Microsoft

sqlbits

An Introduction to AI on Azure

Robin Lester

http://www.translate.it/

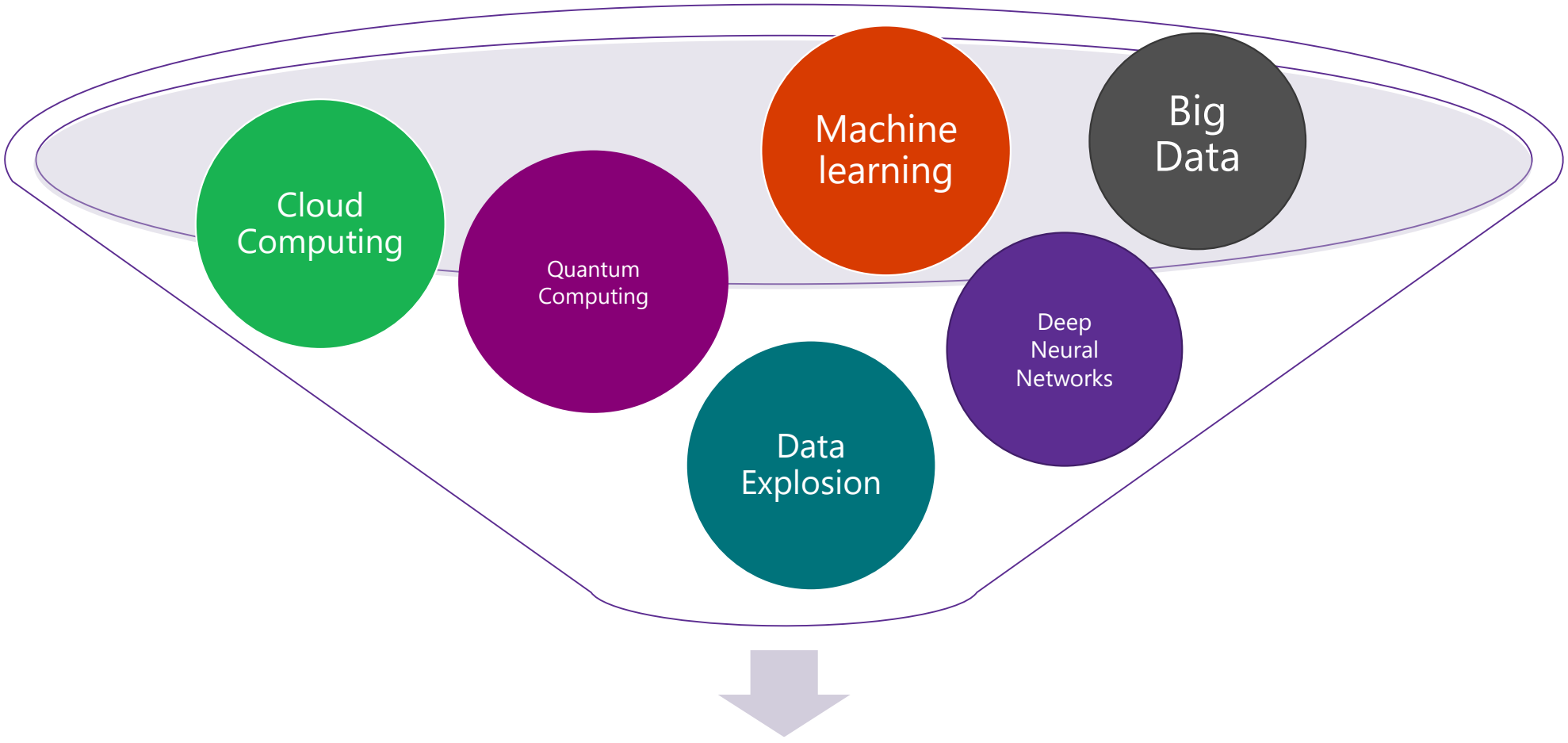
"Our goal is to **democratise AI** to empower every *person* and every *organisation* to achieve more."

Satya Nadella

Every developer can be an **AI developer**, and every company can become an AI company

AI is the New Normal

The world is changing



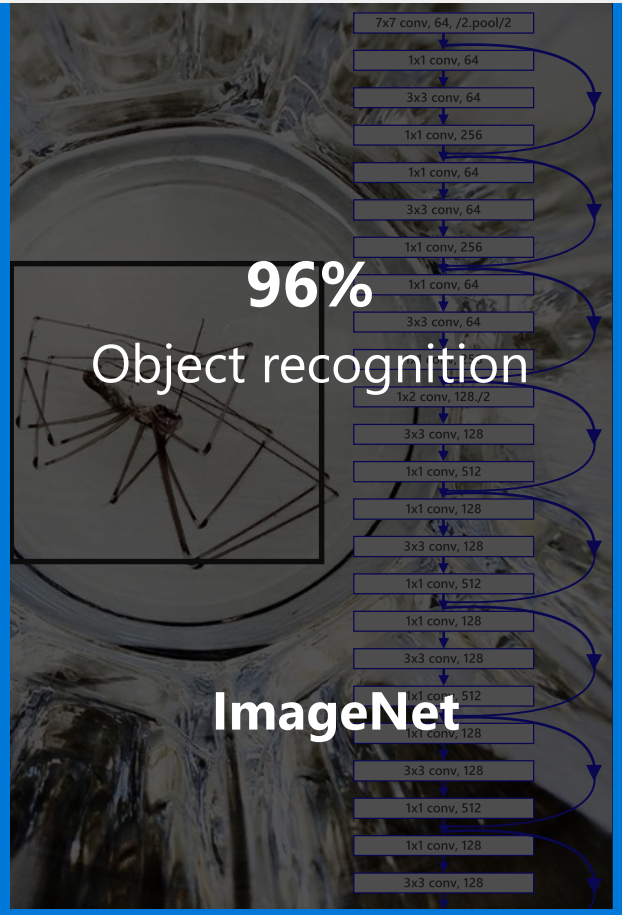
Science Fiction Becomes Reality

Microsoft AI: the first to reach human parity

2015

96%

Object recognition

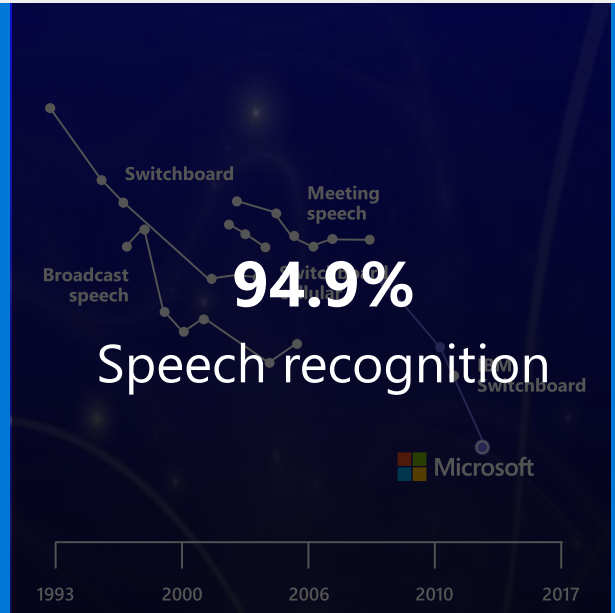


ImageNet

2017

94.9%

Speech recognition



Switchboard

2018

88.5%

Machine reading comprehension

SQuAD

2018

69%

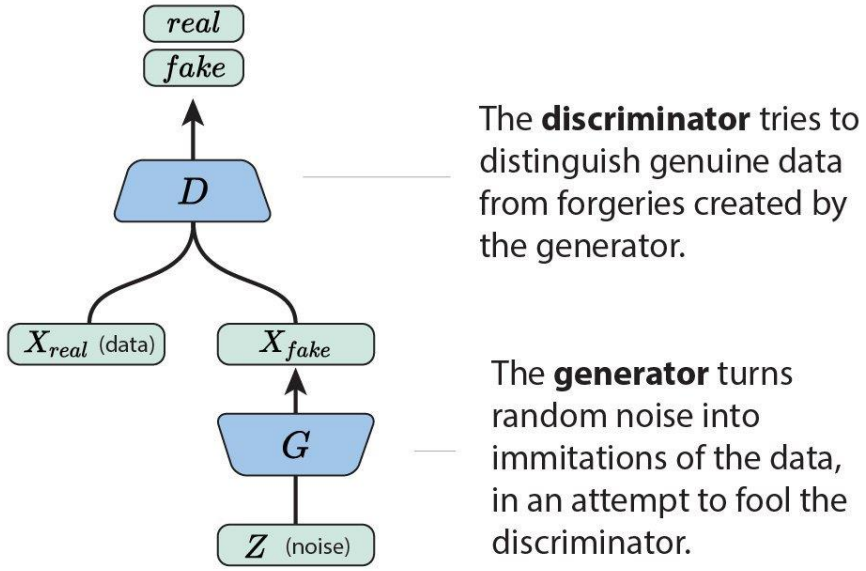
Machine translation

WMT-2017

GAN

https://www.nextrembrandt.com/

Generative Adversarial Networks (GANs) are a way to make a generative model by having two neural networks compete with each other.

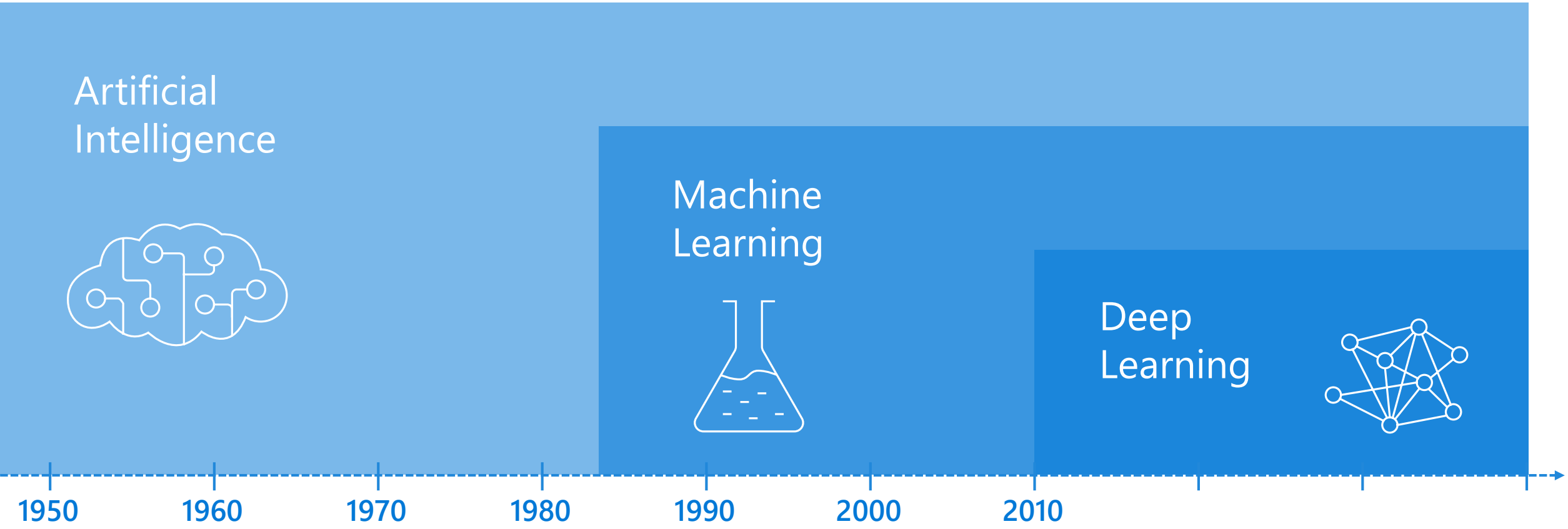


The **discriminator** tries to distinguish genuine data from forgeries created by the generator.

The **generator** turns random noise into immitations of the data, in an attempt to fool the discriminator.

https://drawingbot.azurewebsites.net/

AI, Machine Learning and Deep Learning

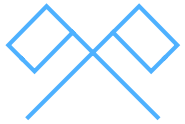


Challenges with AI

Distorted Views of AI

Hollywood

Sales pitches and promises



Bias, Et Cetera

The "system" can be designed with or learn bias over time

Infallibility Expectation

The "system" can't make a mistake
Or if mistakes are made, then the "system" is unreliable

Ethical Challenges

We CAN use AI, but SHOULD we for purpose XYZ?

Neutrality Perception

The "system" isn't human so is an impartial, unbiased advisor or judge

AI Model Flexibility

Static models can experience "concept drift" or become less accurate and decay over time

AI Strategic Trends

‘Insights everywhere’

- Organisations are collecting data and telemetry to drive new insights

Open Source

- Python and R are the AI languages that are winning the race
  - Both are VIP technologies in the Microsoft stack

Beginning of technology maturity = Devops Culture, Processes and Tools

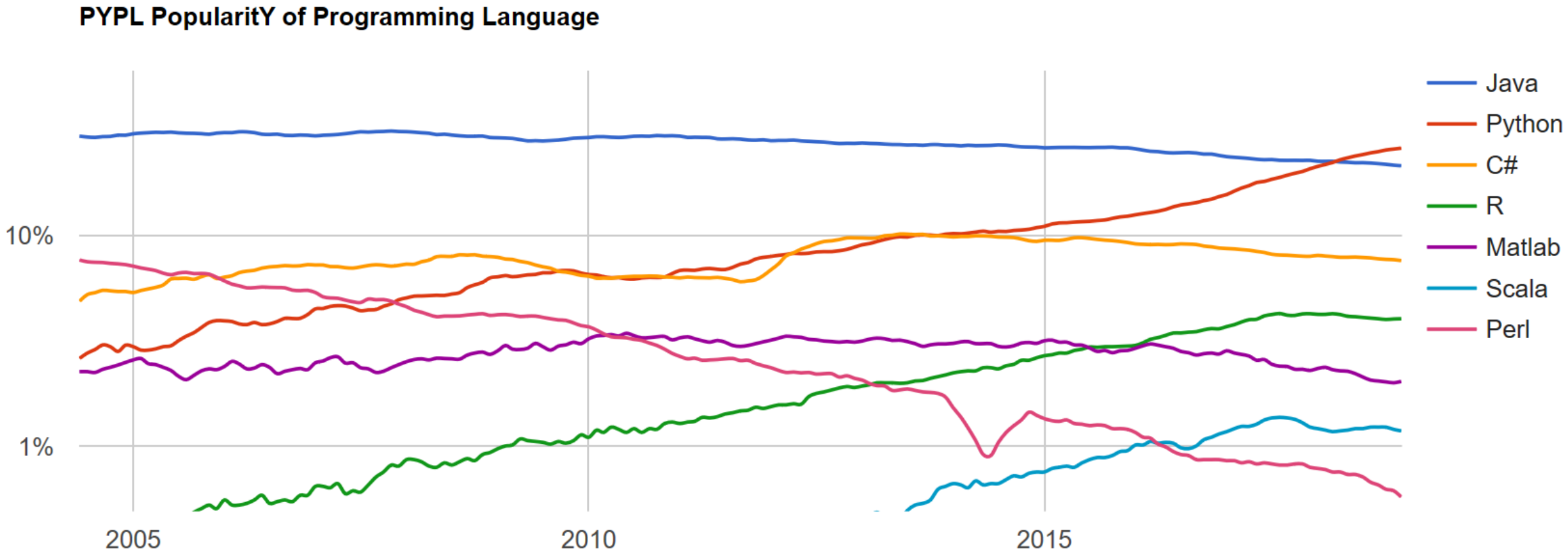
- TDSP and Azure ML Services

Organisations are now ‘AI First’

- Using AI to enable digital transformation and differentiate from the competition. (as opposed to price wars)

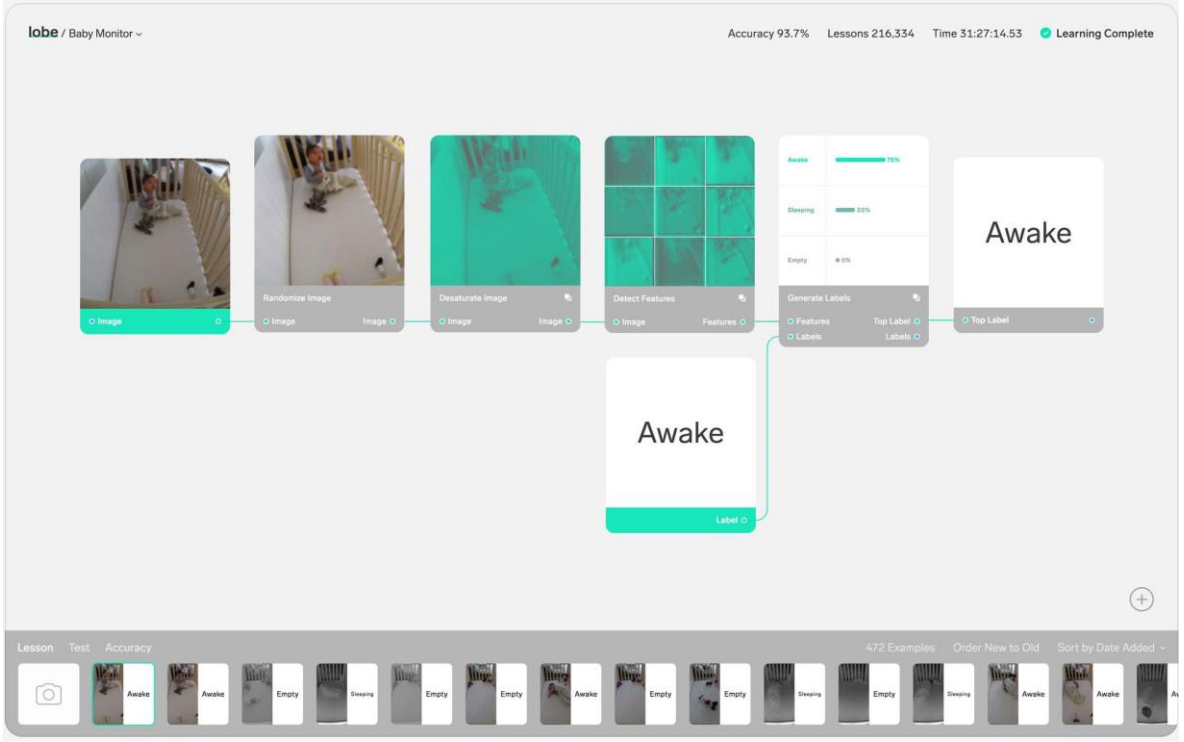
Cloud first and Serverless architecture

- Training and Operationalizing AI with containers and clusters


PYPL PopularitY of Programming Language
10%
1%
2005
2010
2015
Java
Python
C#
R
Matlab
Scala
Perl

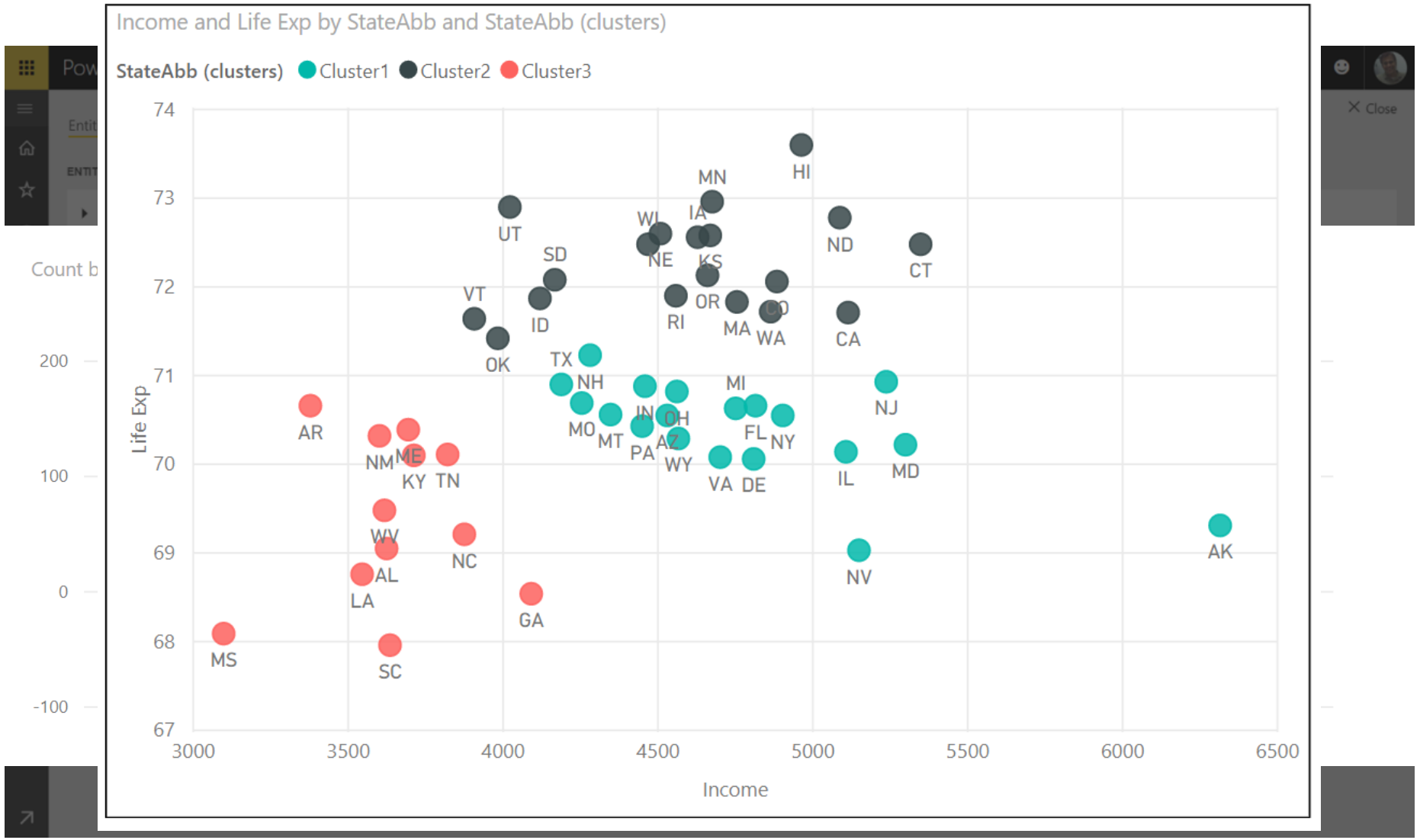
Trends in AI Democratisation of AI
Making things easy
Making things accessible

- Azure Machine Learning Studio
- Lobe AI
- TensorFlow playground
- Keras
- Azure ML Python SDK
  - Hyperparameter tuning
  - AutoML

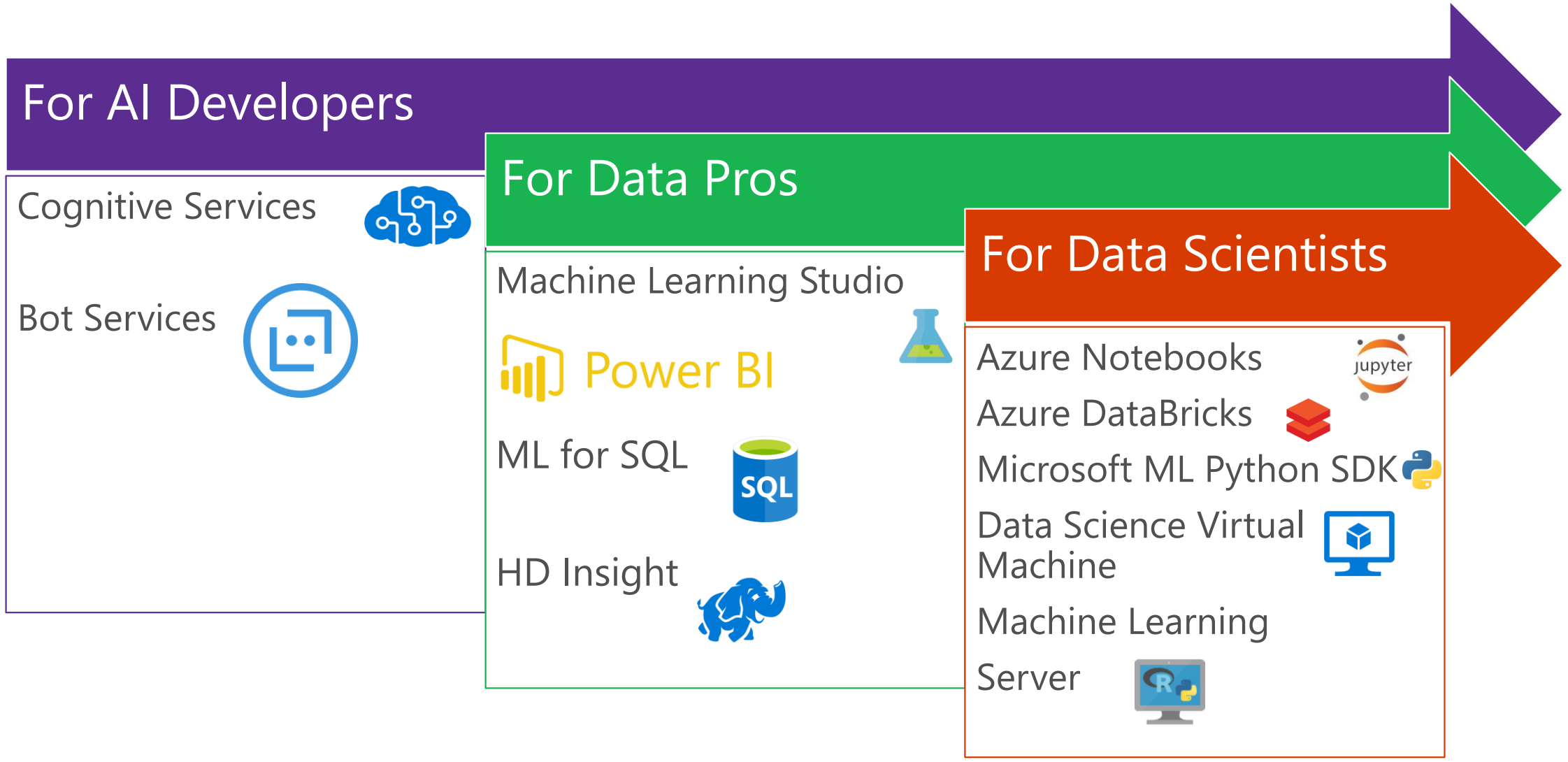


Trends in AI -Democratisation of AI – Making things easy

- Power BI
  - Clustering
  - Trend Lines
  - Auto ML
  - Quick Insights
  - Q and A

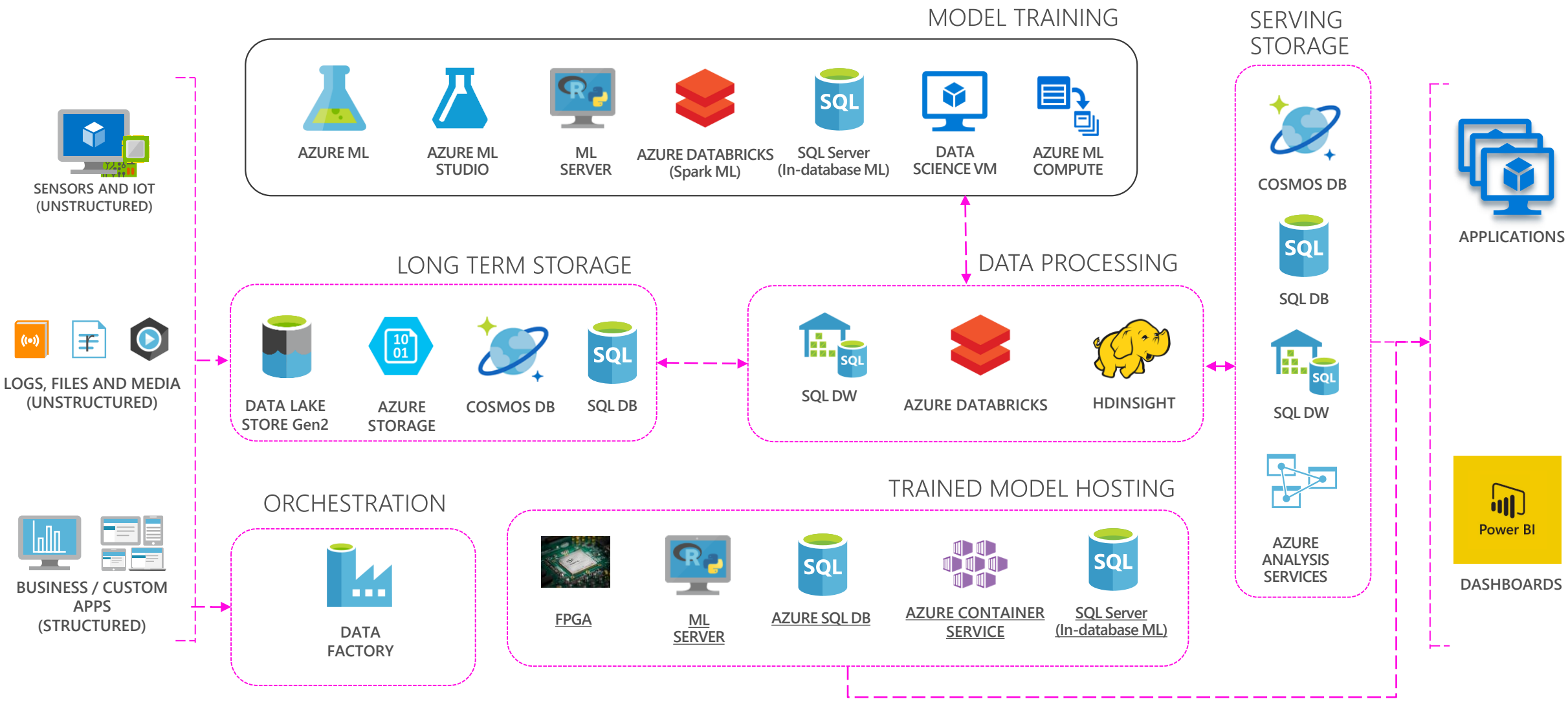


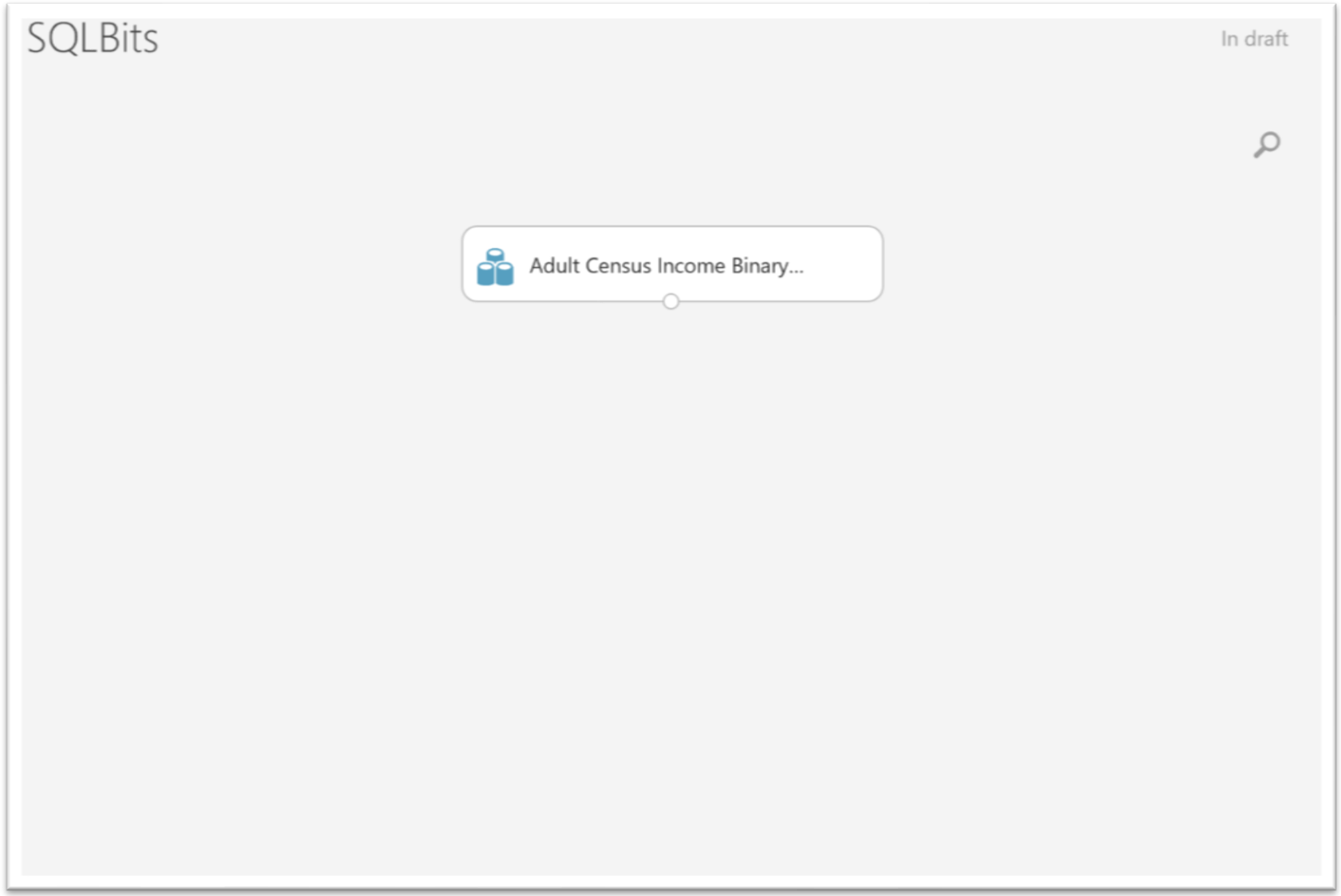
Breakdown of Toolings



ADVANCED ANALYTICS PATTERN IN AZURE

Performing data collection/understanding, modeling and deployment




SQLBits
In draft
Adult Census Income Binary...

SQLBits › Adult Census Income Binary Classification dataset › dataset

rows 32561 columns 15

	age	workclass	fnlwgt	education	education-num	marital-status	occupation	relationship
view as								
	39	State-gov	77516	Bachelors	13	Never-married	Adm-clerical	Not-in-family
	50	Self-emp-not-inc	83311	Bachelors	13	Married-civ-spouse	Exec-managerial	Husband
	38	Private	215646	HS-grad	9	Divorced	Handlers-cleaners	Not-in-family
	53	Private	234721	11th	7	Married-civ-spouse	Handlers-cleaners	Husband
	28	Private	338409	Bachelors	13	Married-civ-spouse	Prof-specialty	Wife
	37	Private	284582	Masters	14	Married-civ-spouse	Exec-managerial	Wife
	49	Private	160187	9th	5	Married-spouse-absent	Other-service	Not-in-family

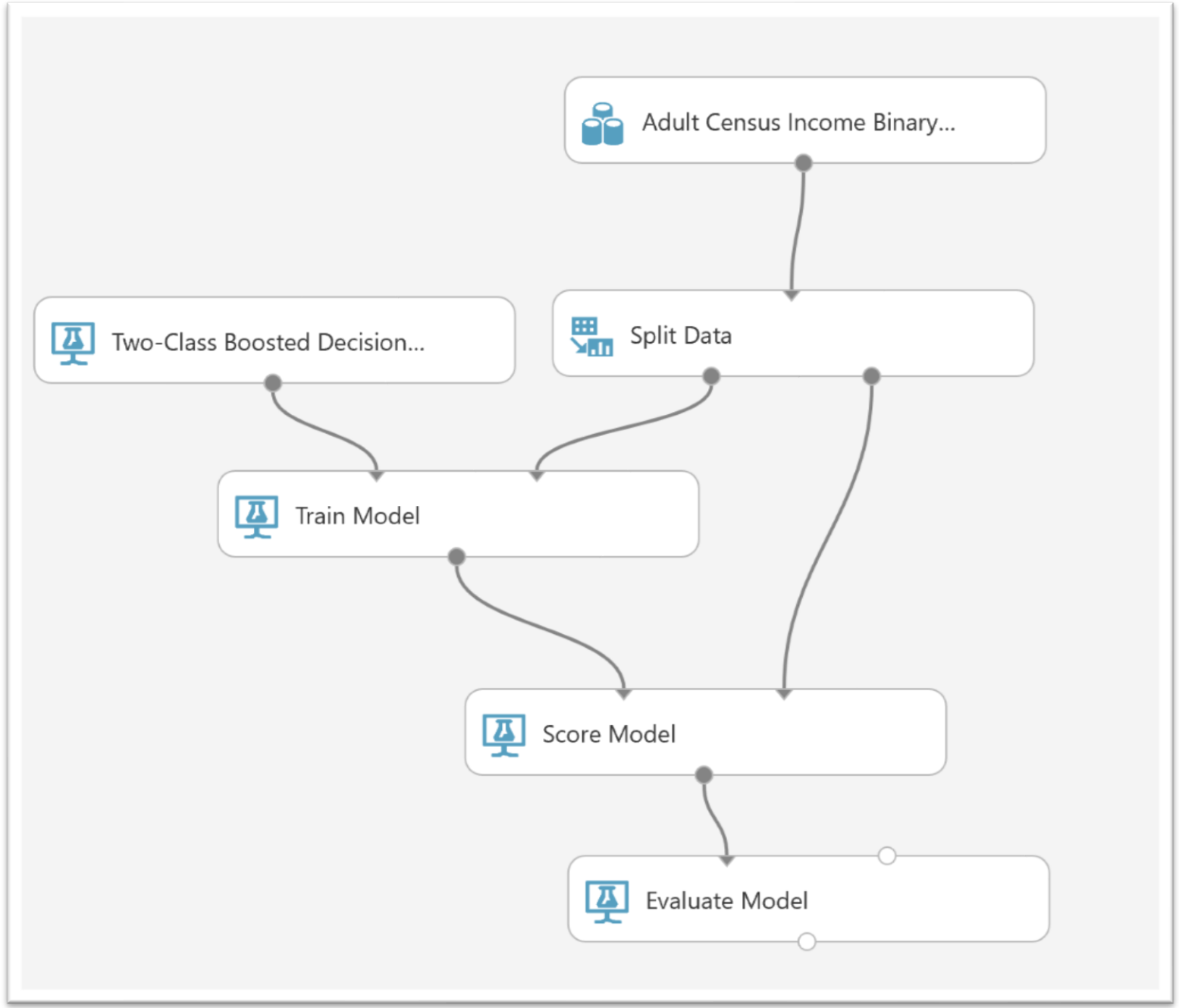
Statistics

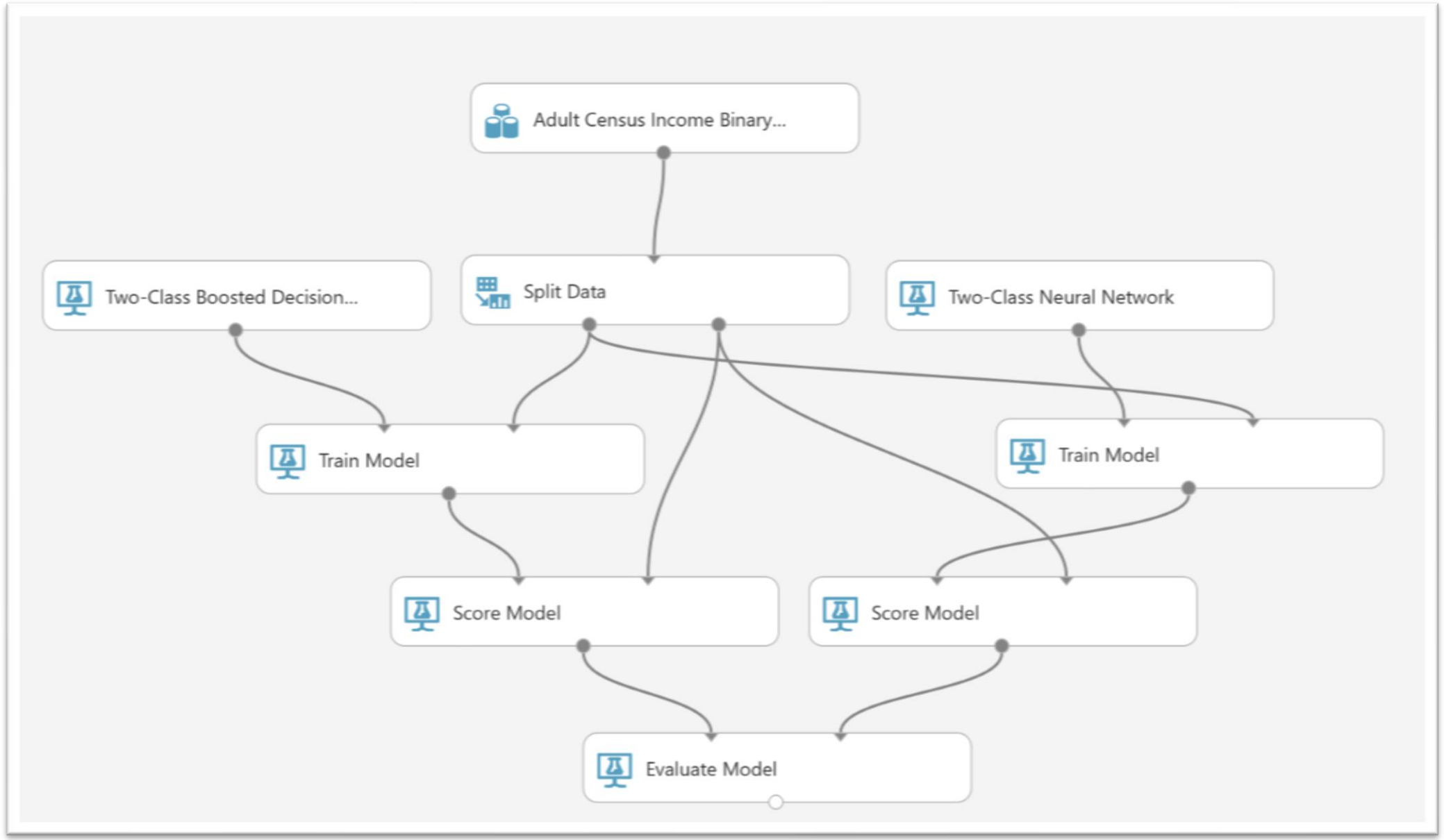
Mean	38.5816
Median	37
Min	17
Max	90
Standard Deviation	13.6404
Unique Values	73
Missing Values	0
Feature Type	Numeric Feature

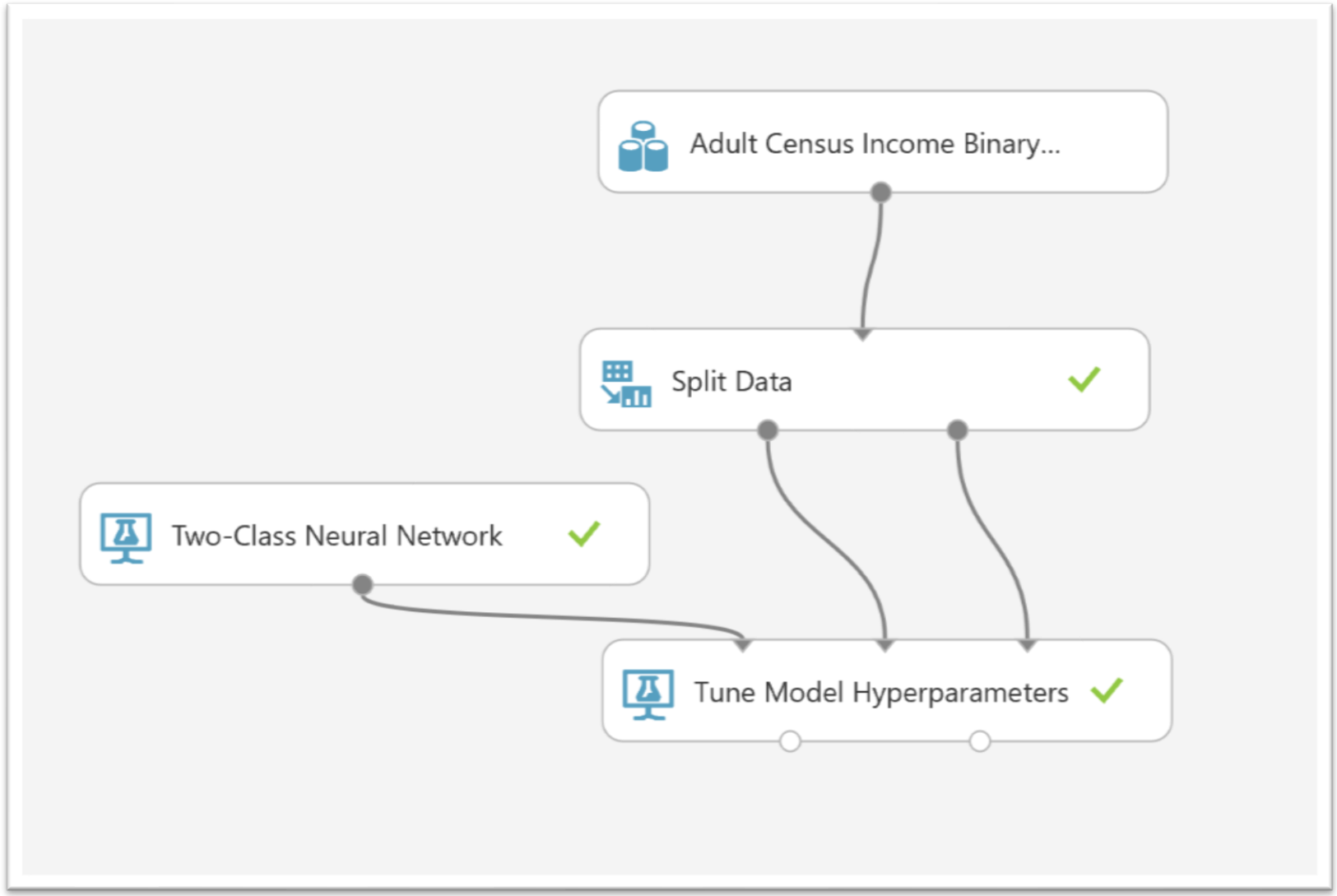
Visualizations

age

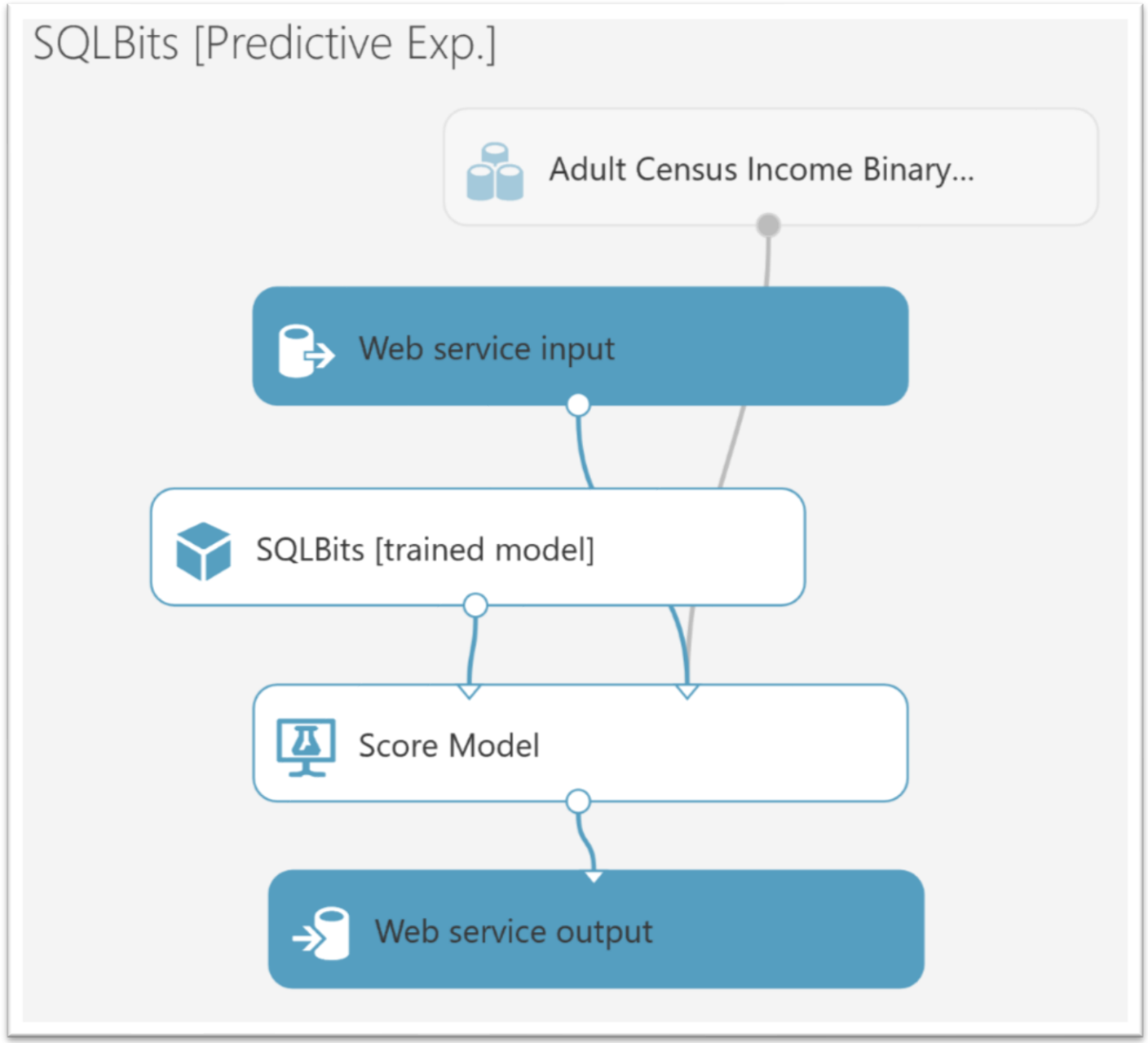
BoxPlot


Adult Census Income Binary...
Two-Class Boosted Decision...
Split Data
Train Model
Score Model
Evaluate Model


Adult Census Income Binary...
Two-Class Boosted Decision...
Split Data
Two-Class Neural Network
Train Model
Train Model
Score Model
Score Model
Evaluate Model

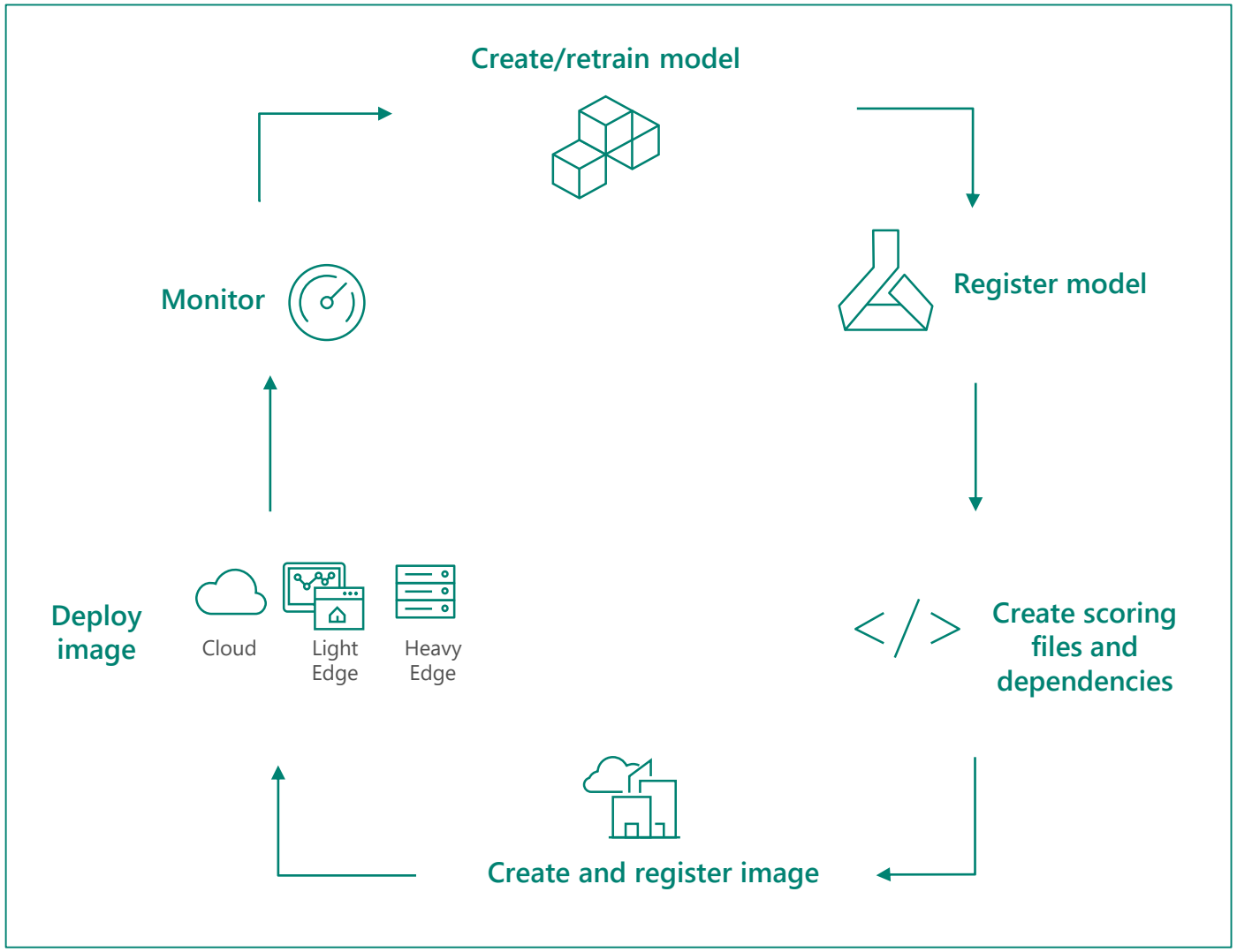

Adult Census Income Binary...
Split Data
Two-Class Neural Network
Tune Model Hyperparameters

Learning rate	LossFunction	Number of iterations	Accuracy	Precision	Recall	F-Score	AUC	Average Log Loss
0.010911	SquaredError	158	0.846678	0.724961	0.624419	0.670945	0.903454	0.33123
0.030629	SquaredError	23	0.846512	0.737959	0.599867	0.661786	0.899127	0.336766
0.035442	SquaredError	21	0.846179	0.739884	0.594559	0.659308	0.898836	0.337245
0.030998	SquaredError	139	0.844518	0.699511	0.664234	0.681416	0.898424	0.347348
0.030315	CrossEntropy	109	0.838704	0.683311	0.662906	0.672954	0.89135	0.368835


SQLBits [Predictive Exp.]
Adult Census Income Binary...
Web service input
SQLBits [trained model]
Score Model
Web service output

Devops in AI

- Team Data Science Process
- Azure ML Workspace



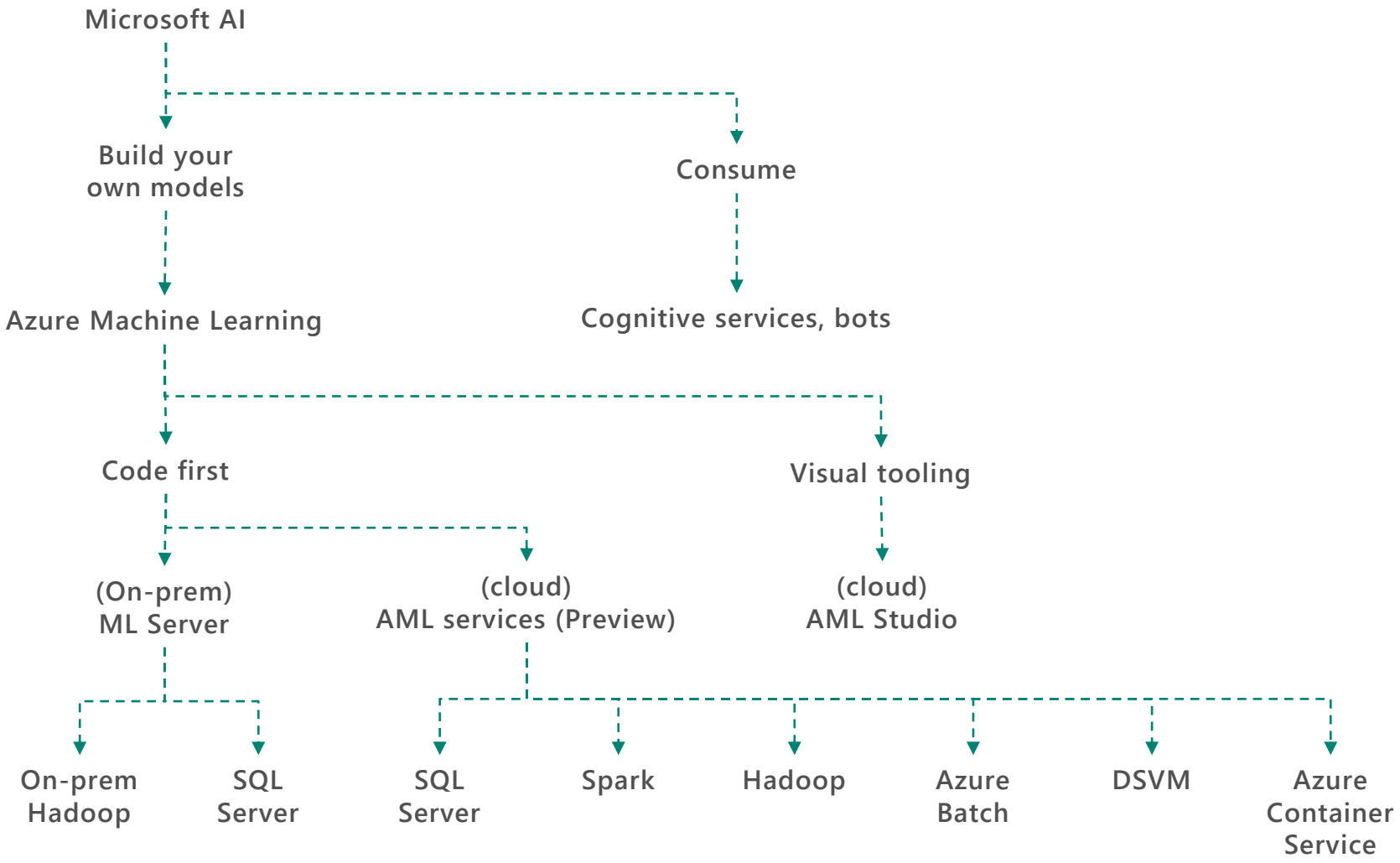
Where should I get started?

Build your own or consume pre-trained models?

Which experience do you want?

Deployment target

What engine(s) do you want to use?



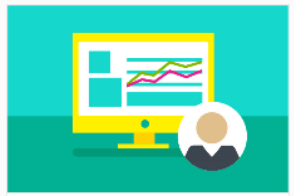
SOLUTION

Loan Credit Risk with SQL Server

Using SQL Server 2016 with R Services, a lending institution can make use of predictive analytics to reduce number of loans they offer to those borrowers most likely to default, increasing the profitability of their loan ...

1.3K 343 24 days ago

Microsoft



SOLUTION

Personalized Offers

In today's highly competitive and connected environment, modern businesses can no longer survive with generic, static online content. Furthermore, marketing strategies using traditional tools are often expensive, ...

4.6K 399 3 months ago

Microsoft

SOLUTION

Campaign Optimization with SQL Server

This solution demonstrates how to build and deploy a machine learning model with SQL Server 2016 with R Services to recommend actions to maximize the purchase rate of leads targeted by a campaign.

8.1K 1.2K 2 hours ago

Microsoft

SOLUTION

Campaign Optimization with Azure HDInsight Spark Clust...

This solution demonstrates how to build and deploy a machine learning model with Microsoft R Server on Azure HDInsight Spark clusters to recommend actions to maximize the purchase rate of leads targeted by a...

1.2K 157 18 days ago

Microsoft

SOLUTION

Predicting Length of Stay in Hospitals

This solution enables a predictive model for Length of Stay for in-hospital admissions. Length of Stay (LOS) is defined in number of days from the initial admit date to the date that the patient is discharged from any ...

10K 1.2K 25 days ago

Microsoft

SOLUTION

Demand Forecasting and Price Optimization

Pricing is recognized as a pivotal determinant of success in many industries and can be one of the most challenging tasks. Companies often struggle with several aspects of the pricing process, including accurately fo...

4.4K 670 3 months ago

Microsoft

SOLUTION

Quality Assurance

Quality assurance systems allow businesses to prevent defects throughout their processes of delivering goods or services to customers. Building such a system that collects data and identifies potential problems alon...

1.9K 313 3 months ago

Microsoft

SOLUTION

Telemetry Analytics

Super computers have moved out of the lab and are now parked in our garage! These cutting-edge automobiles contain a myriad of sensors, giving them the ability to track and monitor millions of events every sec...

9.2K 1.4K 3 months ago

Microsoft

SOLUTION

Demand Forecasting

Accurately forecasting spikes in demand for products and services can give a company a competitive advantage. This solution focuses on demand forecasting within the energy sector

9.5K 1.6K 3 months ago

Microsoft

SOLUTION

Predictive Maintenance

This Predictive Maintenance solution monitors aircraft and predicts the remaining useful life of aircraft engine components

11K 2.1K 3 months ago

Microsoft

Deploy to Azure

Use the following pre-built template to deploy this architecture to Azure

Deploy to Azure

“The most critical next step in our pursuit of A.I. is to agree on an ethical and empathic framework for its design.”

SATYA NADELLA

Responsible & Ethical AI

- https://www.microsoft.com/en-gb/partner/pledge/

Digital Skills

Helping the UK prepare for the challenges of the Fourth Industrial Revolution through Microsoft's Digital Skills programme

Apprenticeships

Joining our efforts to create more apprenticeships in the UK

Diversity

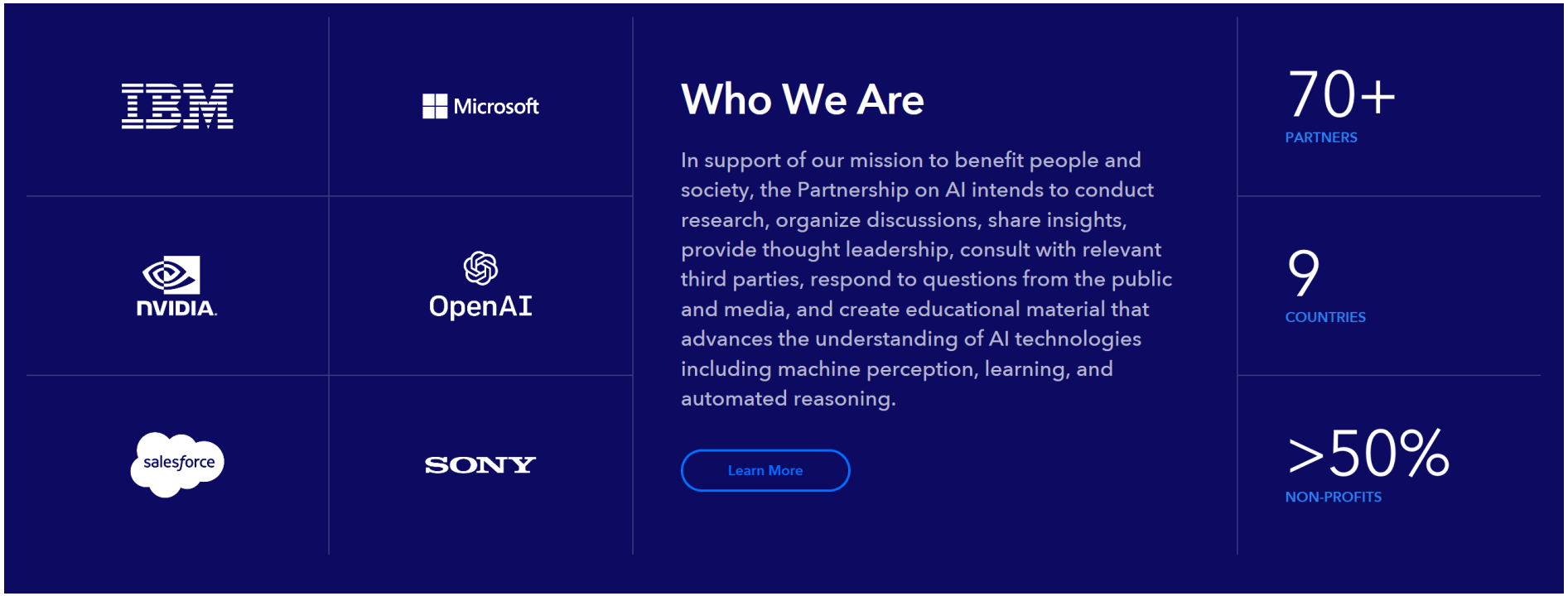
Improving the diversity of the UK technology workforce through the Tech Talent Charter

Responsible & Ethical AI

Ensuring Artificial Intelligence is developed and implemented in responsible and ethical ways, as we set out in AI for good and Future Computed

The Partnership on AI to Benefit People and Society

- The Partnership on AI to Benefit People and Society was established to **study and formulate best practices** on AI technologies, to advance the public's understanding of AI, and to serve as an open platform for discussion and engagement about AI and its influences on people and society.

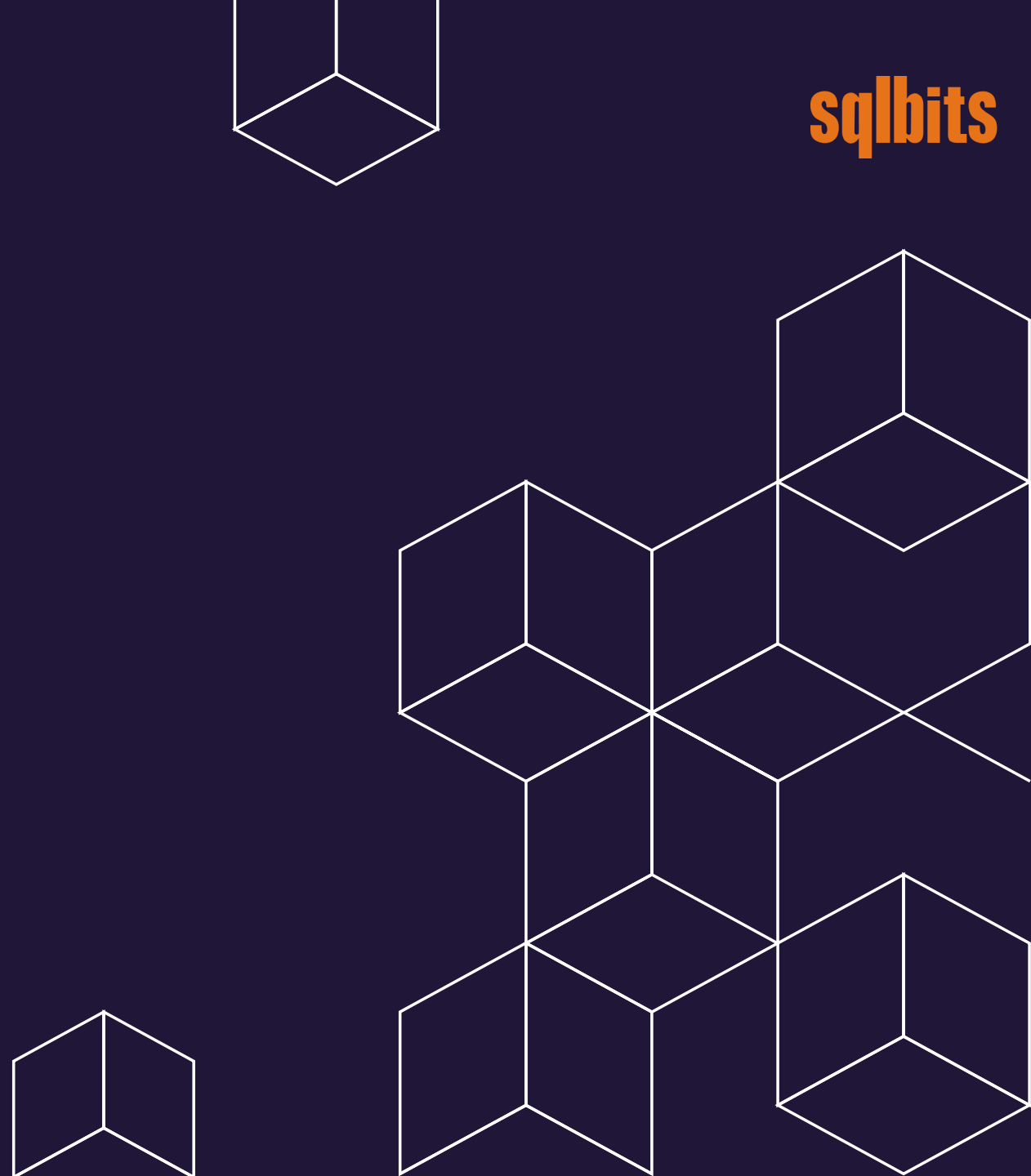


Microsoft

sqlbits

Questions?

Call to Action



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sqlbits

We'd love your feedback!

aka.ms/SQLBits19