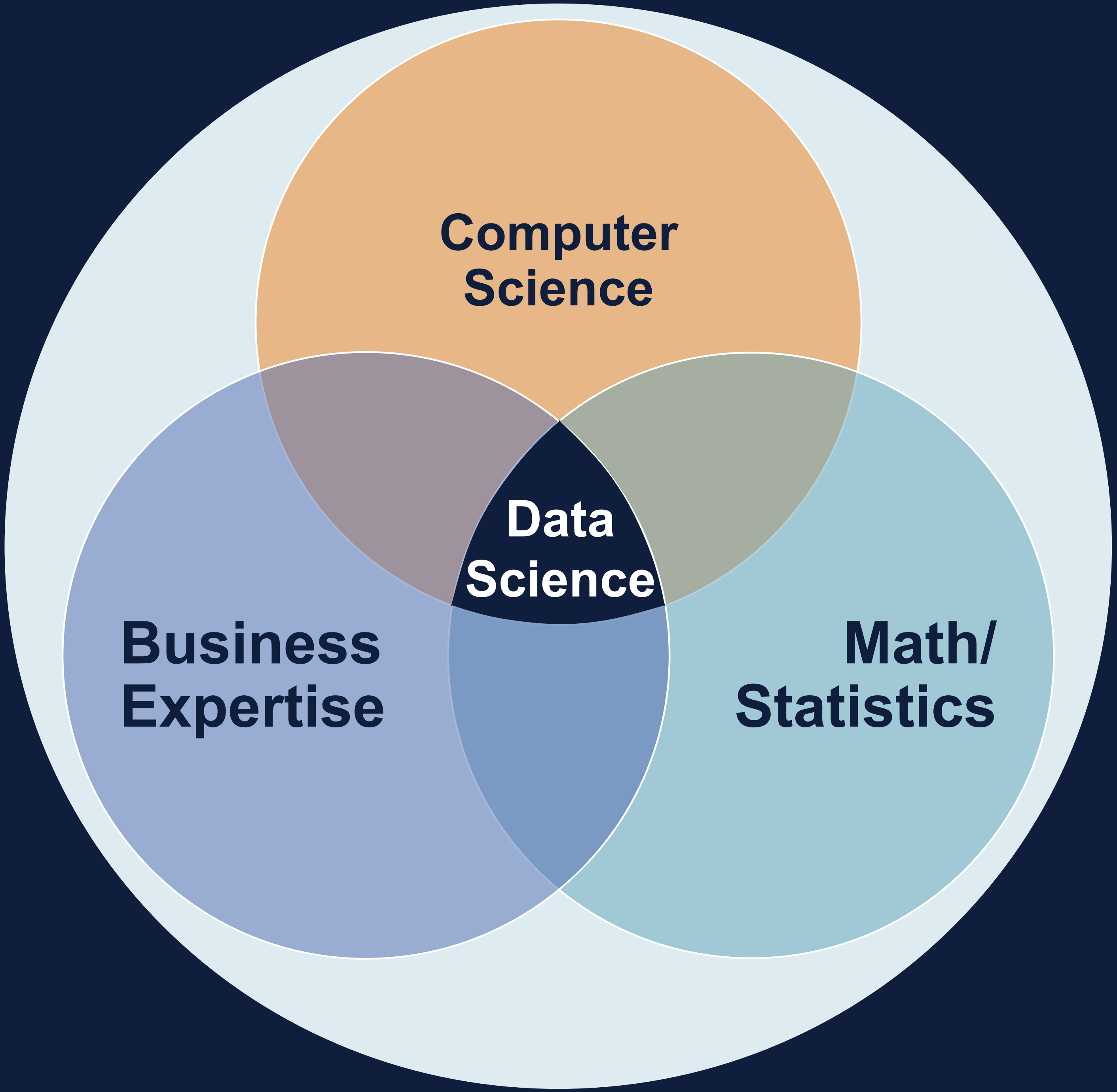
Computer Science
Data Science
Business Expertise
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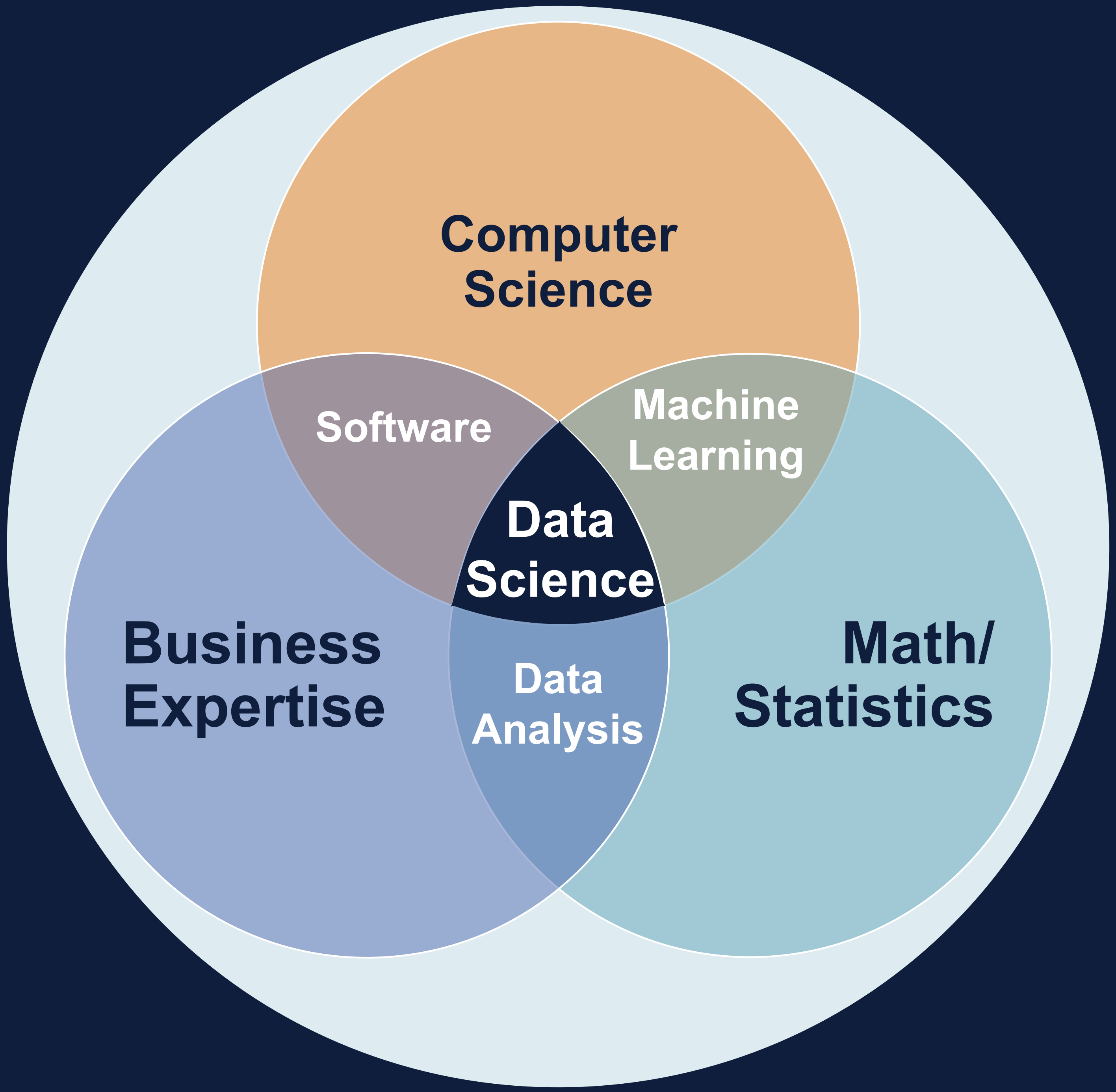
tableau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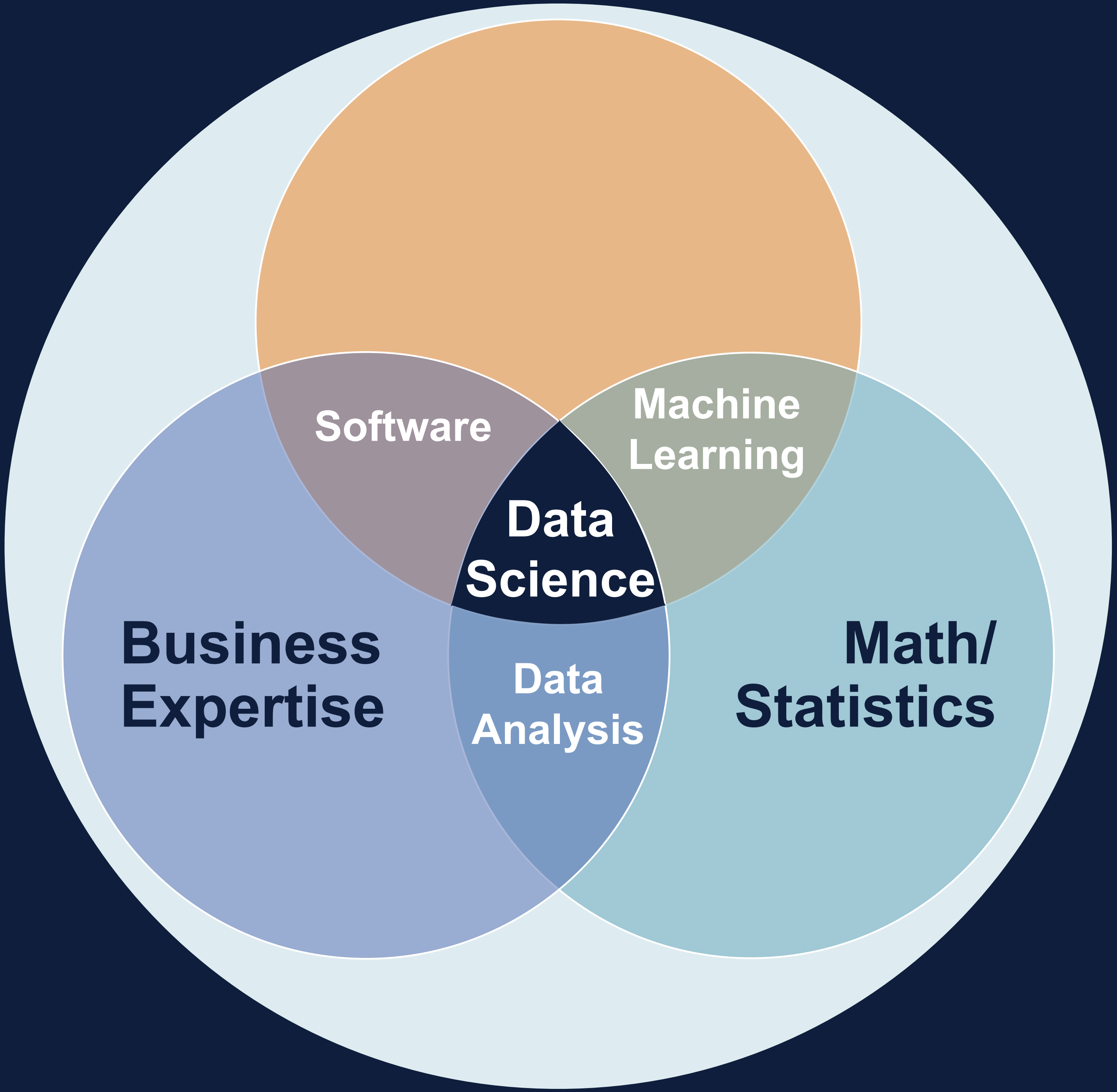
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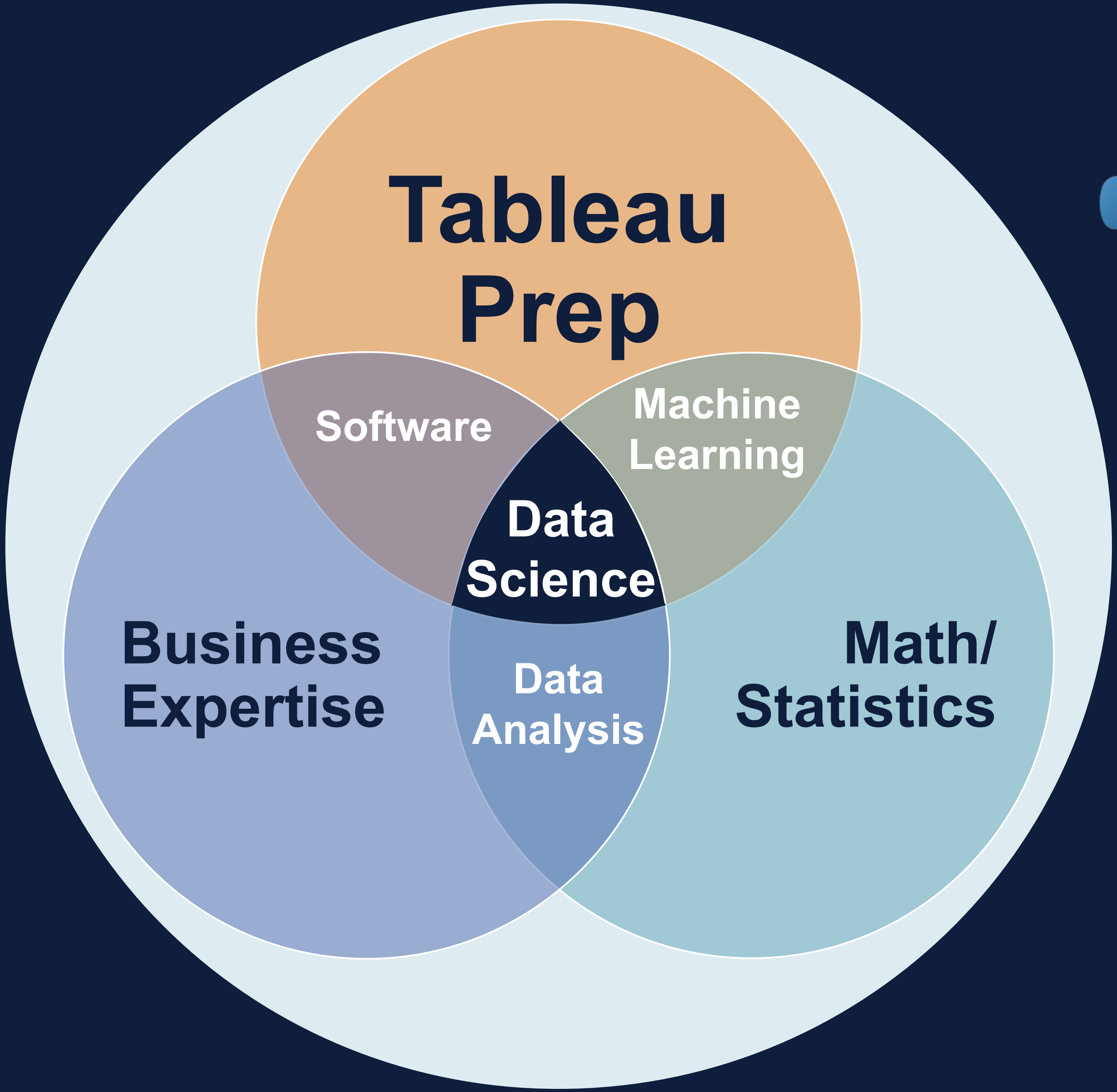
Tableau Prep
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# Predicting Customer Renewal

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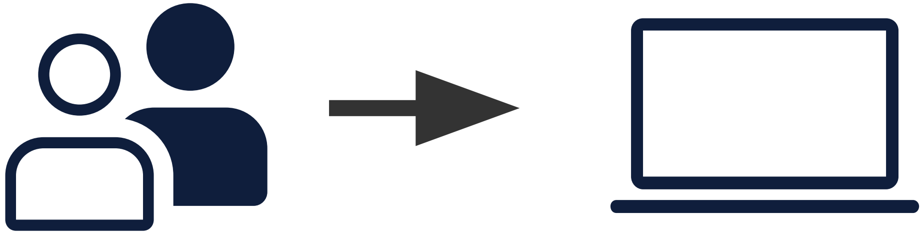
**Customer makes a purchase**

# Predicting Customer Renewal



**Customer makes a purchase**

**Customer uses the product**

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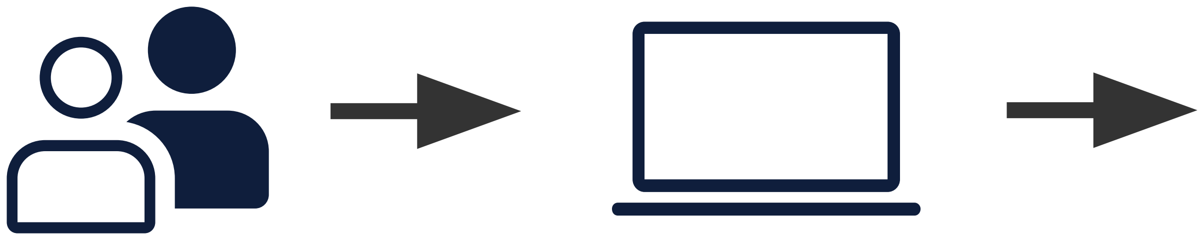


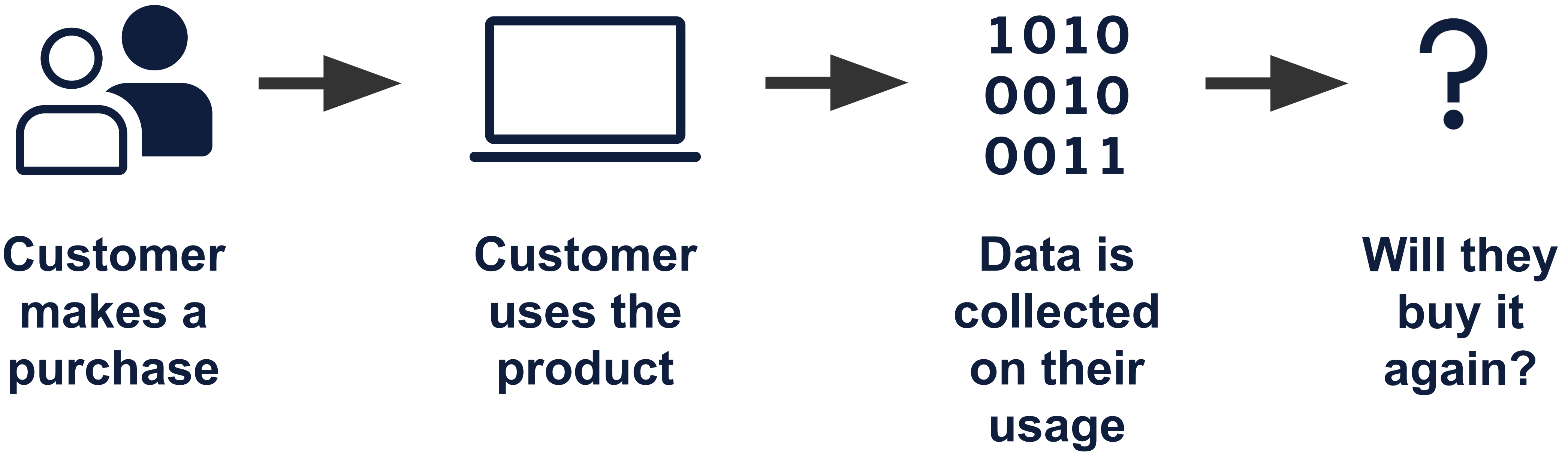
1010
0010
0011

**Customer makes a purchase**

**Customer uses the product**

**Data is collected on their usage**

# Predicting Customer Renewal



# Predicting The Future

# Predicting The Future
# … with 3 Simple Ingredients

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- **Data about the past**

# Predicting The Future
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- Data about the past

- Data about the present

# Predicting The Future … with 3 Simple Ingredients

- Data about the past
- Data about the present
- Predictive model

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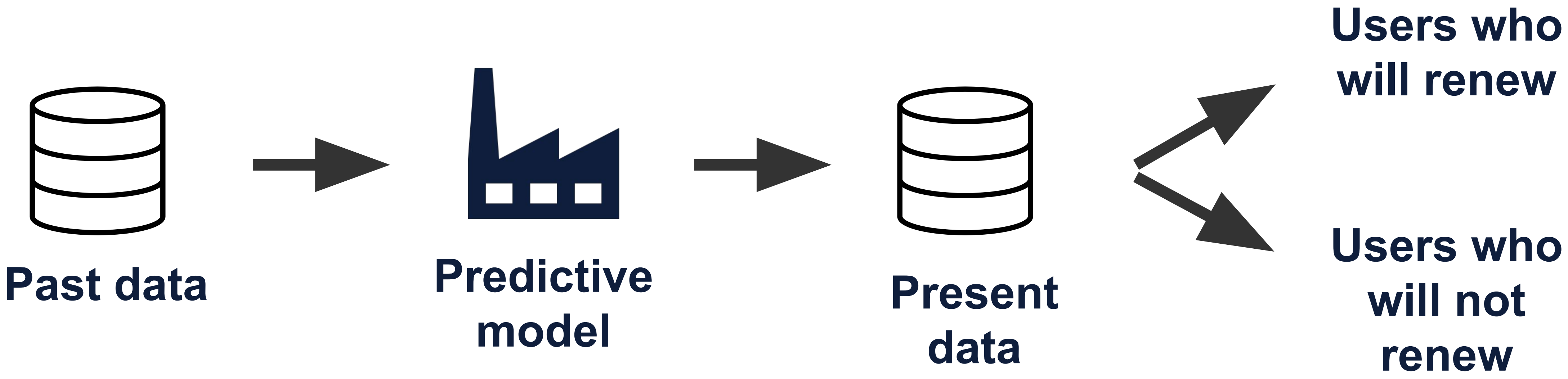

# Predicting Customer Renewal

- Data about the past
- Data about the present
- Predictive model

# Past Data

| Customer ID | Outcome | Pct Active Days | Watch Hours | Profiles | Years Customer |
|---|---|---|---|---|---|
| 7 | Did not Renew | 70% | 146.622 | 2 | 6 |
| 14 | Did not Renew | 59% | 258.284 | 1 | 7 |
| 33 | Did not Renew | 67% | 166.236 | 1 | 1 |
| 37 | Renewed | 100% | 384.249 | 4 | 2 |
| 86 | Did not Renew | 64% | 131.440 | 1 | 3 |
| 100 | Did not Renew | 71% | 110.971 | 2 | 1 |
| 110 | Did not Renew | 65% | 149.879 | 1 | 4 |
| 136 | Did not Renew | 68% | 155.361 | 2 | 1 |
| 138 | Did not Renew | 66% | 251.167 | 2 | 5 |
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- Data about the present
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| Customer ID | Pct Active Days | Watch Hours | Profiles | Years Customer |
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| 14 | 71% | 82.81 | 1 | 5 |
| 35 | 60% | 318.66 | 1 | 6 |
| 62 | 66% | 283.33 | 1 | 4 |
| 97 | 61% | 259.84 | 2 | 5 |
| 110 | 64% | 304.36 | 2 | 3 |
| 133 | 100% | 54.30 | 2 | 3 |
| 140 | 60% | 159.85 | 1 | 3 |
| 147 | 56% | 126.04 | 2 | 10 |
| 160 | 64% | 172.31 | 2 | 1 |
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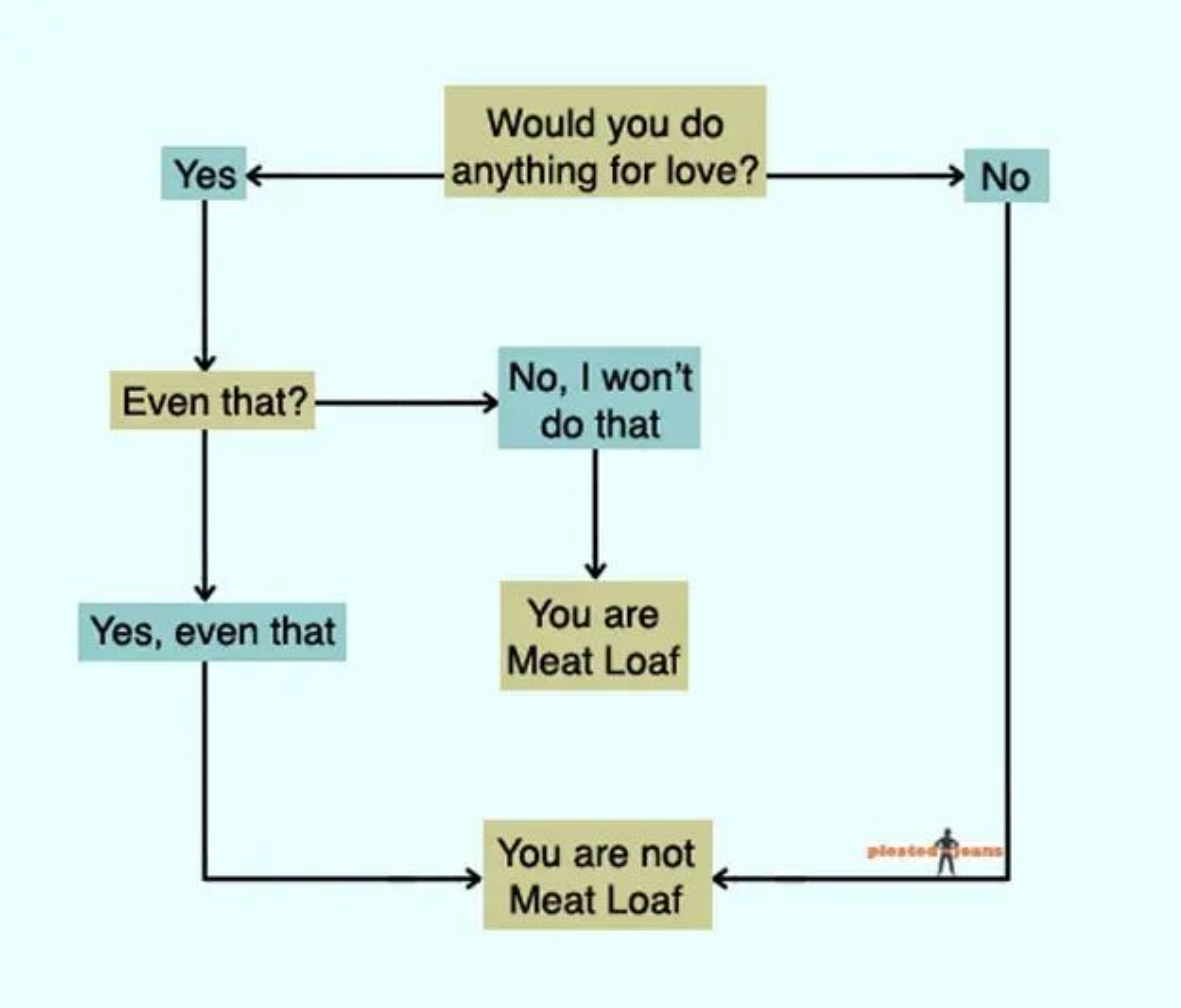
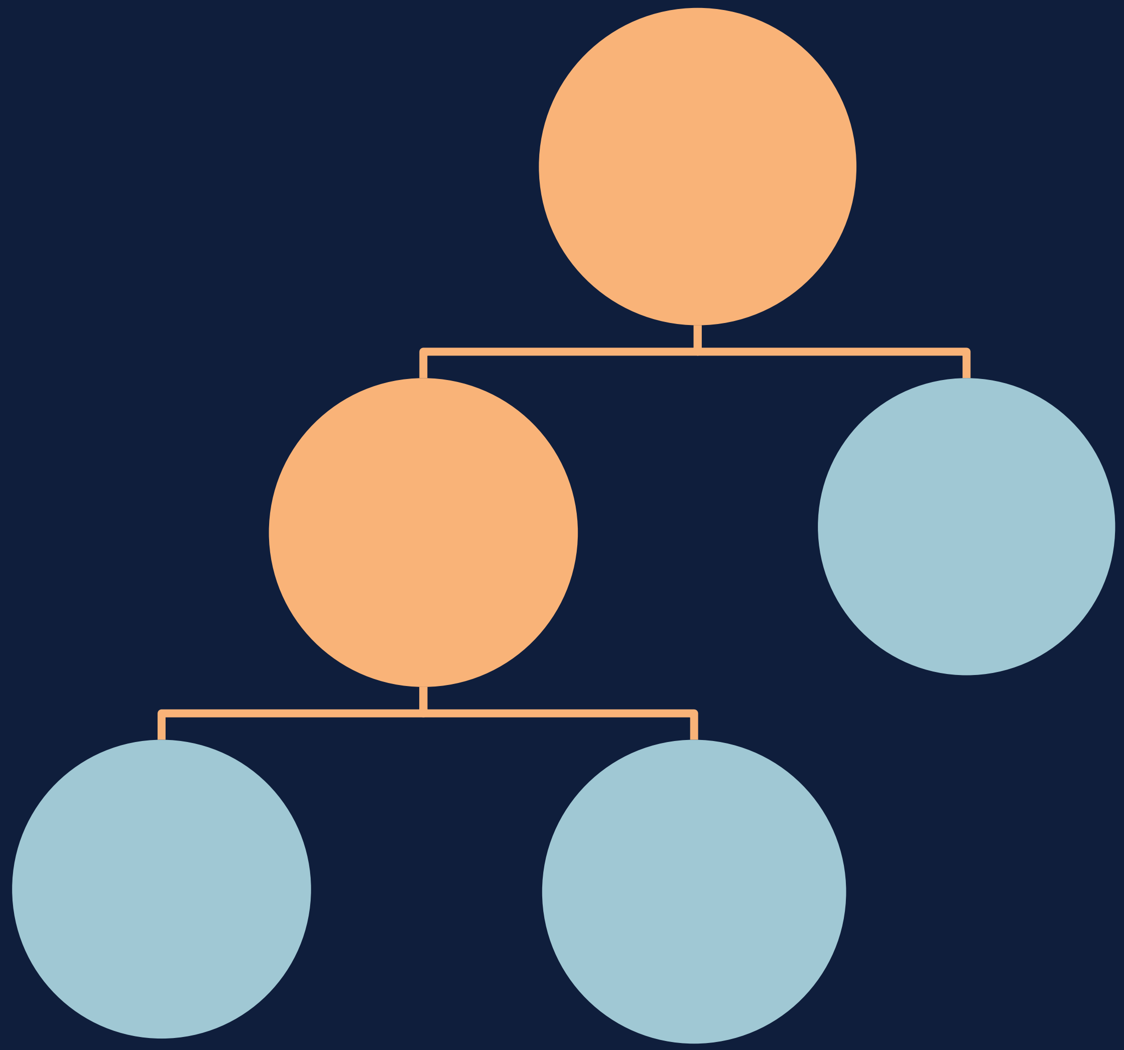

Would you do anything for love?
Yes
No
Even that?
No, I won't do that
Yes, even that
You are Meat Loaf
You are not Meat Loaf

# Random Forest Model



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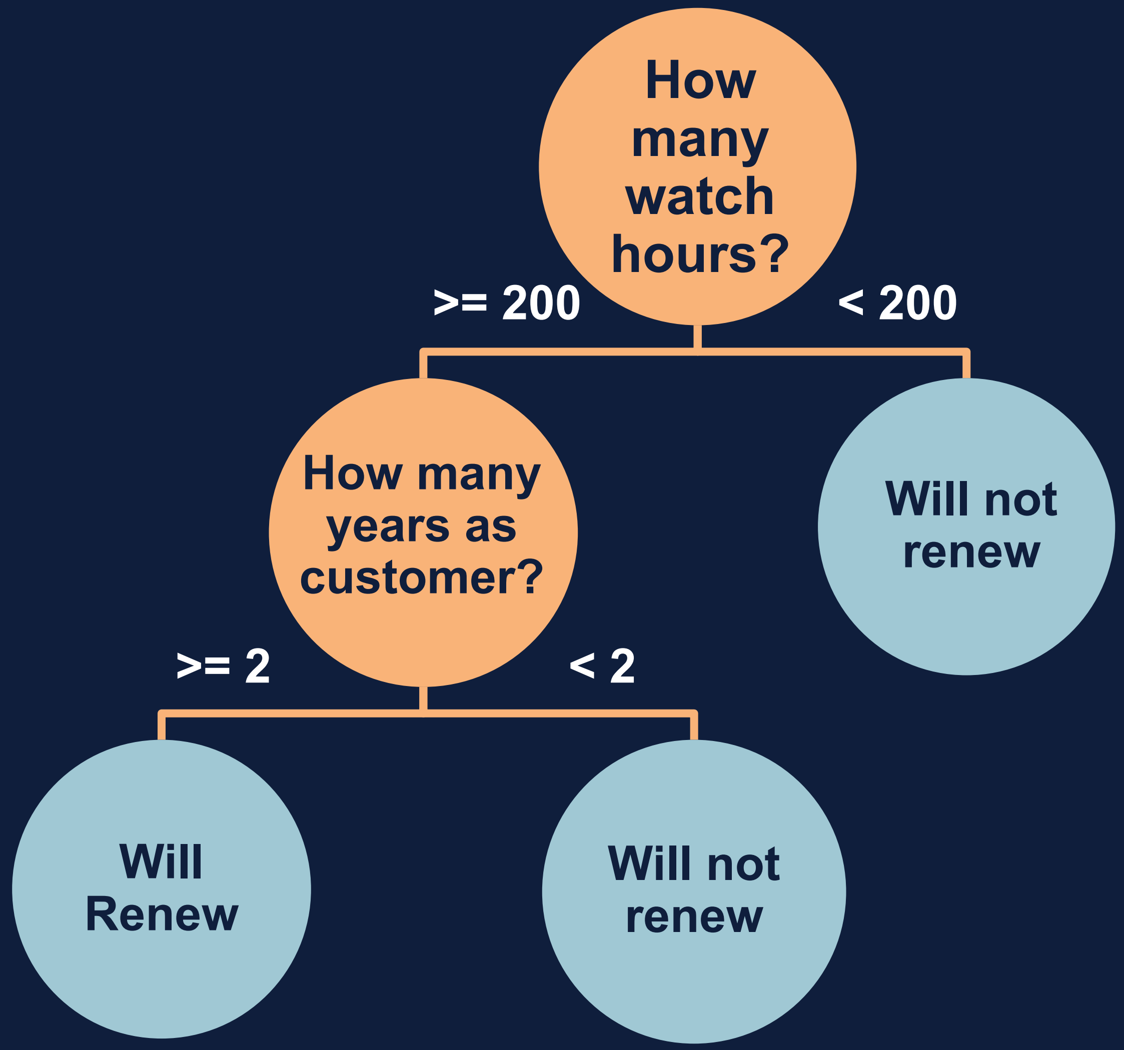

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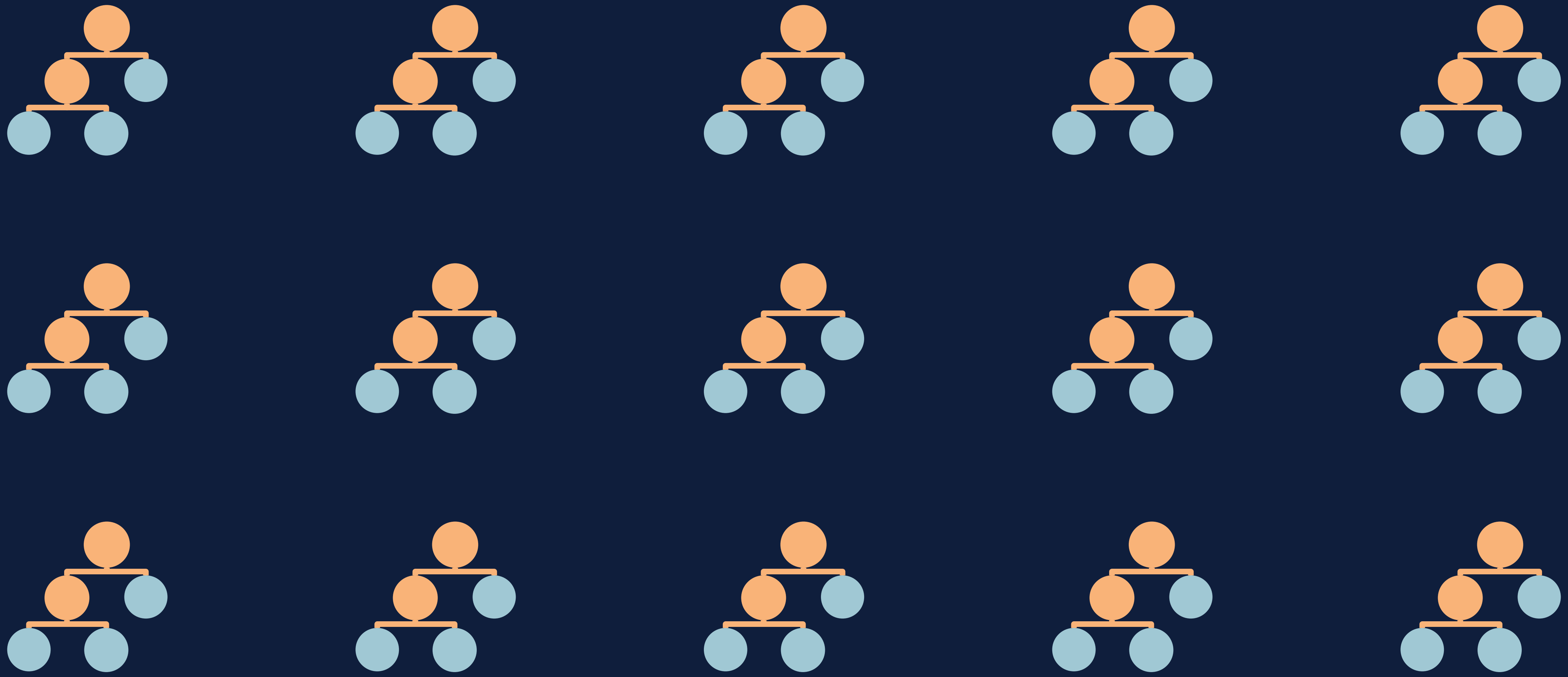

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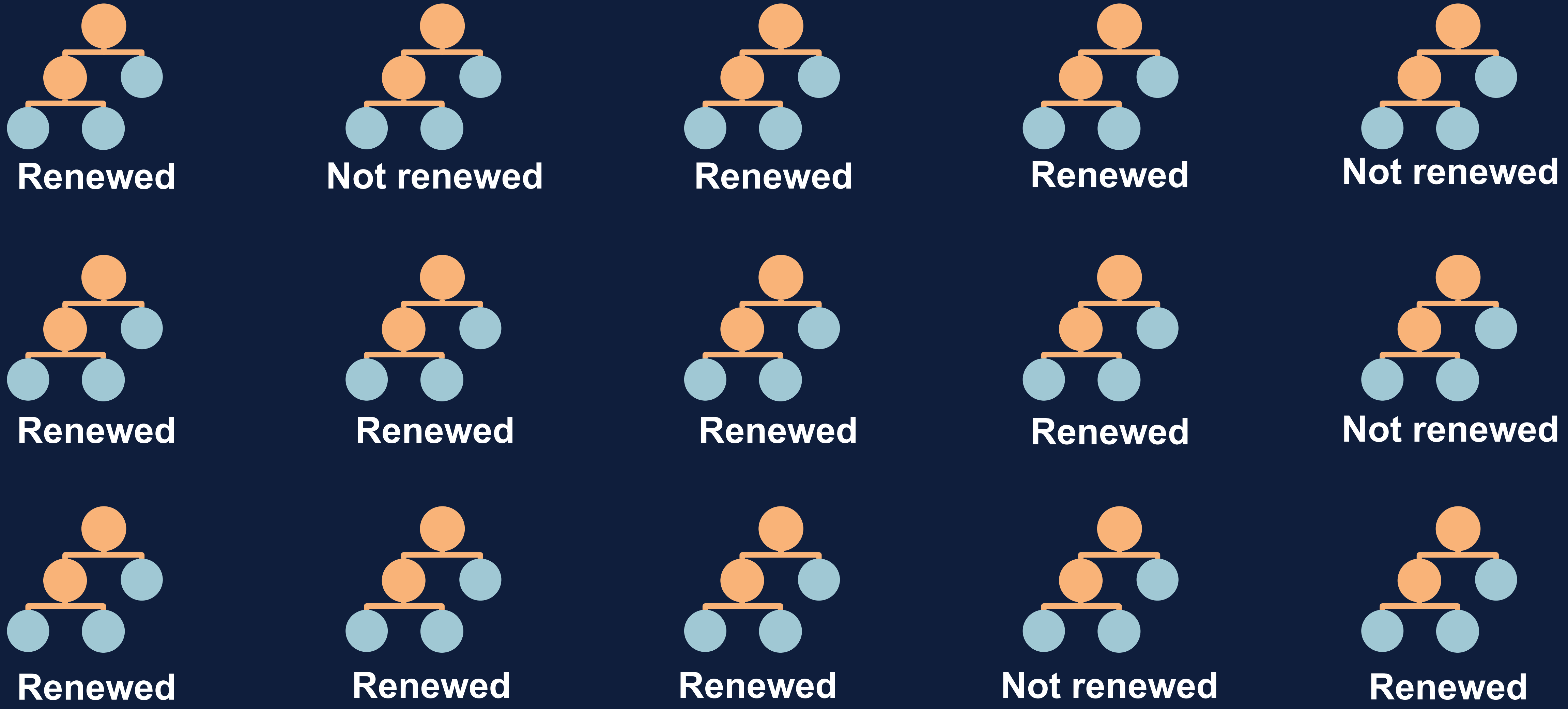


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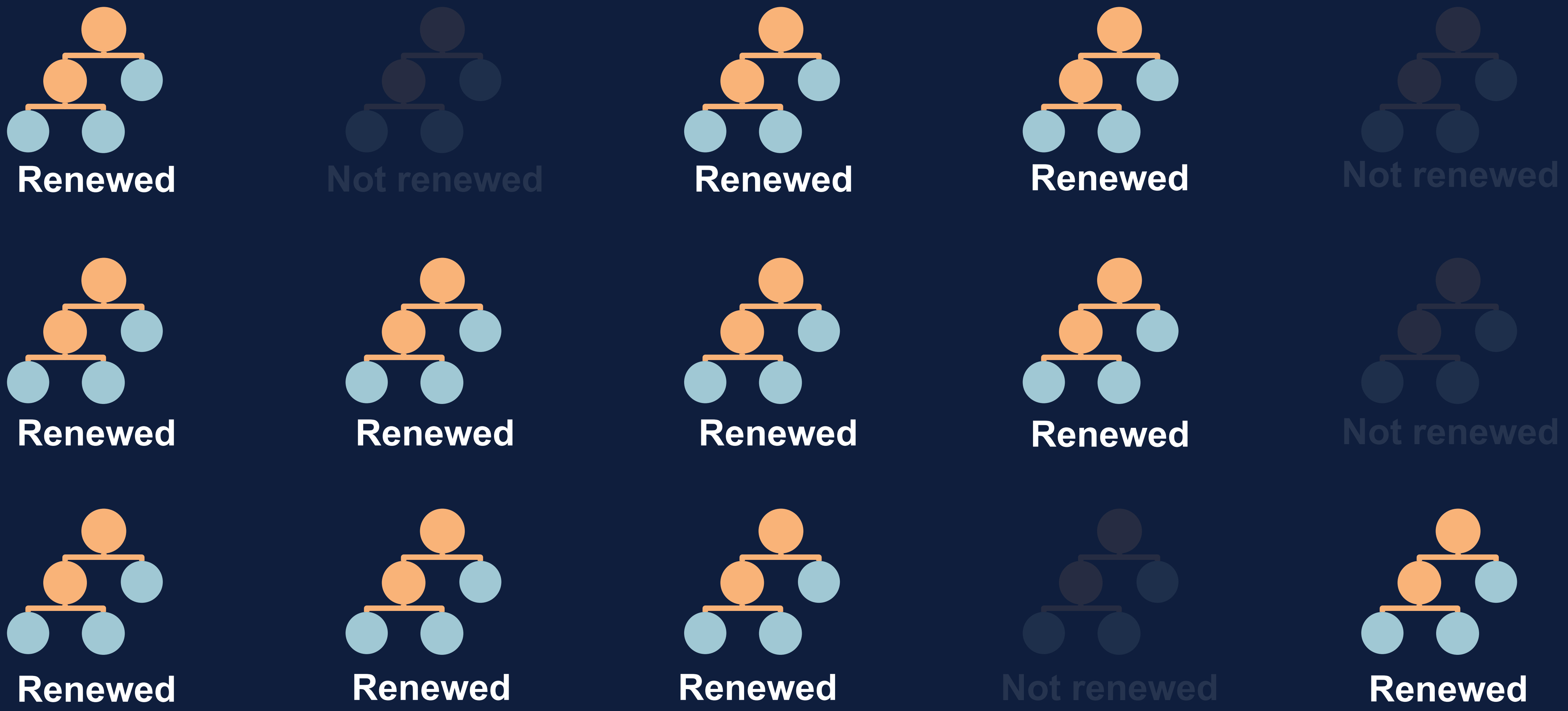

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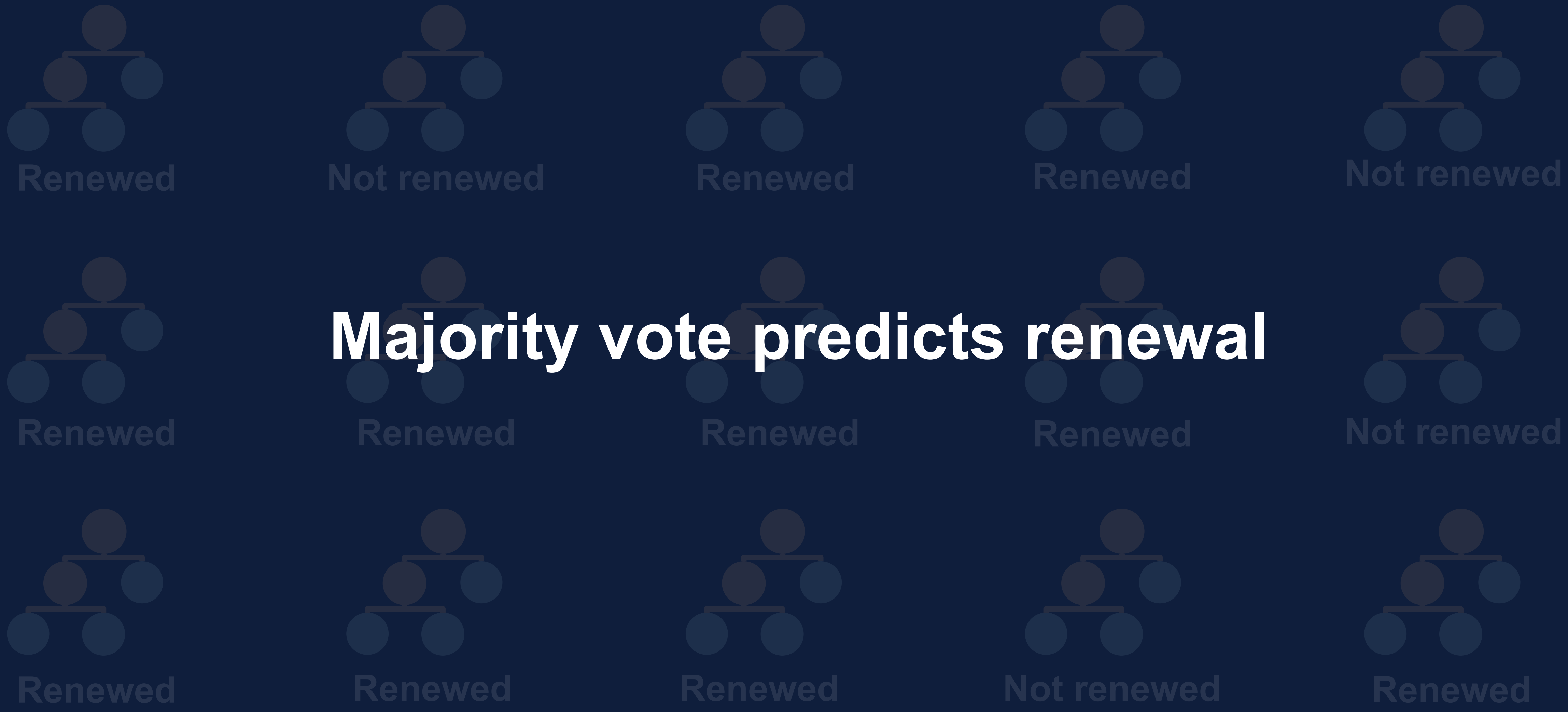


## Majority vote predicts renewal

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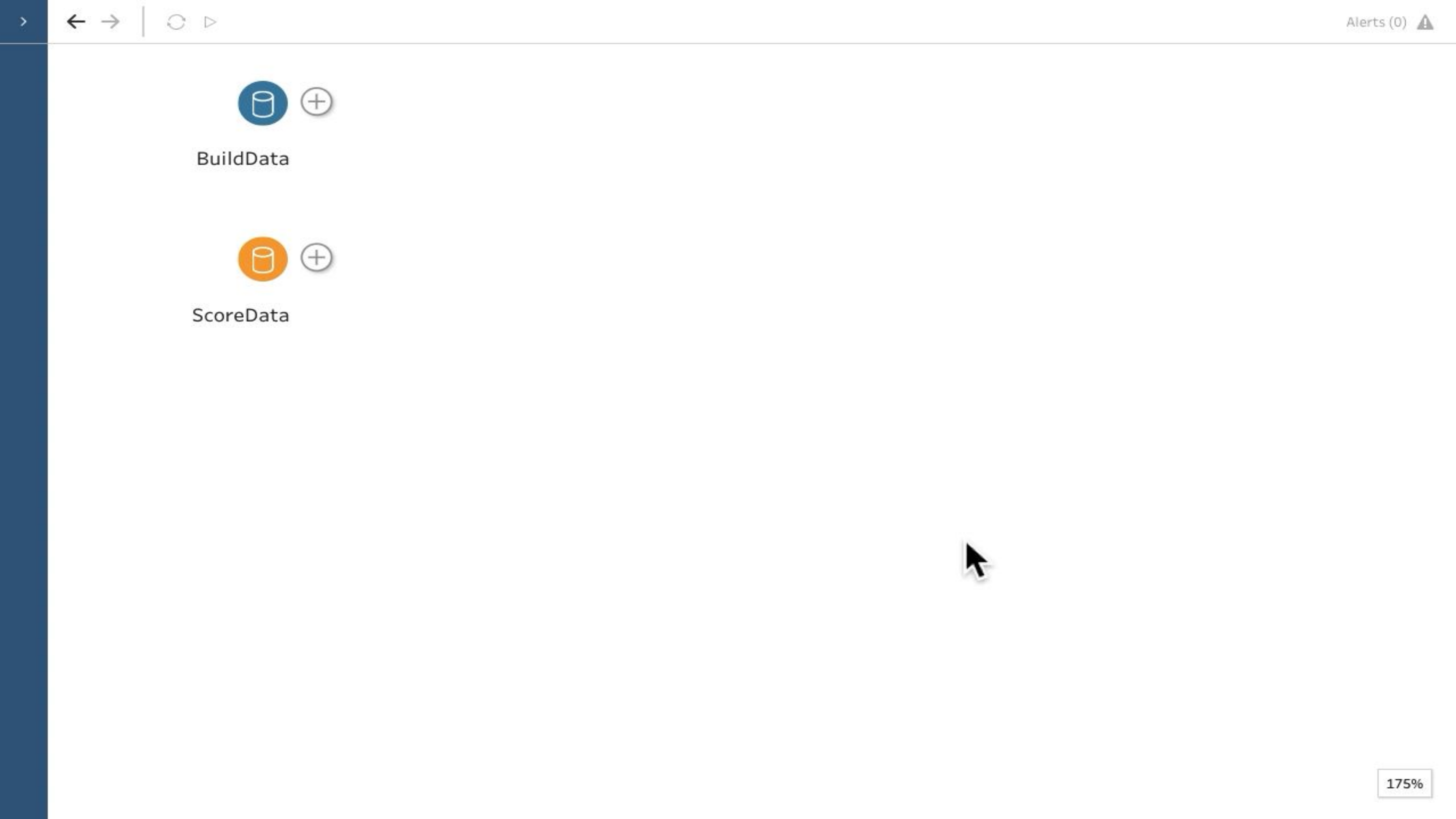
Alerts (0)
BuildData
ScoreData
175%

# R Code

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fit_predict <- function(full_data){
  library(randomForest)
  full_data$outcome <- as.factor(full_data$outcome)

  build_rf <- randomForest(outcome ~ pct_active_days + watch_hours + profiles +
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  full_data$churn_probs[full_data$Purpose == 'Scoring'] <-
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   years_customer, churn_probs, Predicted))

  return(output_data)
}
```

# R Code

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fit_predict <- function(full_data){
  library(randomForest)
  full_data$outcome <- as.factor(full_data$outcome)

  build_rf <- randomForest(outcome ~ pct_active_days + watch_hours + profiles +
years_customer,
                           data = full_data[full_data$Purpose == 'Model Building',])

  full_data$churn_probs[full_data$Purpose == 'Scoring'] <-
    predict(build_rf, full_data[full_data$Purpose == 'Scoring',], type = "prob")[,1]

  full_data$Predicted <-
    ifelse(full_data$churn_probs >= 0.5, 'Predict_NoRenew’,
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  return(output_data)
}
```
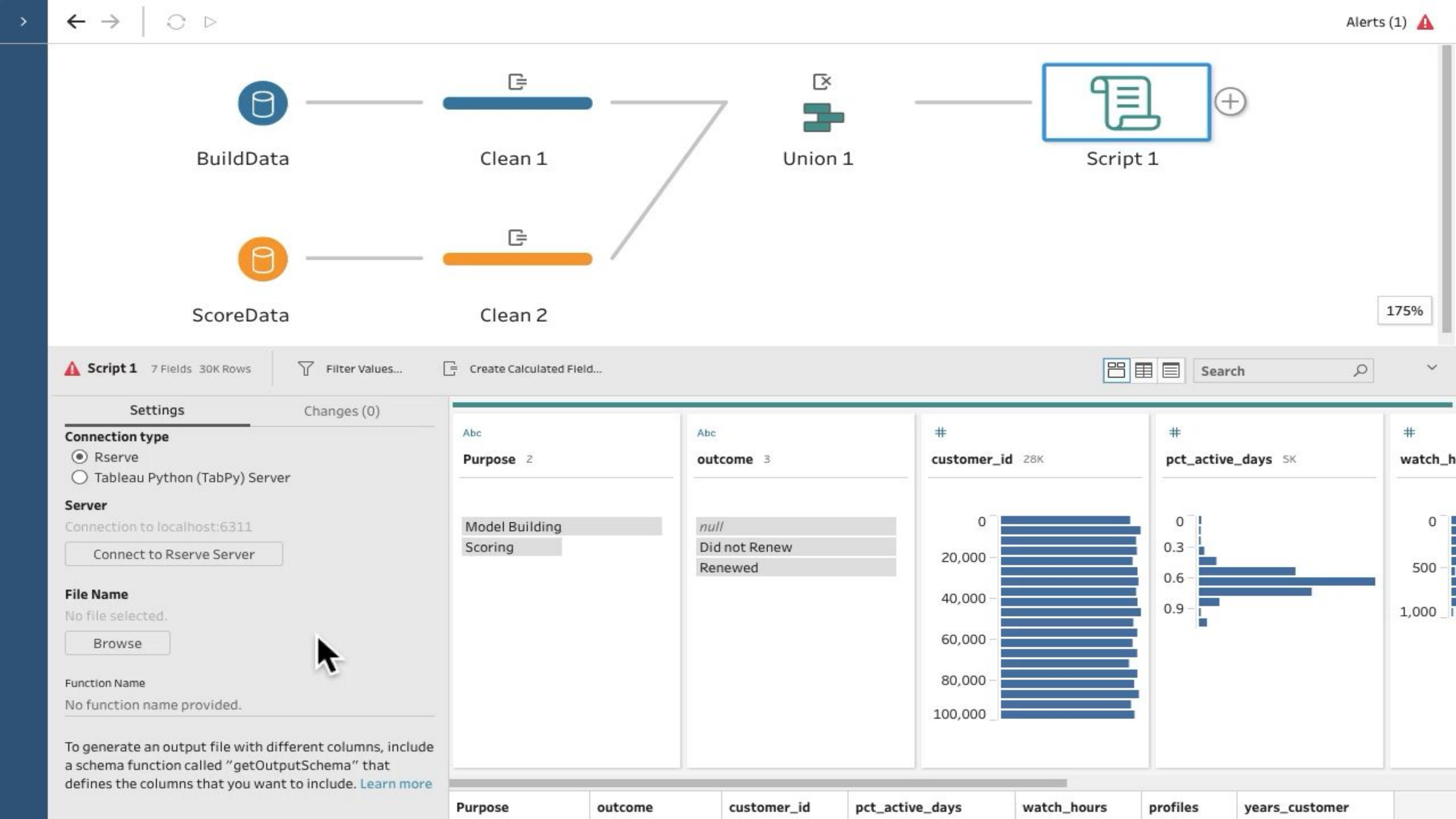

tableau

# R Code

```
getOutputSchema <- function() {
  return (data.frame(
    Customer_ID = prep_string(),
    Percent_Active_Days = prep_decimal(),
    Watch_Hours = prep_decimal(),
    Profiles = prep_decimal(),
    Years_Customer = prep_decimal(),
    Churn_Probability = prep_decimal(),
    Predicted_Outcome = prep_string()));
}
```



Alerts (1)
BuildData
Clean 1
Union 1
Script 1
ScoreData
Clean 2
175%
Script 1
7 Fields 30K Rows
Filter Values...
Create Calculated Field...
Search
Settings
Changes (0)
Connection type
Rserve
Tableau Python (TabPy) Server
Server
Connection to localhost:6311
Connect to Rserve Server
File Name
No file selected.
Browse
Function Name
No function name provided.
To generate an output file with different columns, include a schema function called "getOutputSchema" that defines the columns that you want to include. Learn more
Abc
Purpose 2
Model Building
Scoring
Abc
outcome 3
null
Did not Renew
Renewed
customer_id 28K
0
20,000
40,000
60,000
80,000
100,000
pct_active_days 5K
0
0.3
0.6
0.9
watch_h
0
500
1,000
Purpose
outcome
customer_id
pct_active_days
watch_hours
profiles
years_customer

# R and Python Scripts in Tableau Prep

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- Any library or model

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- Easy to schedule jobs

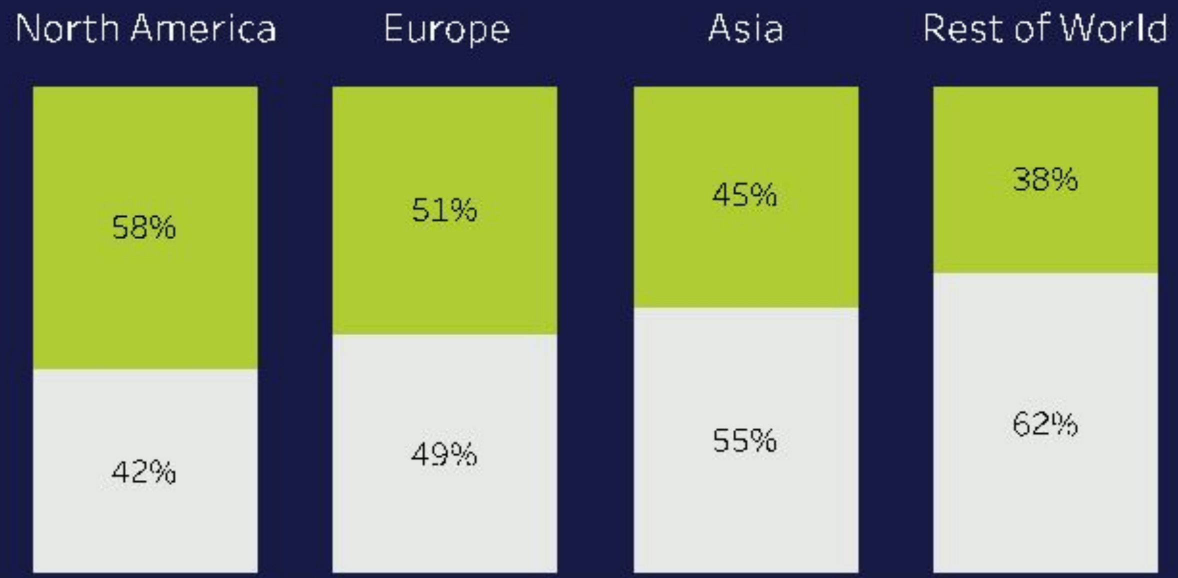
# R and Python Scripts in Tableau Prep

- Any library or model
- Easy to schedule jobs
- Fresh output data

# Who is predicted to renew?

## 49% of subscription are at risk of not renewing


## Asia and Rest of World over-index on predicted non-renewals




## Those predicted to renew have a higher percentage of login days


## ... have more user profiles


## ... and have been customers for longer.

# Predicted Renewals

| Customer ID | Predicted Outcome | Churn Probability | Percent Active Days | Profiles | Years Customer |
|---|---|---|---|---|---|
| 14 | Renewal | 0.14 | 71% | 1 | 5 |
| 35 | No Renewal | 0.85 | 60% | 1 | 6 |
| 62 | Renewal | 0.41 | 66% | 1 | 4 |
| 97 | No Renewal | 0.77 | 61% | 2 | 5 |
| 110 | Renewal | 0.35 | 64% | 2 | 3 |
| 133 | Renewal | 0.34 | 100% | 2 | 3 |
| 140 | No Renewal | 0.91 | 60% | 1 | 3 |
| 147 | Renewal | 0.34 | 56% | 2 | 10 |
| 160 | No Renewal | 0.76 | 64% | 2 | 1 |
| 165 | Renewal | 0.00 | 70% | 2 | 1 |
| 175 | Renewal | 0.29 | 75% | 1 | 4 |
| 189 | Renewal | 0.10 | 73% | 1 | 5 |

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**Over / Under based on global average**

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# Why Do Data Science Projects Fail?

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Sometimes they should fail

Data issues

Lack of leadership buy-in/understanding

Can’t get model into production

# How Do Data Science Projects NOT Fail?

Focus on impactful models

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Work as a data community to solve data issues

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Effective communication and “selling” of models

# How Do Data Science Projects NOT Fail?

Focus on impactful models

Work as a data community to solve data issues

Effective communication and “selling” of models

Use Tableau Prep + R/Python to get models into production

# THANK YOU

**Alyssa Peck**
**apeck@tableau.com**

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