

# Introduction to Machine Learning



**SQLGrillen**  
Databases  
Bratwurst  
Beer



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# Alex Whittles



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## Business Intelligence Consultancy

Data Modelling  
Data Warehousing  
OLAP Cubes

ETL Systems  
Reporting Systems  
Managed Service



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# Agenda

What is Machine Learning?

Real world scenarios

ML algorithms

Training & Testing

Data Preparation

Demo

Using the model





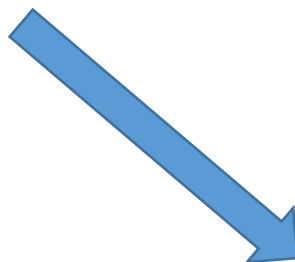
# What is Machine Learning?





# Machine Learning in Today's World

Retail - Amazon



Frequently bought together



Total price: £25.11

Add both to Basket

Customers who bought this item also bought



Transformers Robots in Disguise Power Surge Sideswipe and Wind Strike Toy - Red  
★★★★☆ 39  
£19.99 ✓prime



50 Polka Dot Twist Ties For Cone Party Bags Cello Cellophane Bags Assorted Colours  
★★★★☆ 18  
£2.45 ✓prime



Banana Boat Kids Ultramist Spray Sun Lotion SPF 50, 175ml  
★★★★☆ 43  
£7.72 ✓prime



SainSmart Jr. Puzzle Ball Wisdom Ball 3D Intelligence Ball Game Magic Puzzle 21 Pcs  
★★★★☆ 47  
£9.99 ✓prime



Trutex Limited Boy's Short Sleeve Plain Polo Shirt  
★★★★☆ 137  
£1.24 - £9.95



The Wishing-Chair Collection: Three stories in one! (The Wishing-Chair... Enid Blyton  
★★★★☆ 177  
Paperback  
£6.99 ✓prime



The Magic Faraway Tree Collection: 3 Books in 1 Enid Blyton  
★★★★☆ 1,123  
Paperback  
£6.29 ✓prime



Violin Star 1, Student's book, with CD (Violin Star (ABRSM)) Edward Huws Jones  
★★★★☆ 118  
Paperback  
£5.59 ✓prime



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# Machine Learning in Today's World

- Credit Scoring
- Customer Segmentation
- Post Office Image Recognition





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What is Machine Learning?

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# Selecting a Model

(simplified!!!!)

Type	Scenario	Model
Unsupervised	Clustering	K-Means
	Outlier detection	K-Means
Supervised	Predict Yes/No	Two-class boosted decision tree Two-class logistic regression
	Predict Classification	Multi-class logistic regression Support Vector Machine Multi-class neural net
	Predict Value	Linear Regression
	Feature based detection / intelligence	Neural Net

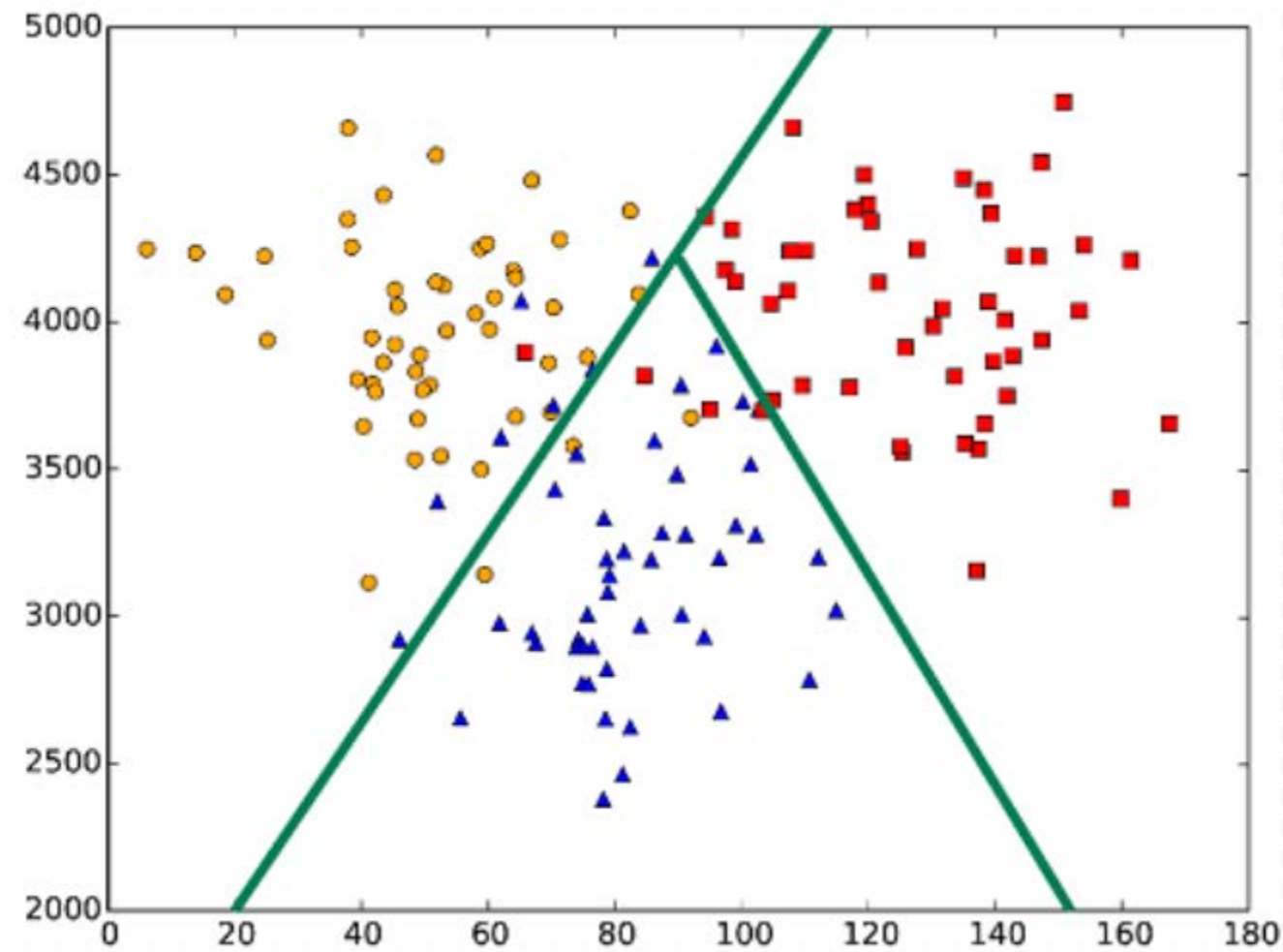




# K-Means Clustering

Unsupervised

No training, just dive straight in!



Credit: <https://docs.microsoft.com/en-us/azure/machine-learning/machine-learning-algorithm-choice>



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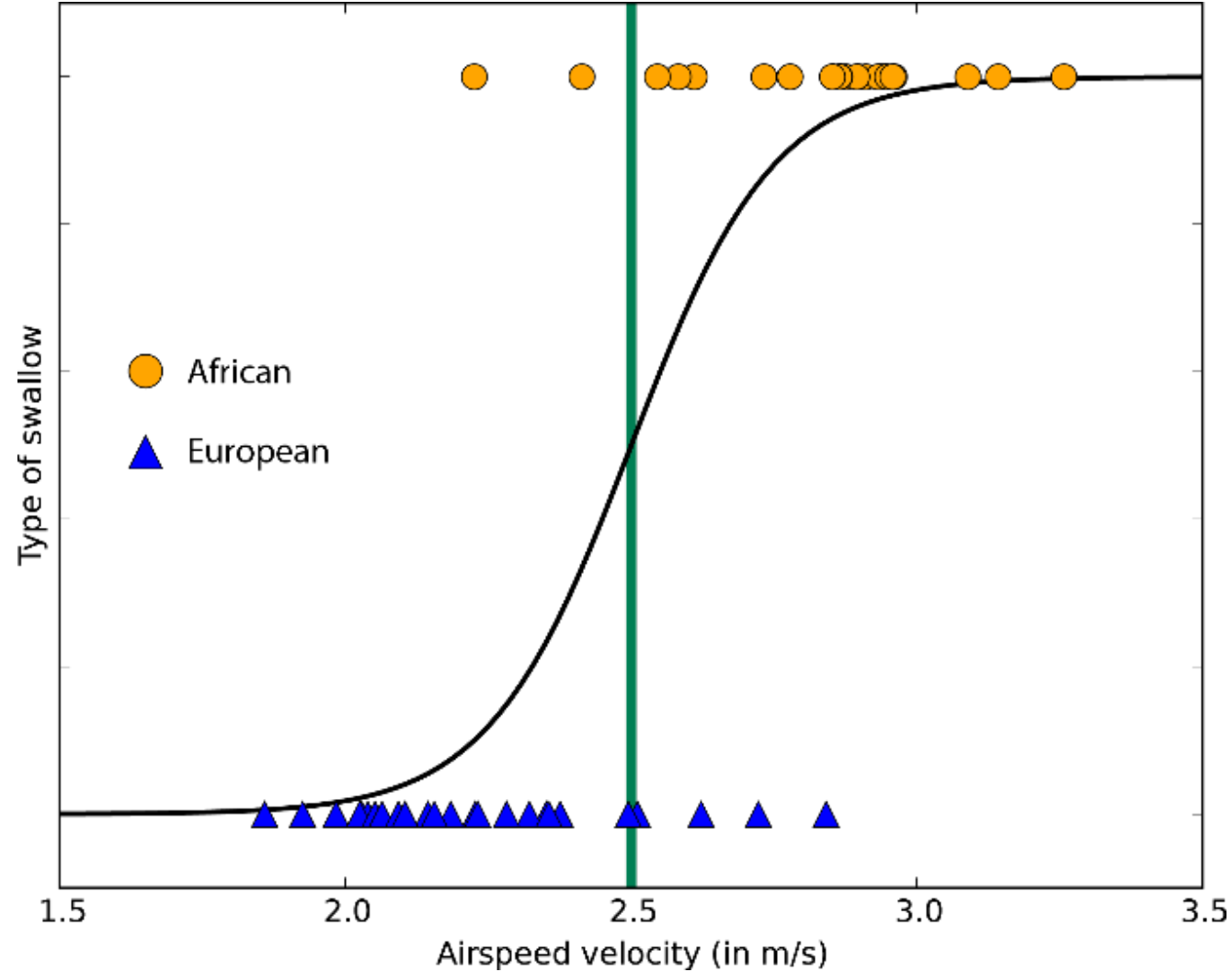
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# Logistic Regression

Supervised

Build a model using training data, then use



Credit: <https://docs.microsoft.com/en-us/azure/machine-learning/machine-learning-algorithm-choice>



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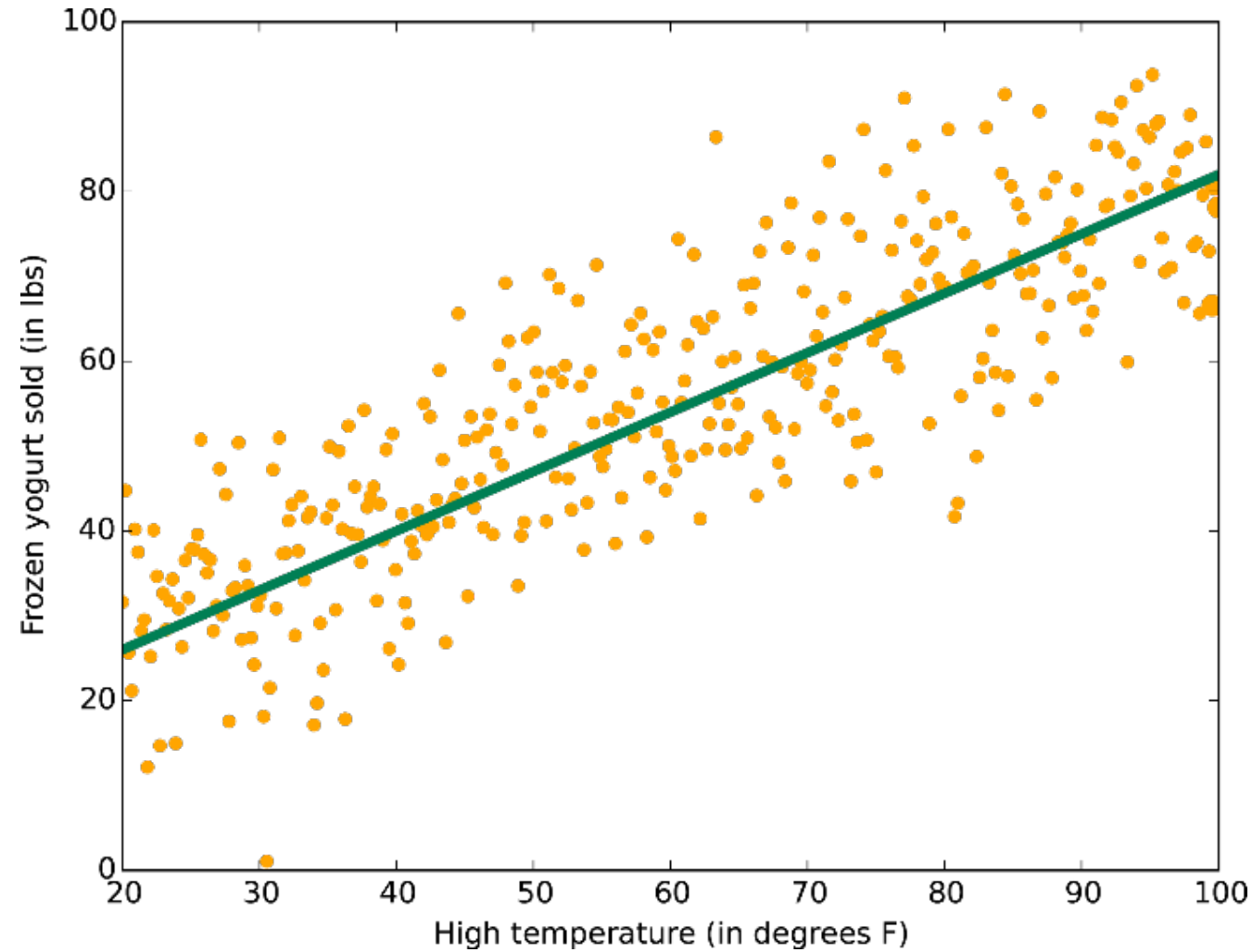
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# Linear Regression

Supervised



Credit: <https://docs.microsoft.com/en-us/azure/machine-learning/machine-learning-algorithm-choice>



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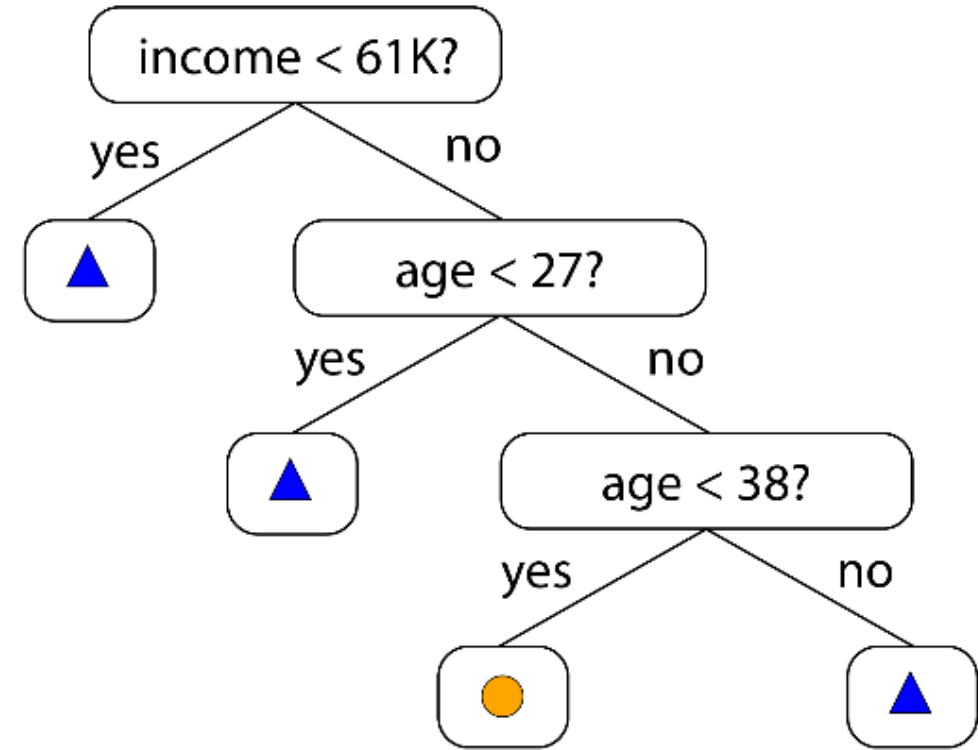
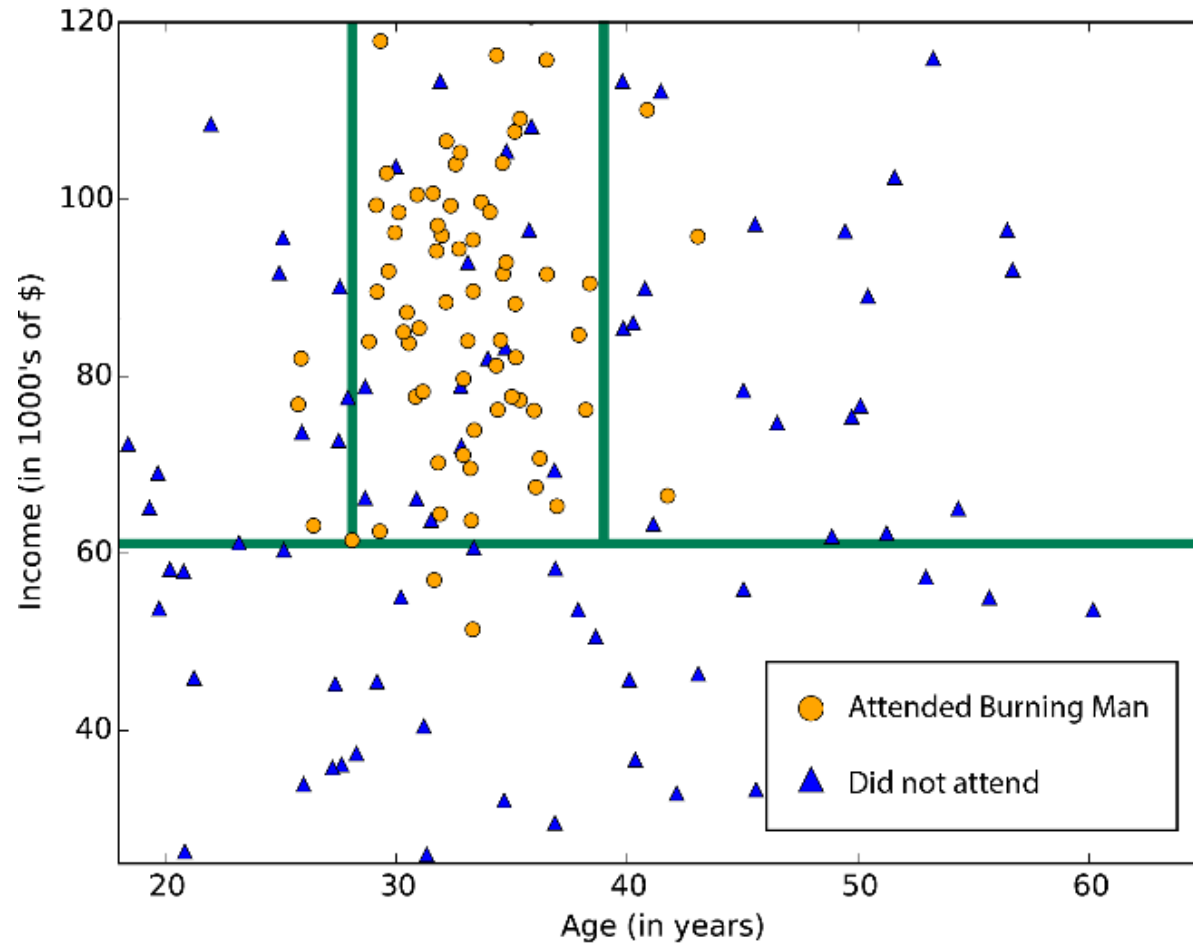


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# Decision Trees

Supervised



Credit: <https://docs.microsoft.com/en-us/azure/machine-learning/machine-learning-algorithm-choice>



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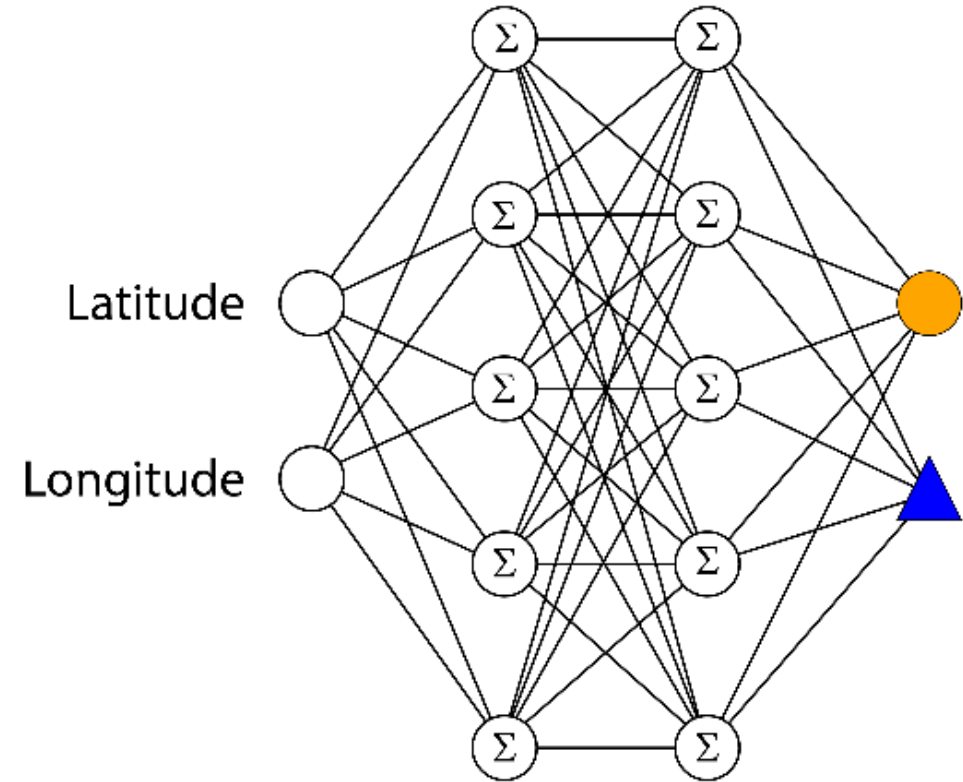
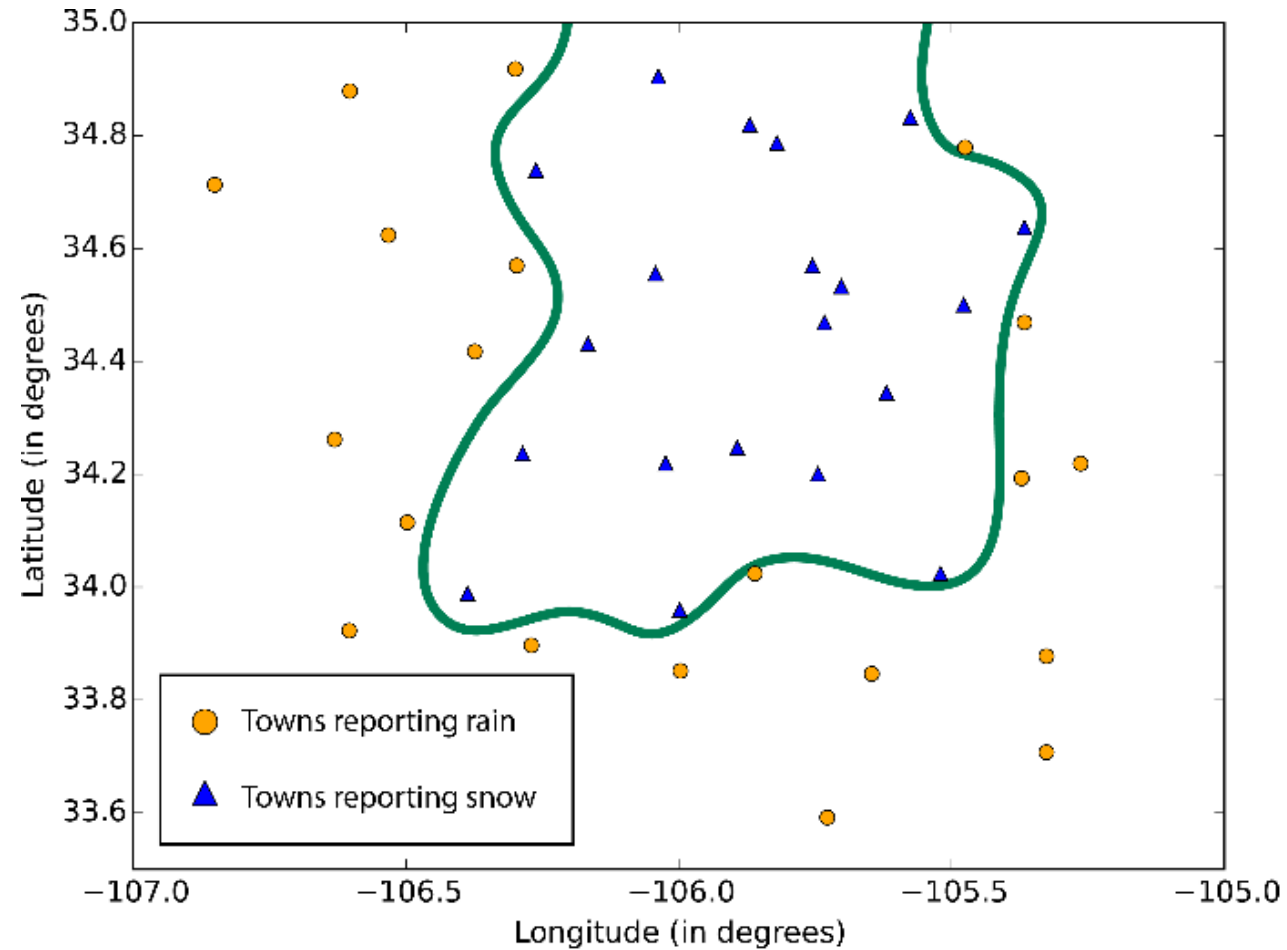
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# Neural Network

Supervised



Credit: <https://docs.microsoft.com/en-us/azure/machine-learning/machine-learning-algorithm-choice>



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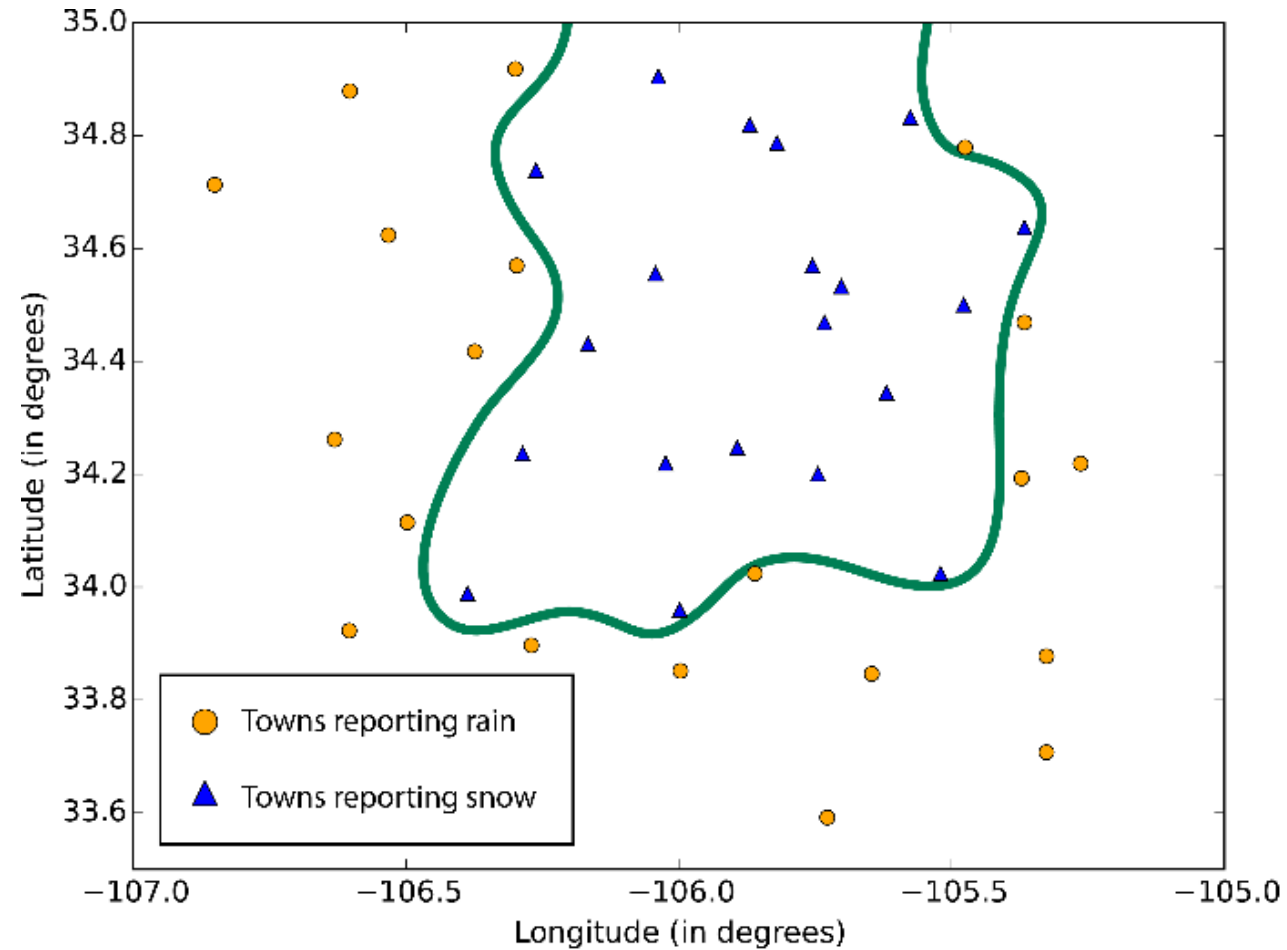
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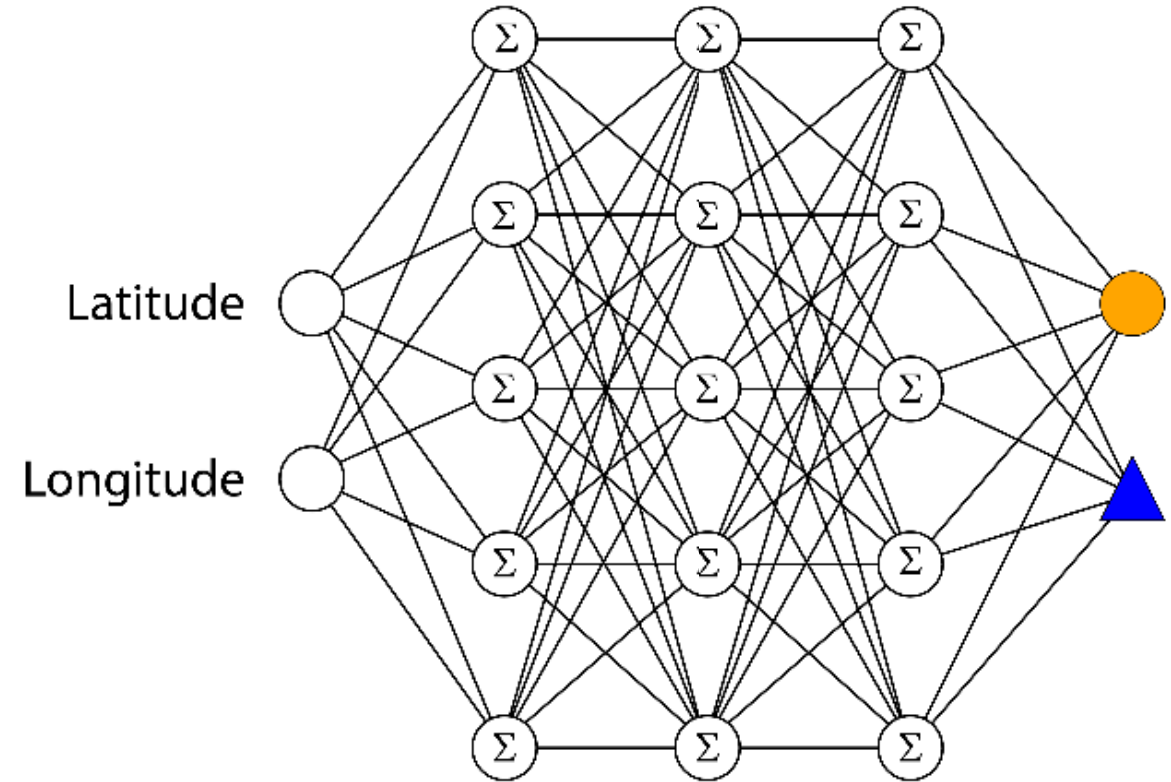


# Neural Network

Supervised



--> Deep Learning (n layers)



Credit: <https://docs.microsoft.com/en-us/azure/machine-learning/machine-learning-algorithm-choice>



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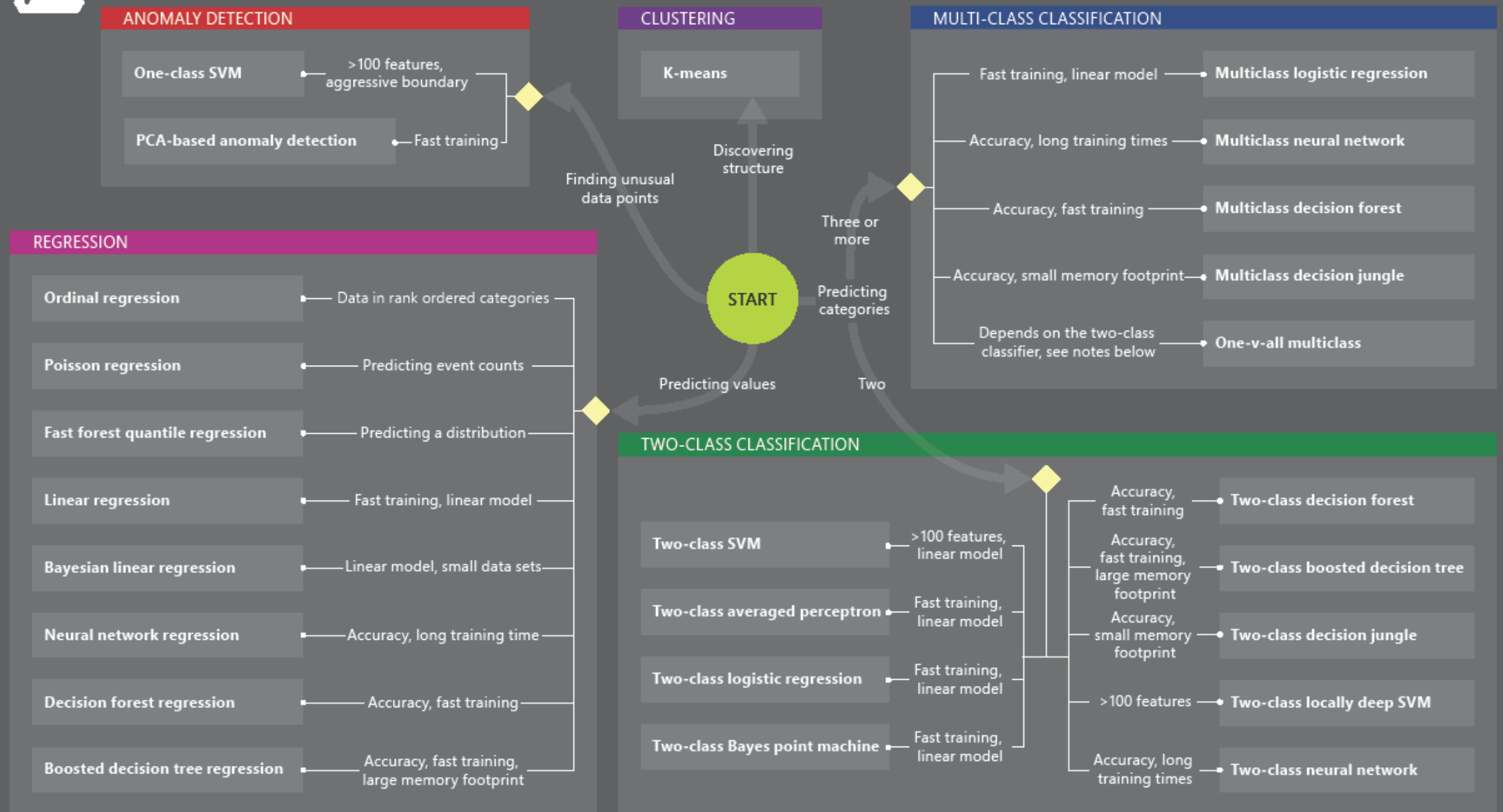
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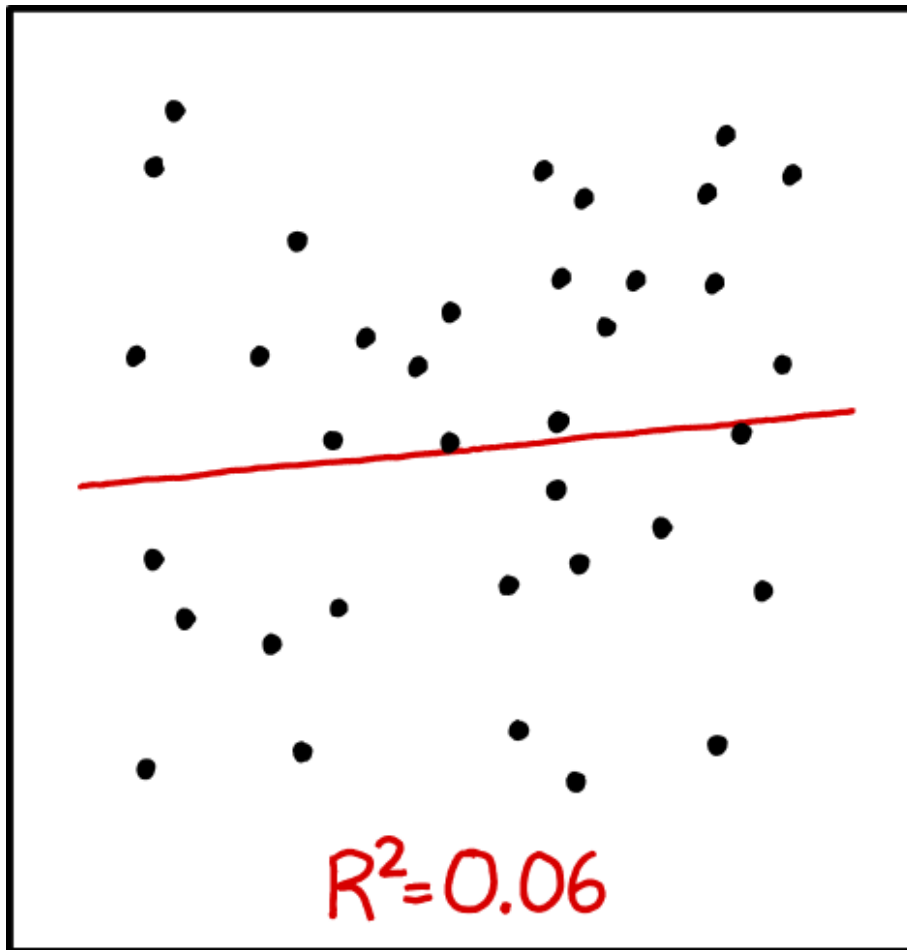




# Microsoft Azure Machine Learning: Algorithm Cheat Sheet

This cheat sheet helps you choose the best Azure Machine Learning Studio algorithm for your predictive analytics solution. Your decision is driven by both the nature of your data and the question you're trying to answer.





I DON'T TRUST LINEAR REGRESSIONS WHEN IT'S HARDER TO GUESS THE DIRECTION OF THE CORRELATION FROM THE SCATTER PLOT THAN TO FIND NEW CONSTELLATIONS ON IT.





# Agenda

What is Machine Learning?

Real world scenarios

ML algorithms

👑 Training & Testing

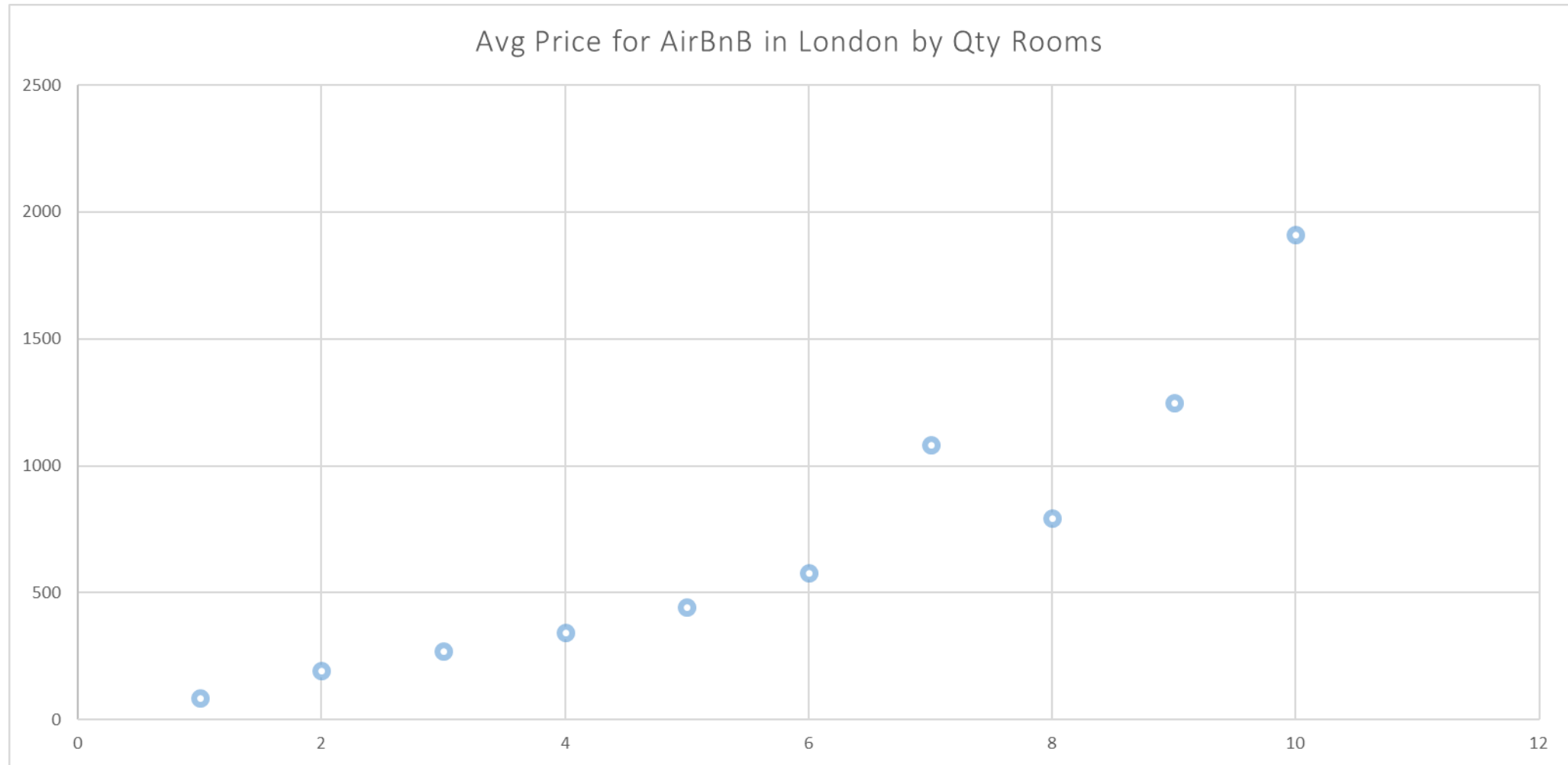
Data Preparation

Demo

Using the model

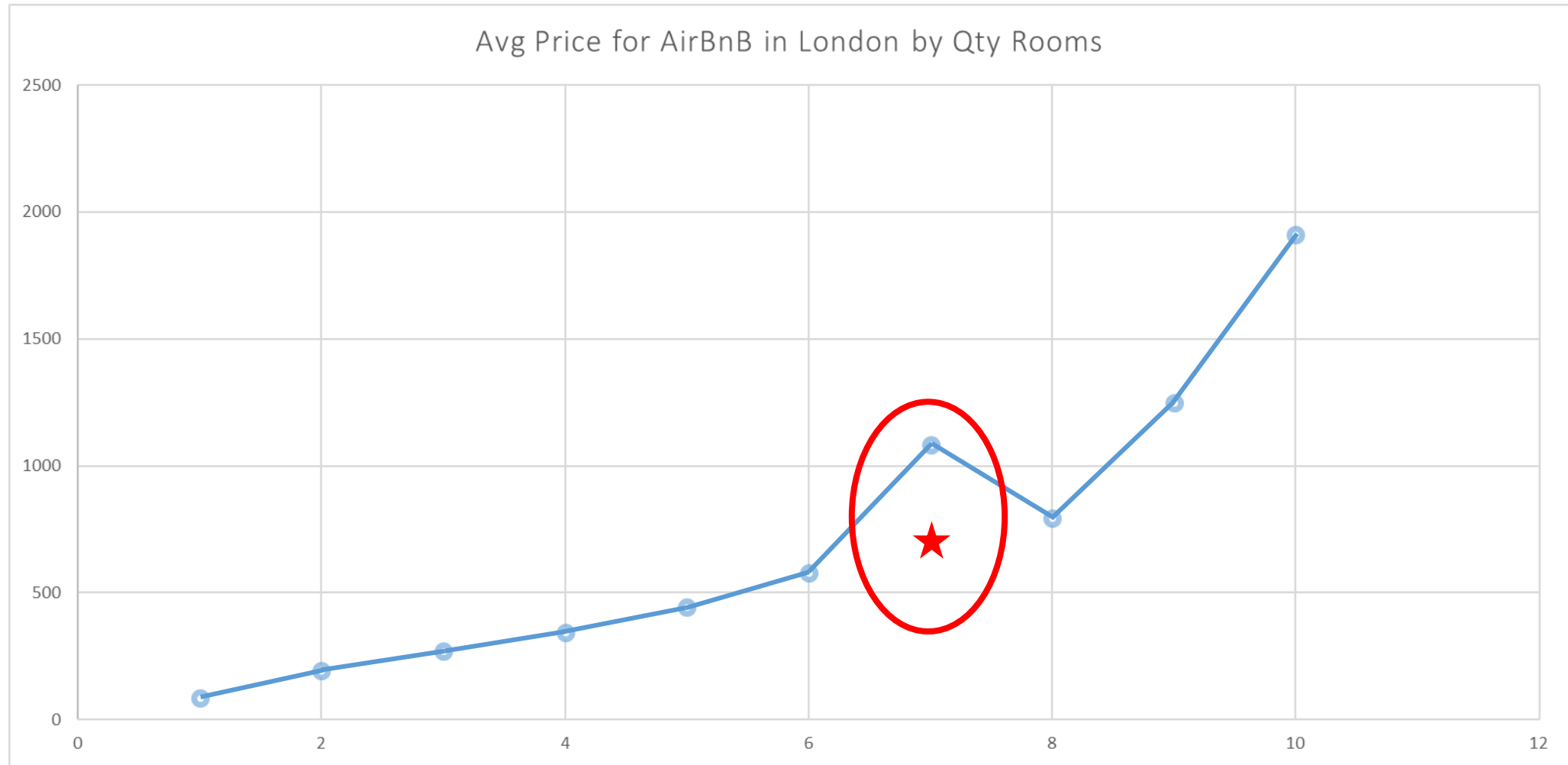


# Training & Testing



# Training & Testing

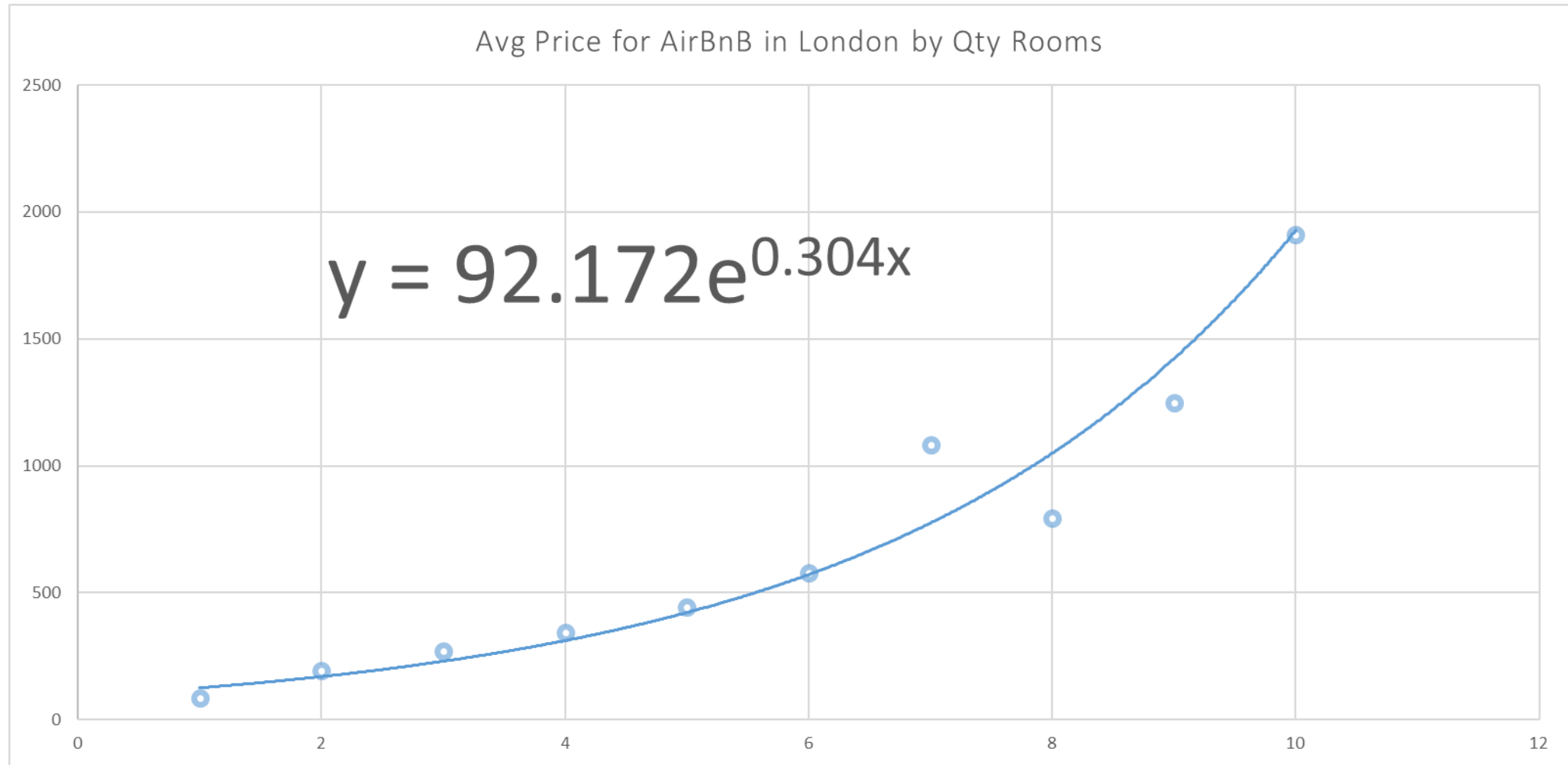
Over trained





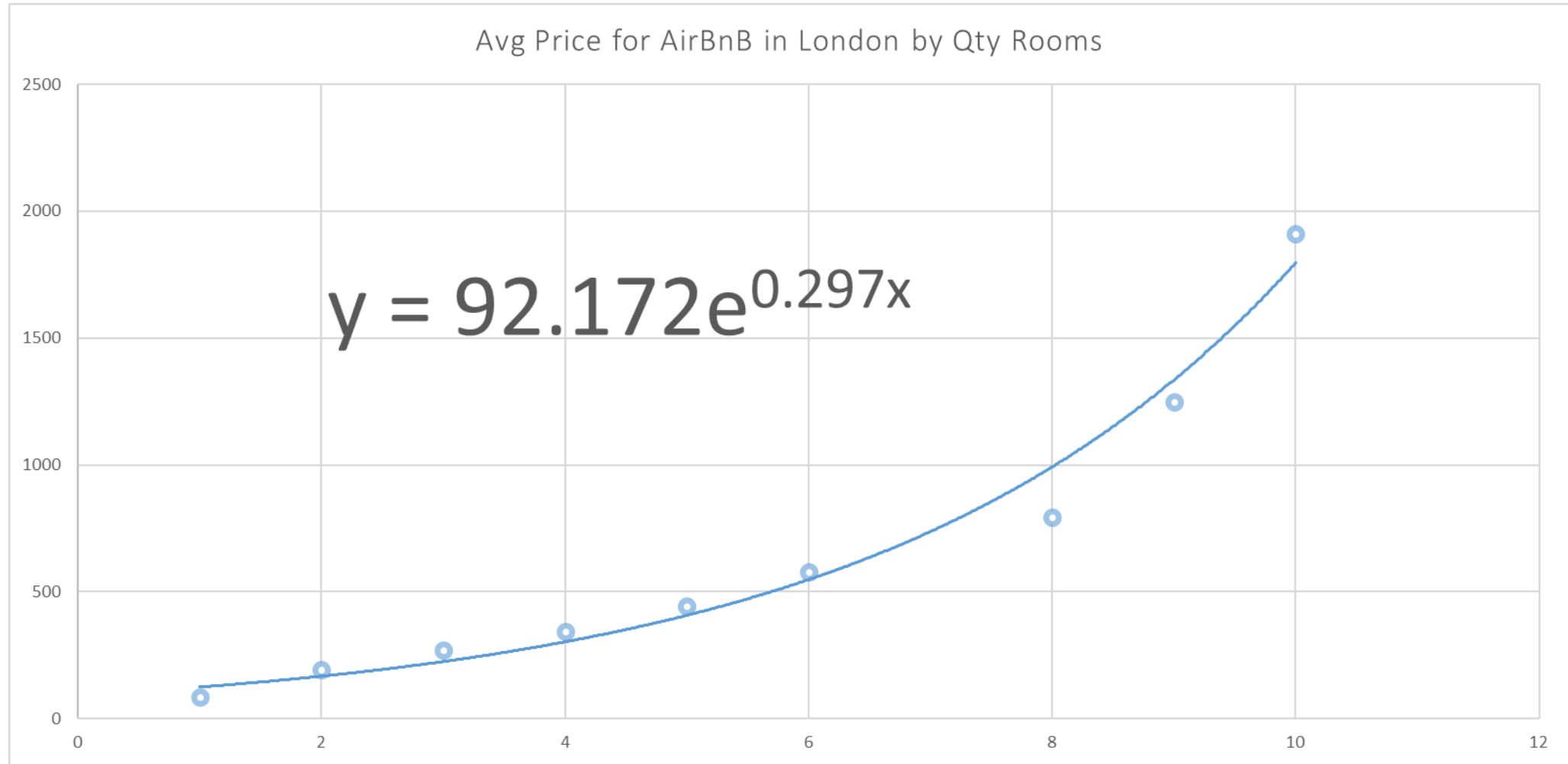
# Training & Testing

Generic model



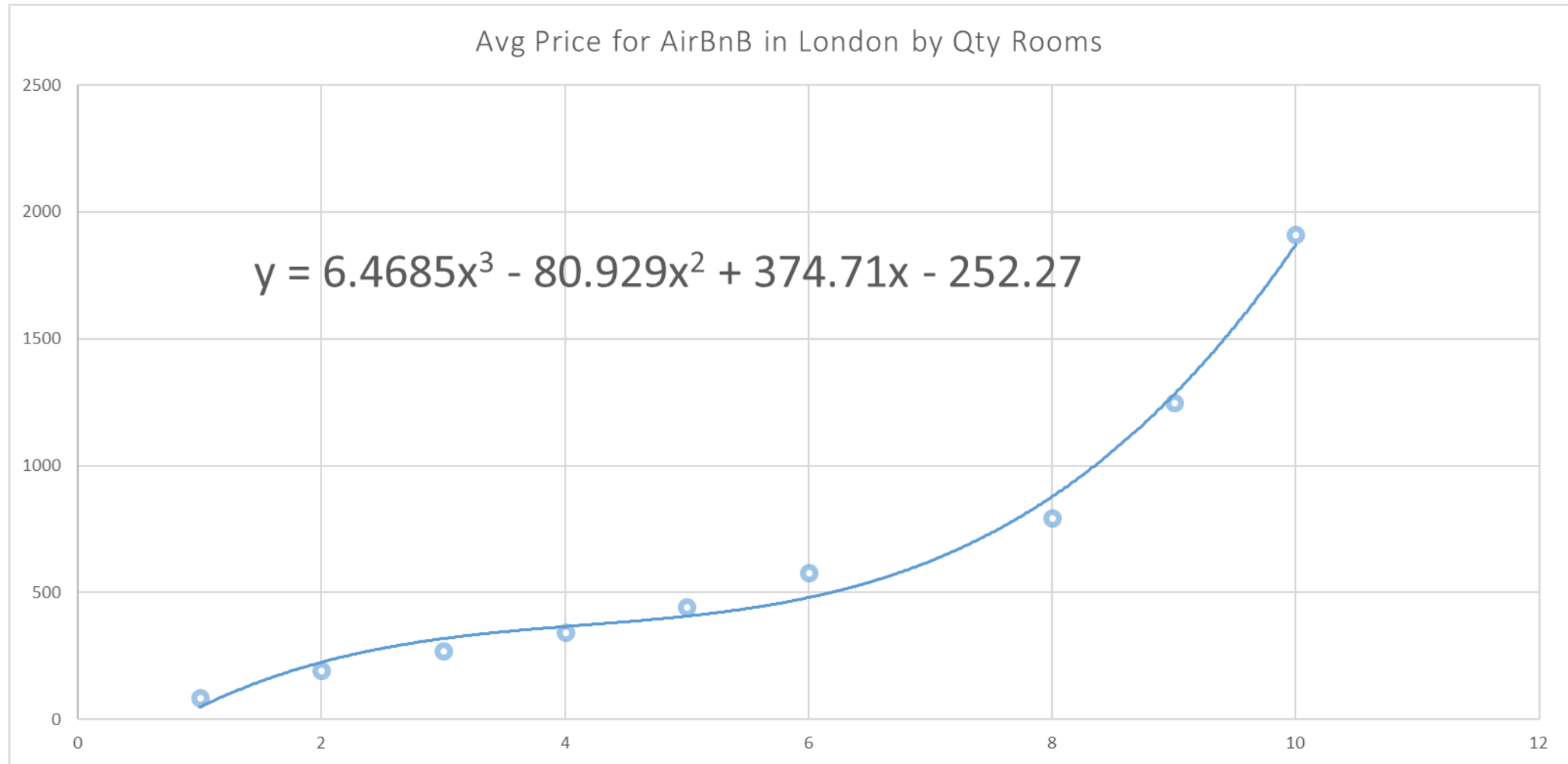
# Training & Testing

Generic model



# Training & Testing

Generic model



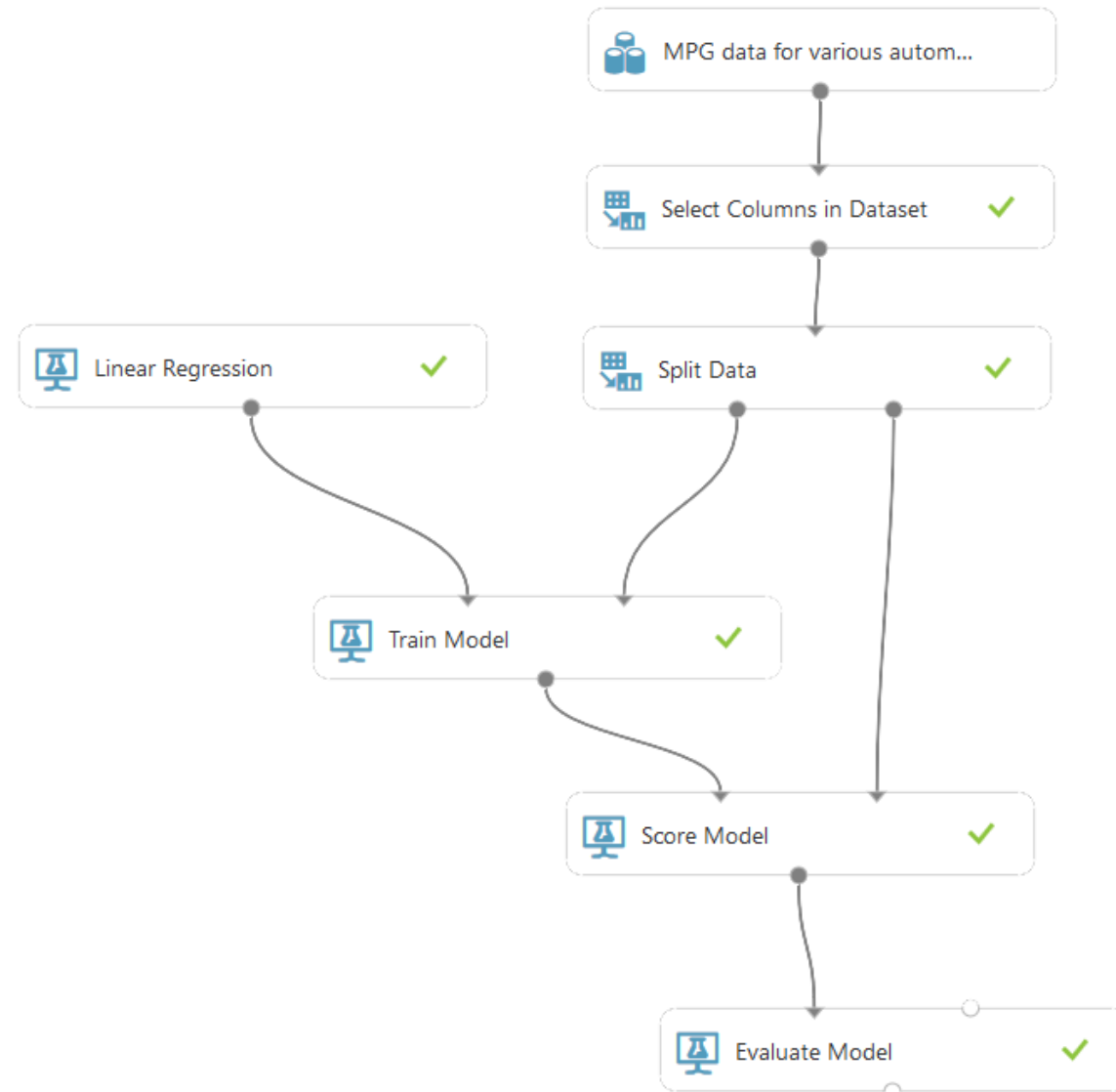
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# Demo





# Using Azure ML

What do you want to do?

- Consume pre generated ML functionality

Cognitive Services

Bots

- Getting started on custom models, Graphical Interface

Azure ML Studio (browser)

- Code your own complex models, full on data scientist code monkey

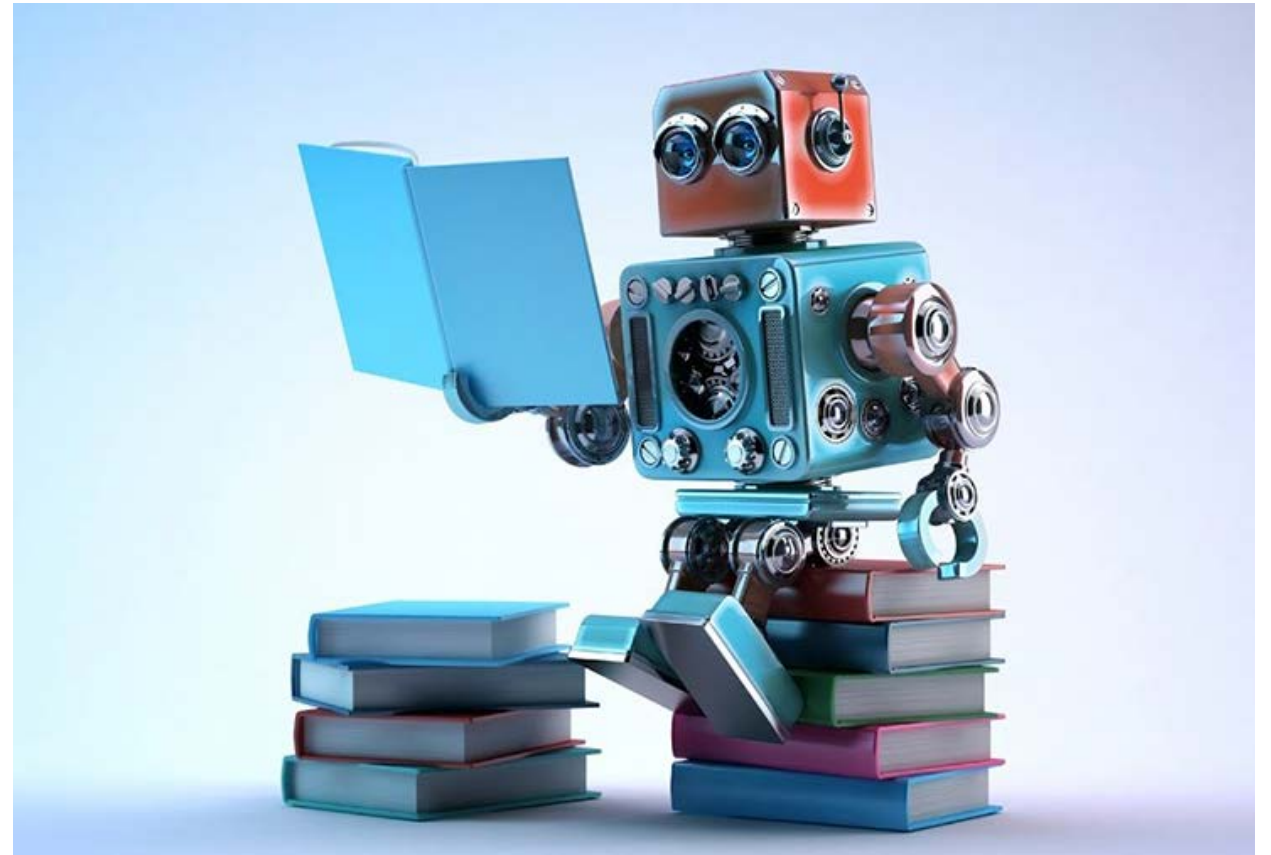
ML Workbench

ML Server



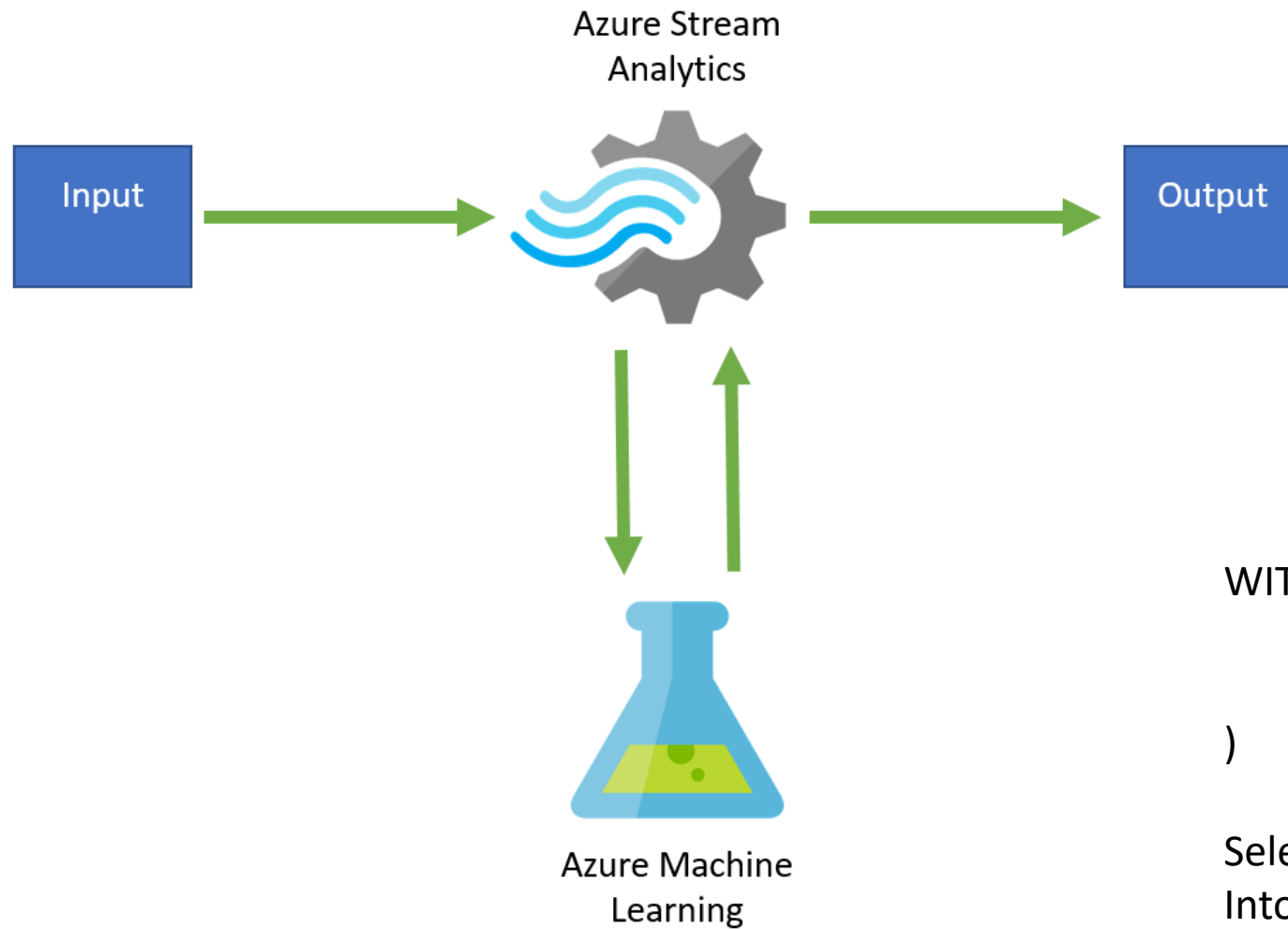
# I've got my model – now what?

- Batch Execution
  - *Process prediction asynchronously for bulk data*
  - Web Service API
  - Data Lake Analytics
  - Excel
- Request-Response
  - *One prediction at a time*
  - Web Service API
  - Stream Analytics



# I've got my model – now what?

Real Time Data – Stream Analytics



New function

- \* Function Alias  
sentiment ✓
- \* Function Type  
Azure ML ▼
- \* Import option  
Import from a different subscription ▼
- \* URL  
s/42380 dcd11/sco
- \* Key  
.....

WITH sentiment AS (  
SELECT text, sentiment(text) as result  
from [Input]  
)

Select text, result.[Scored Labels]  
Into [output]  
From [sentiment]

<https://docs.microsoft.com/en-us/azure/stream-analytics/stream-analytics-machine-learning-integration-tutorial>



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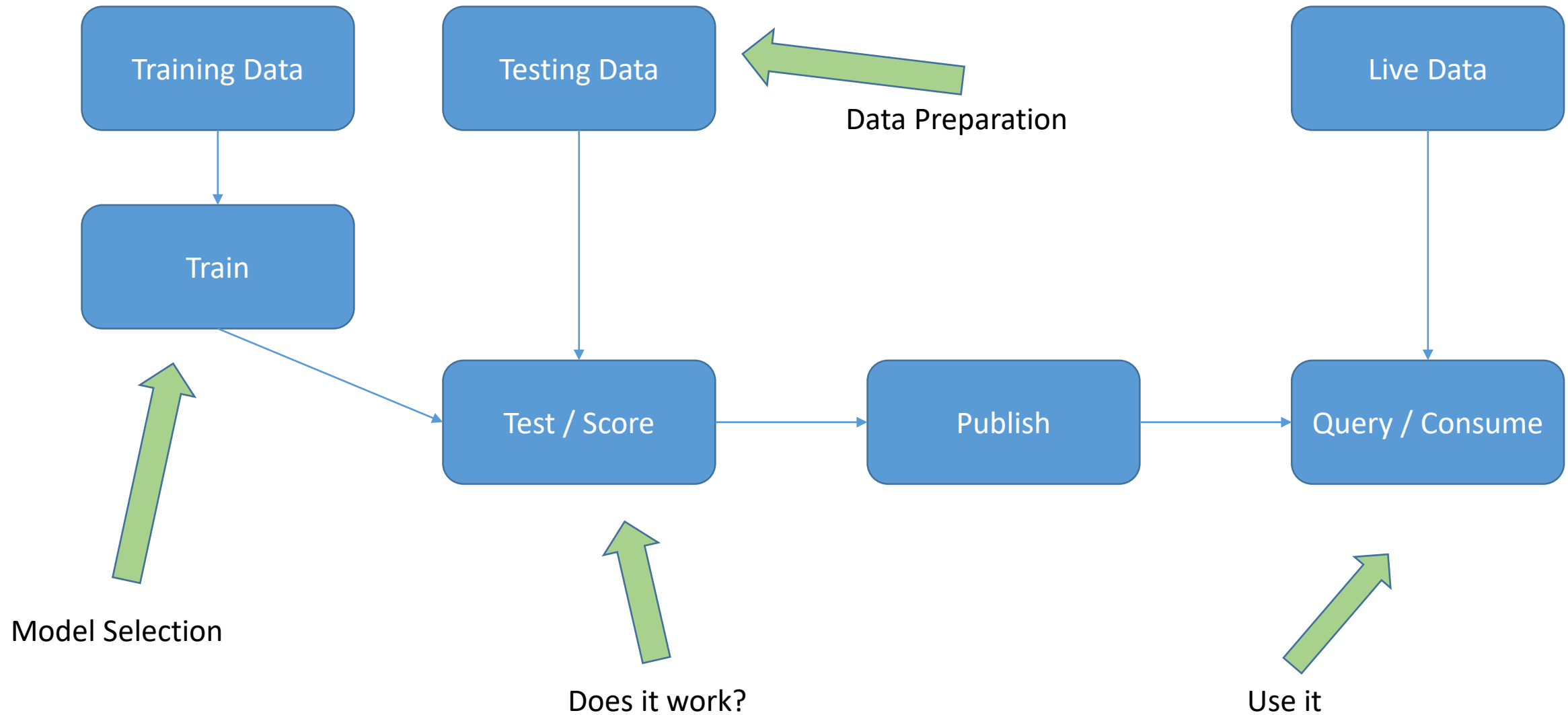


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# Machine Learning Summary



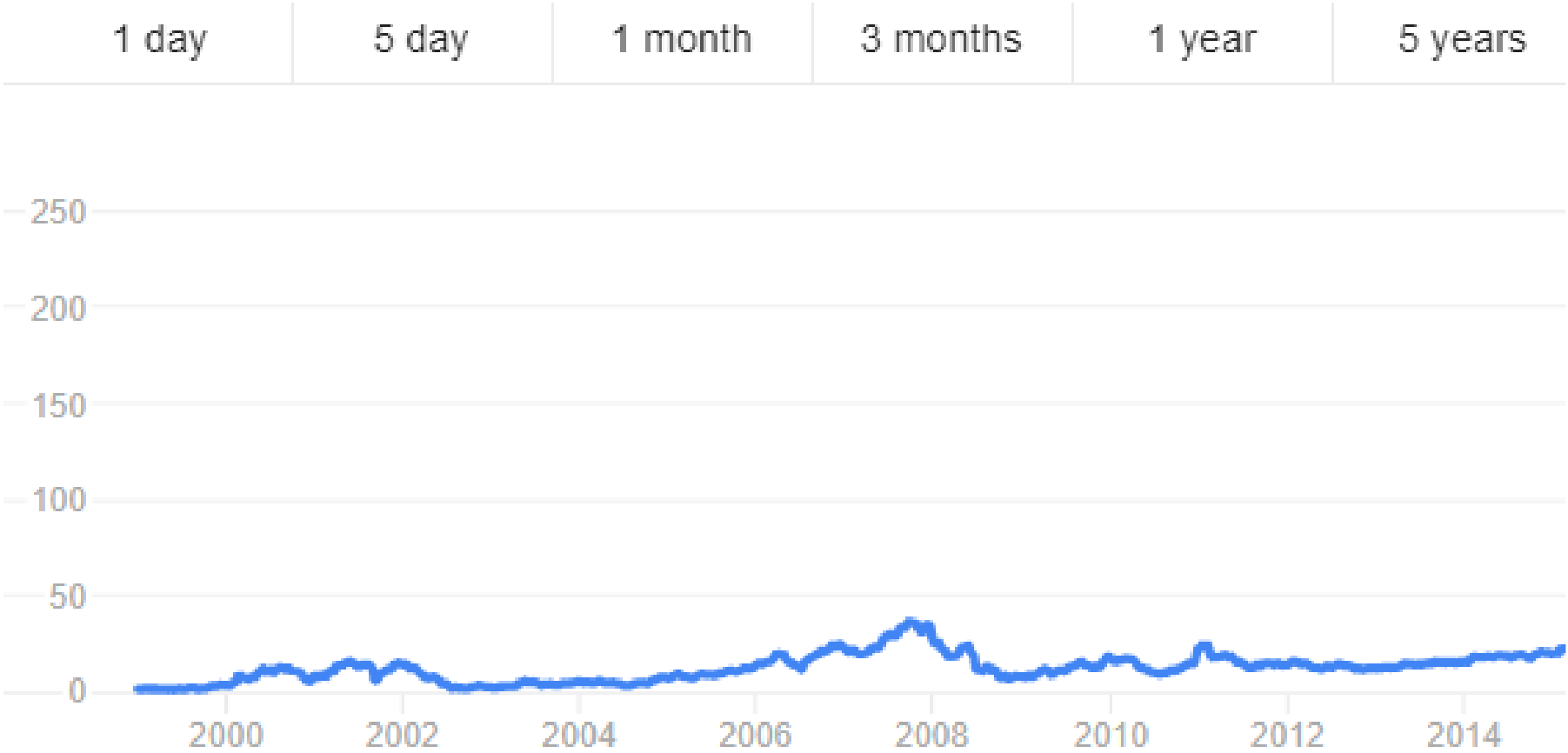
# Machine Learning without Azure ML?

- Algorithms are generic, not Azure ML specific
- Other tools
  - SQL Server on Prem
    - 'R' in SQL Server 2016 'Machine Learning Services'
    - Python added in SQL Server 2017
  - R Studio
  - Python
  - SAS
  - Analysis Services Data mining
  - 'R' in Data Lake
  - Amazon Machine Learning



# Market summary > NVIDIA Corporation

NASDAQ: NVDA - Jan 11, 9:55 AM EST



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# Market summary > NVIDIA Corporation

NASDAQ: NVDA - Jan 11, 9:55 AM EST



224.73 USD ▲ 1.05 (0.47%)

1 day

5 day

1 month

3 months

1 year

5 years

max



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# Introduction to Machine Learning



## Questions? Bit.ly/frogml

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