



Demyystifying AI

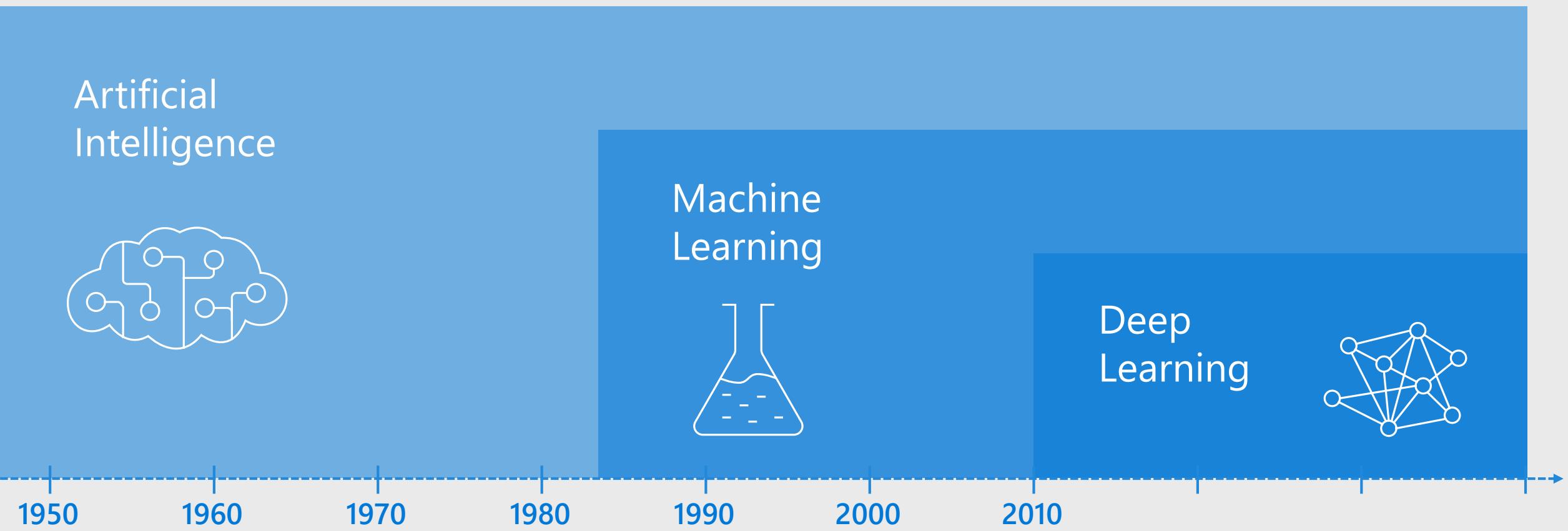
Krit Kamtuo
Software Engineer (AI/ML)
Commercial Software Engineering
Microsoft Asia Pacific
@kritcs18



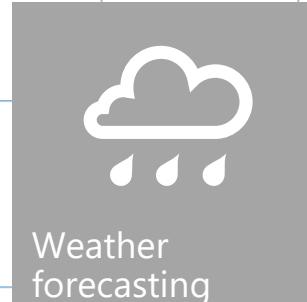
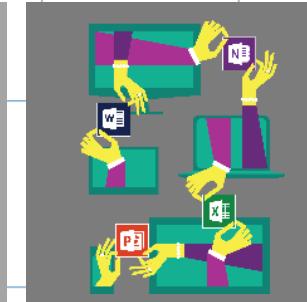
Our strategy is to build best-in-class **platforms** and productivity services for an **intelligent cloud and an intelligent edge** infused with **artificial intelligence** ("AI").



AI, Machine Learning and Deep Learning

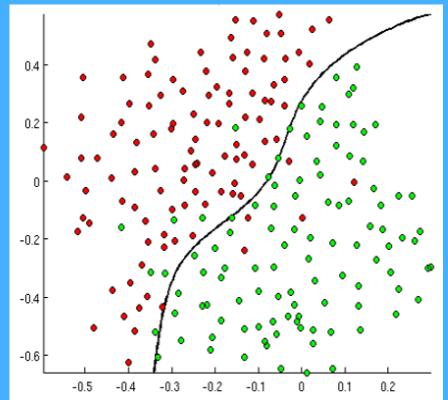


What Can Machine Learning Do?

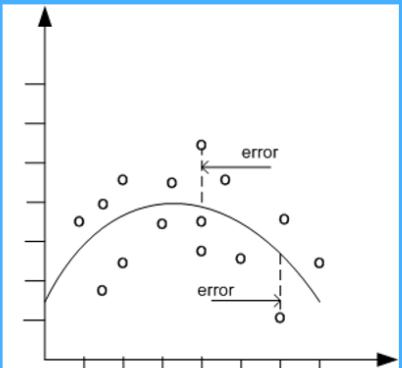
	Telemetry data analysis	Buyer propensity models	Social network analysis	Predictive maintenance	Web app optimization
					
Fraud detection	Life sciences research	Targeted advertising	Network intrusion detection		Smart meter monitoring

Machine Learning Techniques

Classification



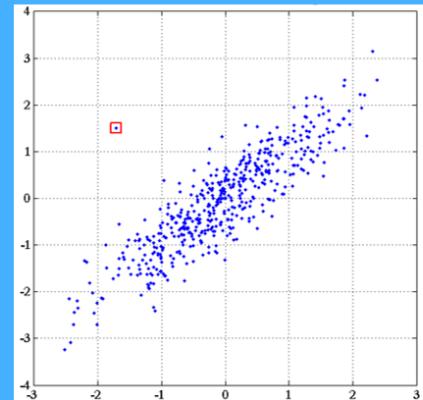
Regression



Recommenders



Anomaly Detection



Clustering



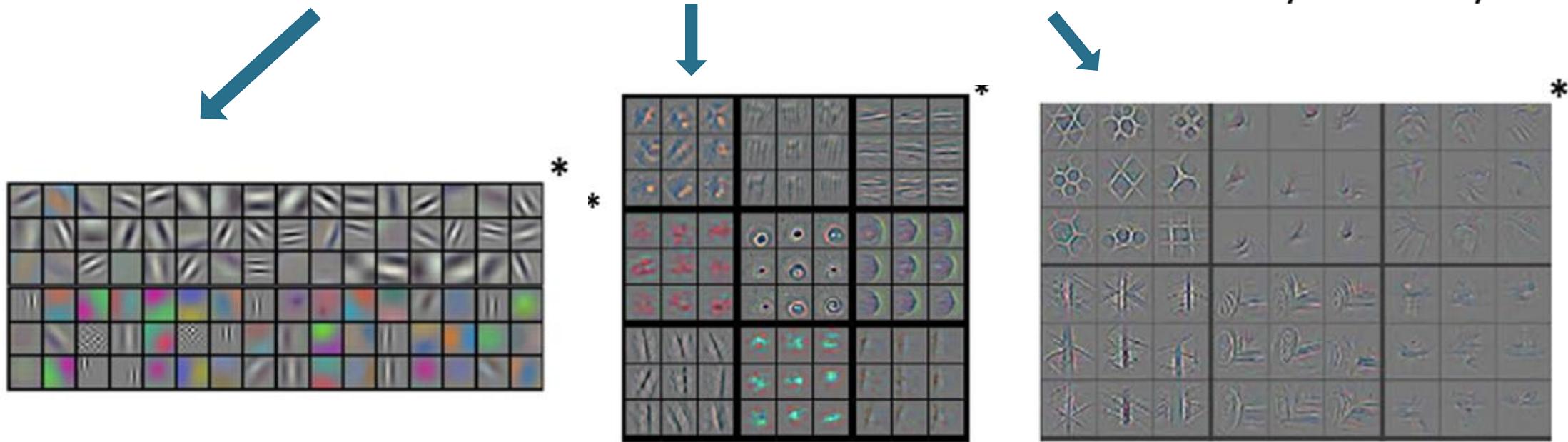
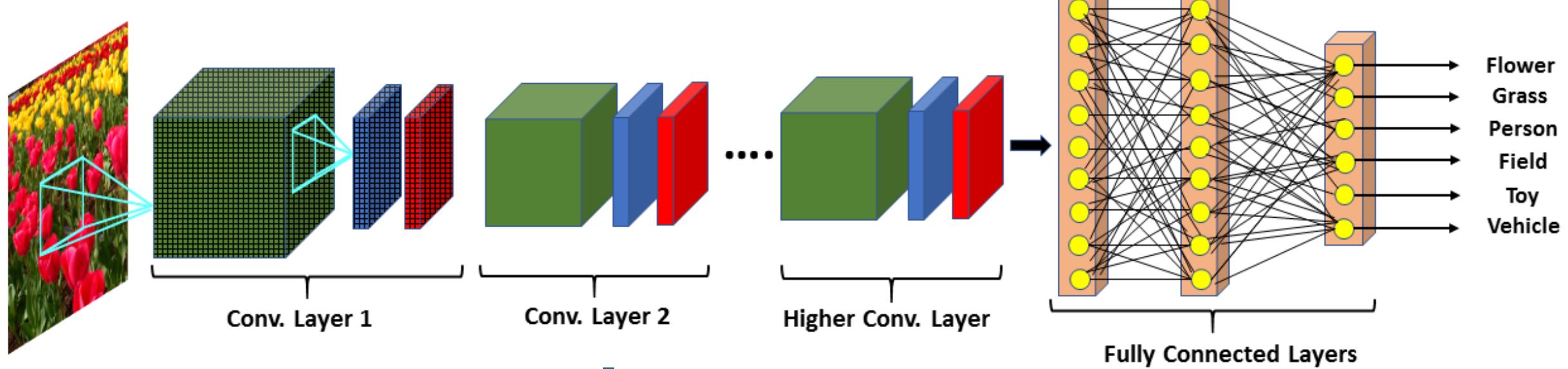
Convolutional Neural Network

Used to analyze visual imagery

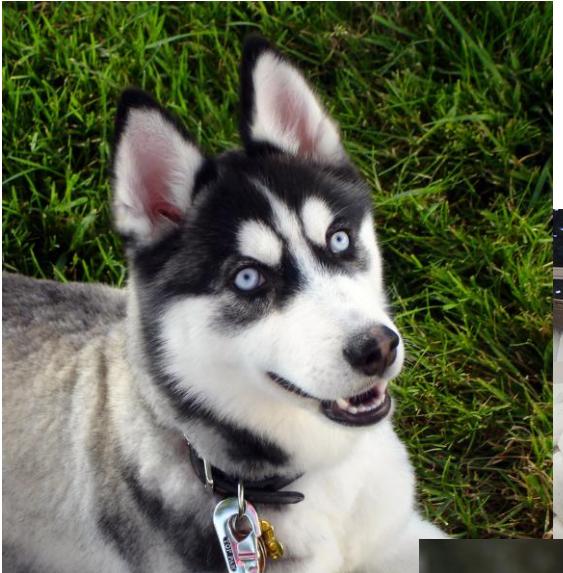


-1	0	1
-2	0	2
-1	0	1
G_x		
1	2	1
0	0	0
-1	-2	-1
G_y		





Dogs



Wolves



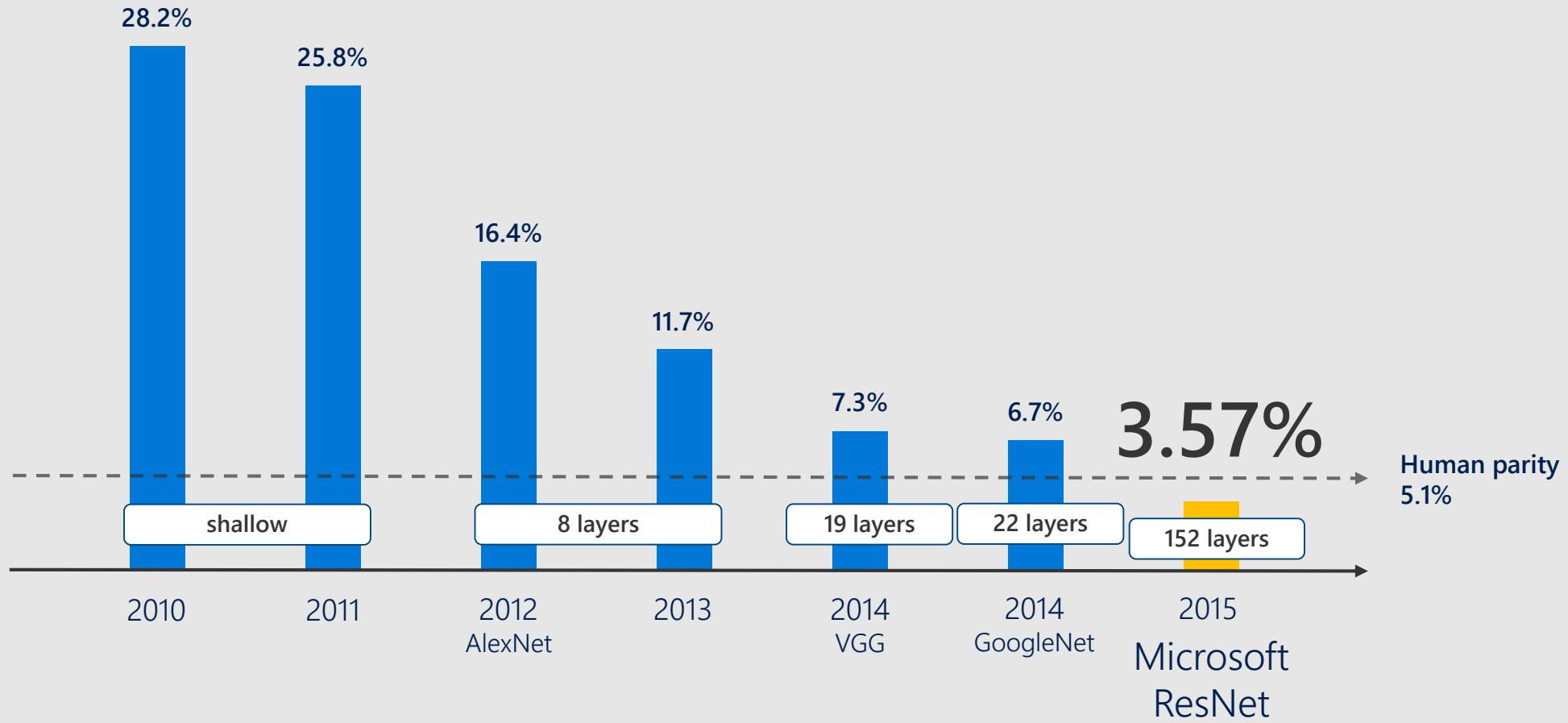
Microsoft AI advancements



Machine reading
comprehension
Human parity
Jan 2018



ImageNet classification challenge



Language to image synthesis

“A bird with **wings that are blue** and a **red belly**”



“this bird is **red with white** and has a very **short beak**”



“A herd of **sheep** grazing on a lush **green field**”



LIGHTING NEEDS TO BE REBUILT (27 unbuilt object(s))

'DisableAllScreenMessages' to suppress

Loaded settings from C:\Users\v-jimpi\Documents\AirSim\settings.json

Press F1 to see help

Default config: PX4

API server started at (default)

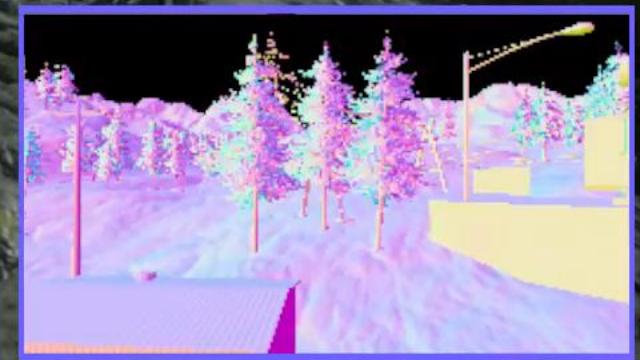
Connecting to PX4 over serial port: COM4, baud rate 115200

Connected to PX4 over serial port.

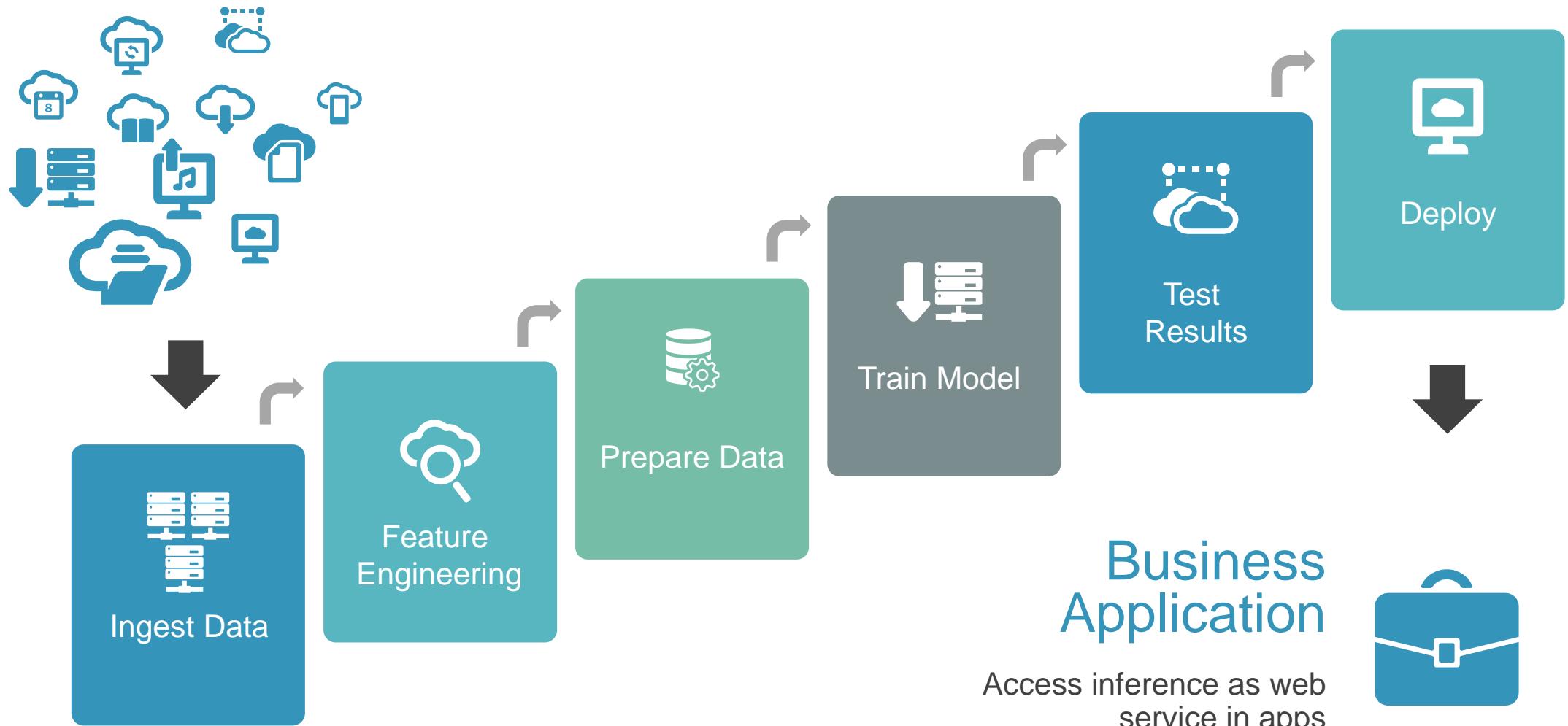
Collision Count:4

ARMED by RC

Takeoff detected



Machine Learning Activities



Traditional Approach

Uses rules-based approach

- Based on heuristics - Strategies derived from previous experiences
- Poor generalization – can't be applied to other types of fraud
- Manual data collection and risk scoring by experts

Becomes Complex

- As events occur, new rules are added
- Becomes unwieldy and cumbersome

Changes Happen Quickly

- Changes happen faster than rules can be created, tested and deployed

Costly and slow

- Updating and testing new rules can take a long time
- As system grow more complex, operational costs rise
- Many false positives

How is Machine Learning Different

Deterministic vs
Probabilistic

- Machine learning returns a prediction score

Needs lots of
training data

- Algorithms infer rules accurately with enough applicable examples

Operationalization

- Convenience
- Scalability

Problems with Data

Data is often messy

01

Missing Values

Either eliminate these records or determine an acceptable value

02

Duplication

Determine which fields indicate a duplicated record

04

Class Imbalance

Use methods to counteract

03

Outliers

Find outliers that are skewing the results



Microsoft AI Platform

Azure AI Services

PRE-BUILT AI

Cognitive Services

CONVERSATIONAL AI

Bot Service



CUSTOM AI

Azure Machine Learning

CODING & MANAGEMENT TOOLS

VS Tools
for AI



Azure ML
Studio

Azure ML
Workbench

Others (PyCharm...)

Jupyter Notebooks...)

AI ON DATA

Azure Infrastructure

AI COMPUTE

Cosmos DB

SQL DB

SQL DW

Data Lake

Hadoop
Spark

DSVM

Batch AI

ACS

IoT Edge



CPU, GPU, GPU

DEEP LEARNING FRAMEWORKS

3rd Party

Cognitive
Toolkit

TensorFlow

Caffe

Others (Scikit-learn, MXNet, Keras,
Chainer, Gluon...)

Azure AI services

Bot Service

Accelerated development for conversational AI.

Cognitive Services

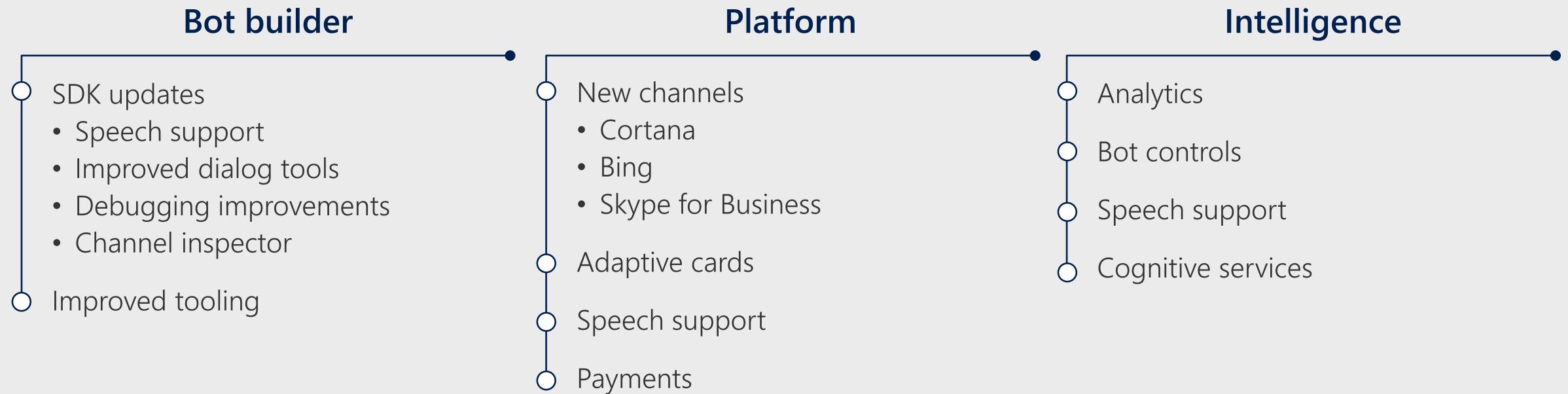
Vision, speech, language, knowledge and search pre-trained services customizable for any scenario.

Azure Machine Learning

Experimentation and management services for creating AI models with productivity.



Azure Bot Service

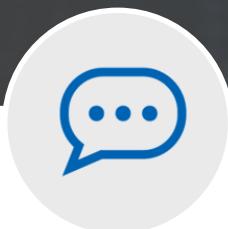


Microsoft Cognitive Services



Vision

From faces to feelings, allow your apps to understand images and video



Speech

Hear and speak to your users by filtering noise, identifying speakers, and understanding intent



Language

Process text and learn how to recognize what users want



Knowledge

Tap into rich knowledge amassed from the web, academia, or your own data



Search

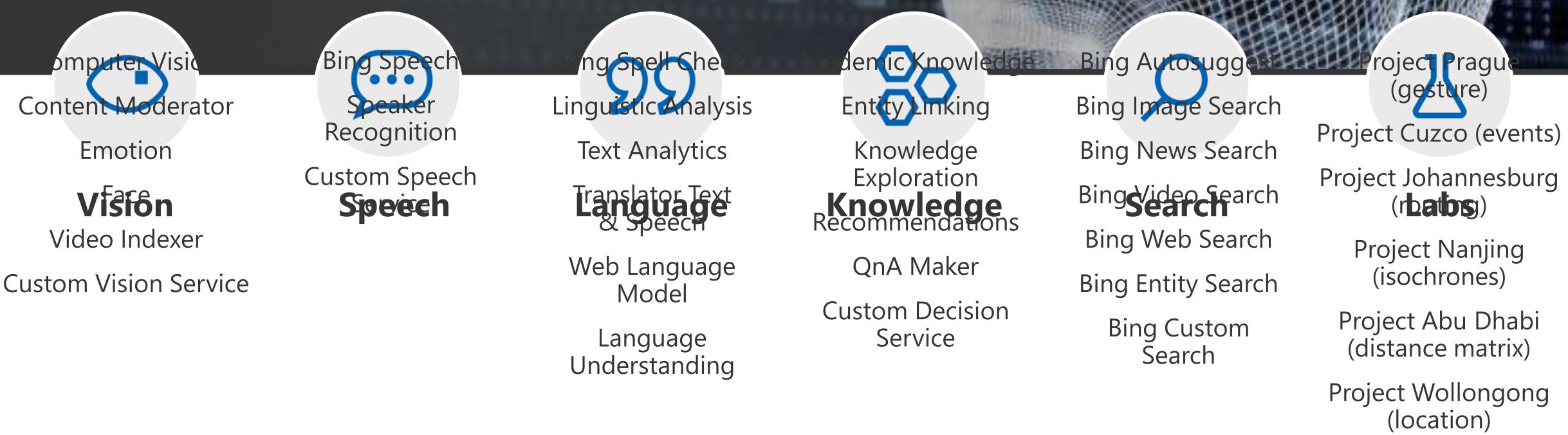
Access billions of web pages, images, videos, and news with the power of Bing APIs



Labs

An early look at emerging Cognitive Services technologies: discover, try and give feedback on new technologies before general availability

Microsoft Cognitive Services



Azure Machine Learning - Experimentation

Command line tools
IDEs
Notebooks in Workbench
VS Code Tools for AI



- Local machine
- Scale up to DSVM
- Scale out with Spark on HDInsight
- Azure Batch AI
- ML Server

Azure Machine Learning – Model Management



AZURE ML

MODEL MANAGEMENT



DOCKER

- Single node deployment (cloud/on-prem)
- Azure Container Service
- Azure IoT Edge
- Microsoft ML Server
- Spark clusters
- SQL Server

AI infrastructure

AI on data

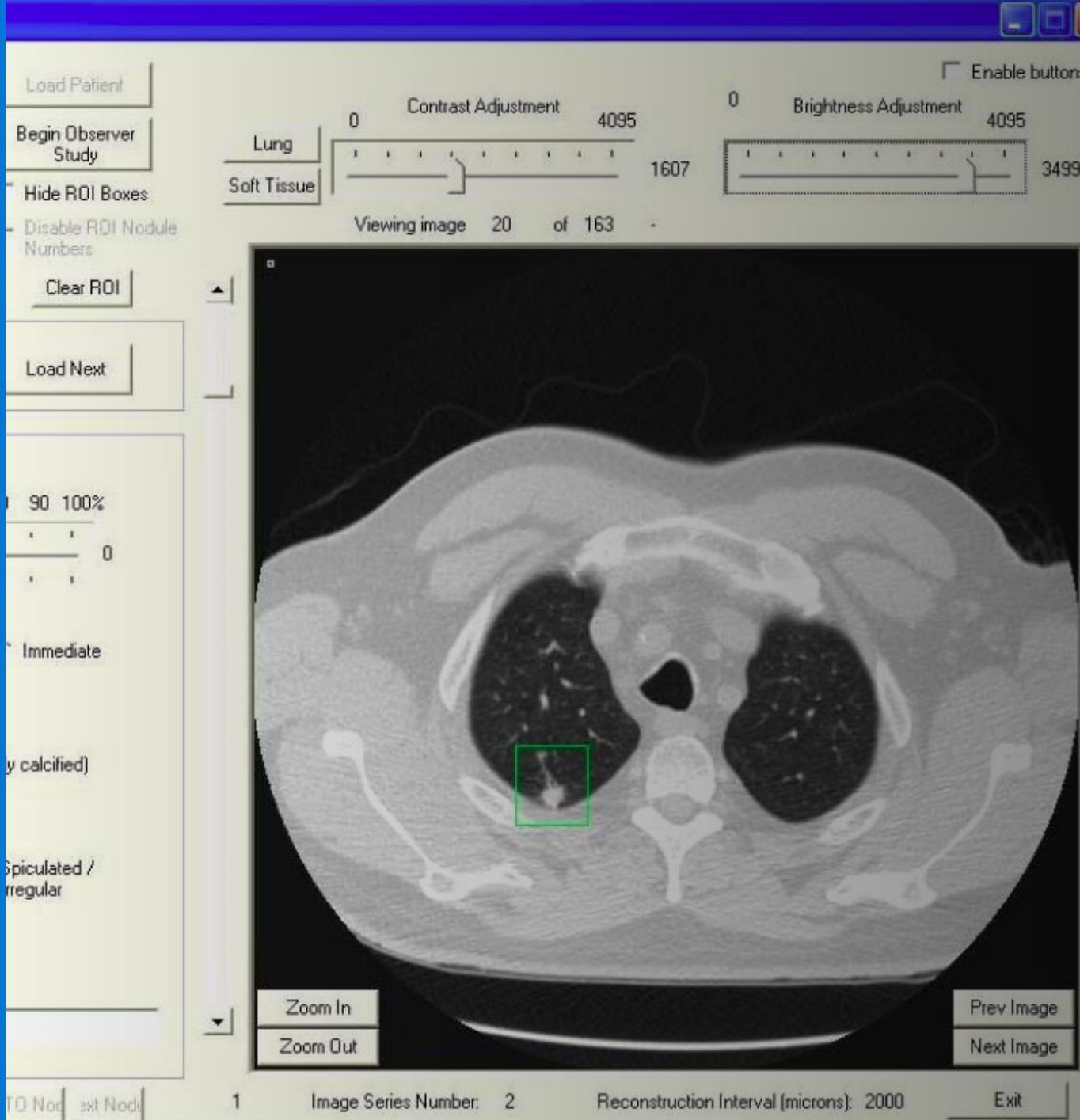
Built-in AI across your data estate.

AI compute

Flexible compute infrastructure from virtually infinite cloud scale to the edge .

AI core infrastructure

The AI supercomputer: CPU, GPU, and (coming next) FPGA.



Tools

Visual Studio Tools for AI

Boost productivity with code-centric AI development and Azure integration.

Azure Machine Learning Workbench

Full lifecycle support for AI and data wrangling productivity.

Azure Machine Learning Studio

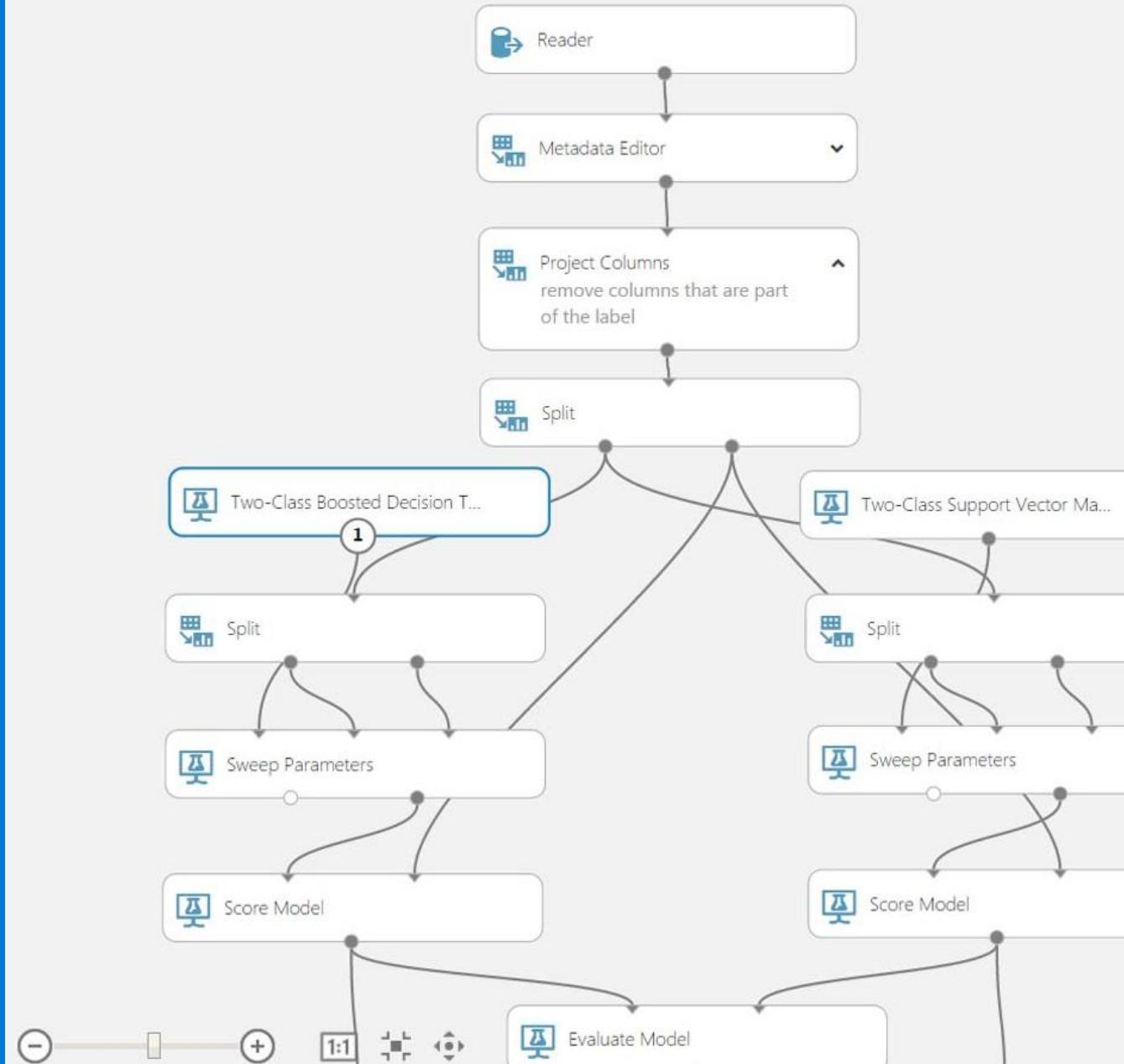
Drag and drop machine learning development for any skillset.

Open deep learning framework support

Full support for CNTK, TensorFlow, Caffe and others.

Open standard for deep learning (ONNX).

Binary Classification: Direct marketing



Visual Studio Tools for AI

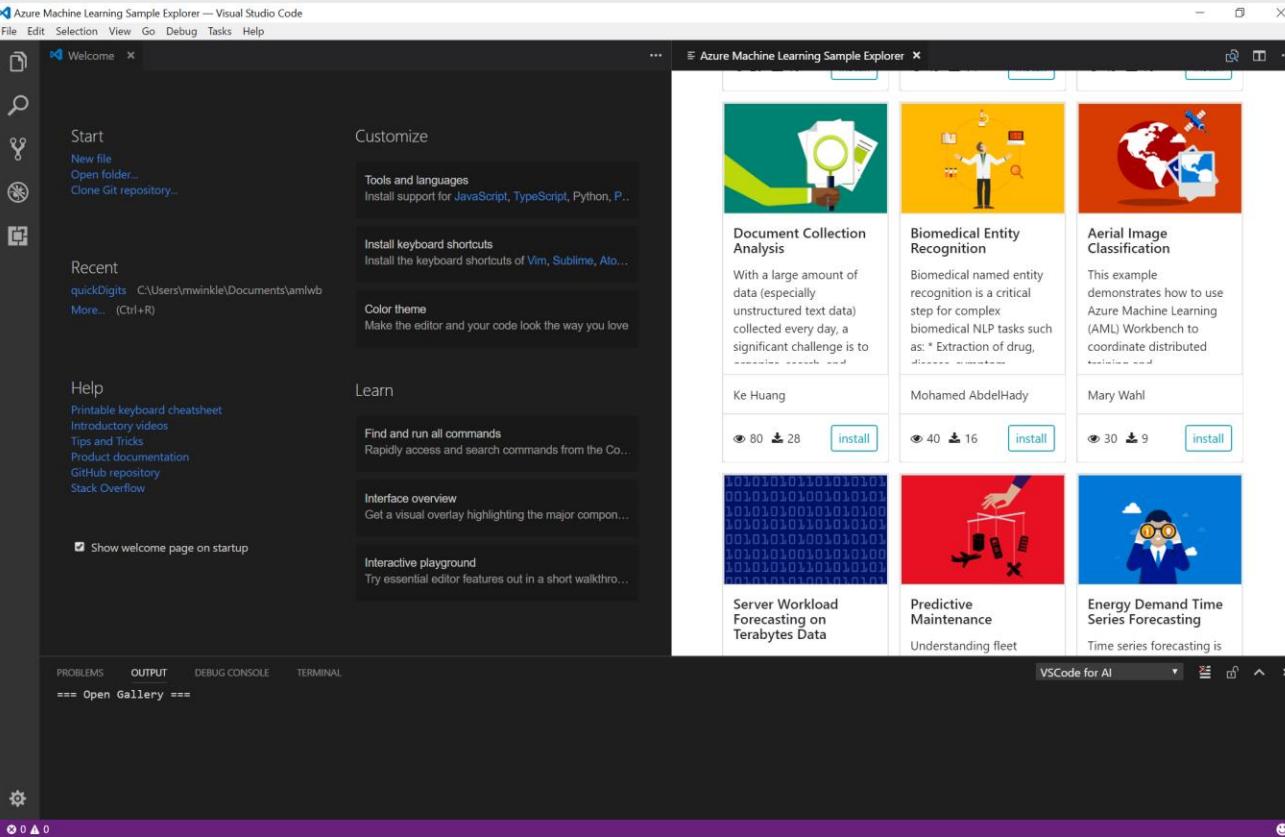
Visual Studio extension with deep integration to Azure ML

End to end development environment, from new project through training

Support for remote training

Job management

On top of all of the goodness of Visual Studio (Python, Jupyter, Git, etc)



Azure Machine Learning Workbench

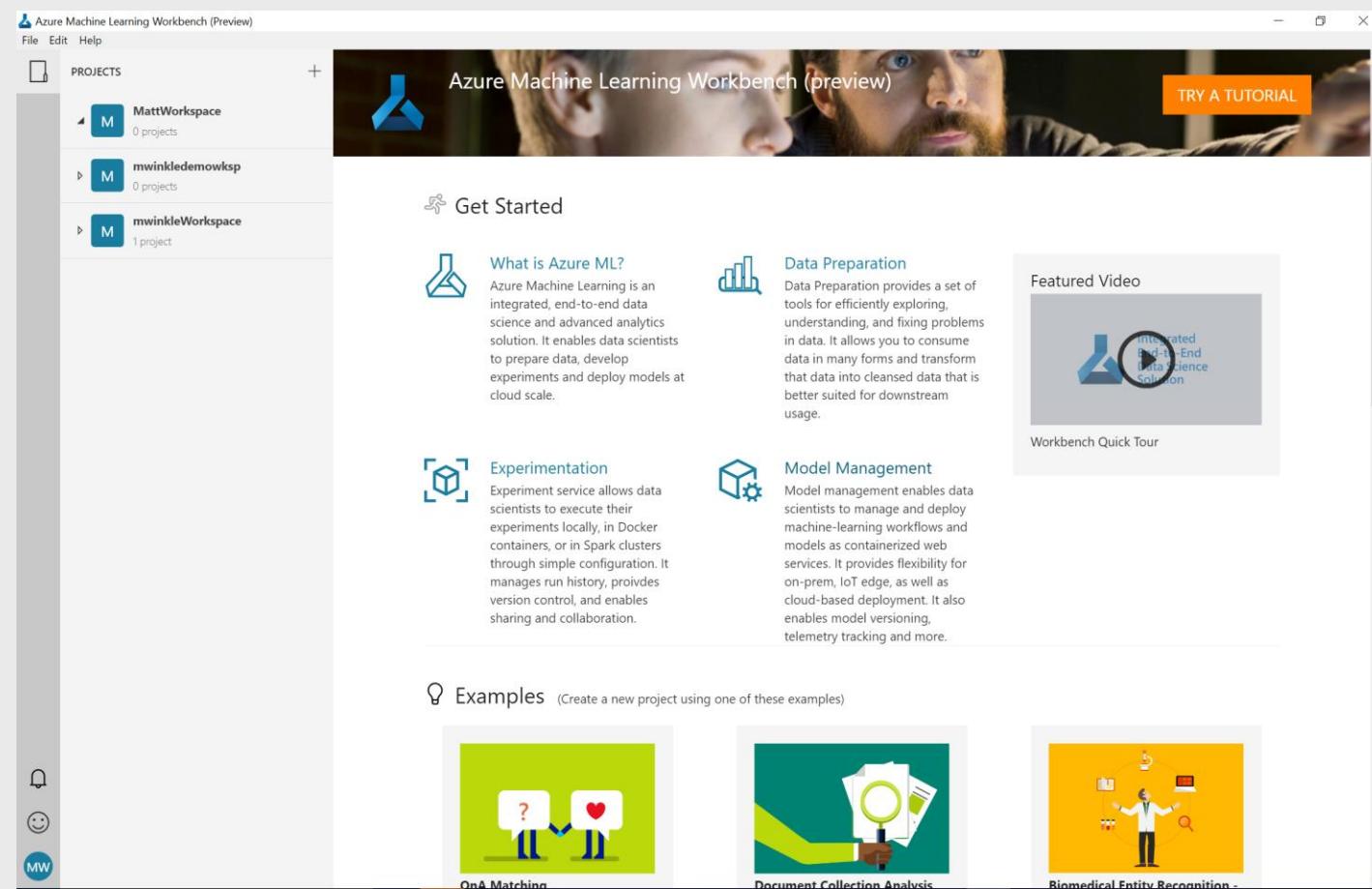
Windows and Mac based companion for AI development

Full environment set up (Python, Jupyter, etc)

Embedded notebooks

Run History and Comparison experience

New data wrangling tools



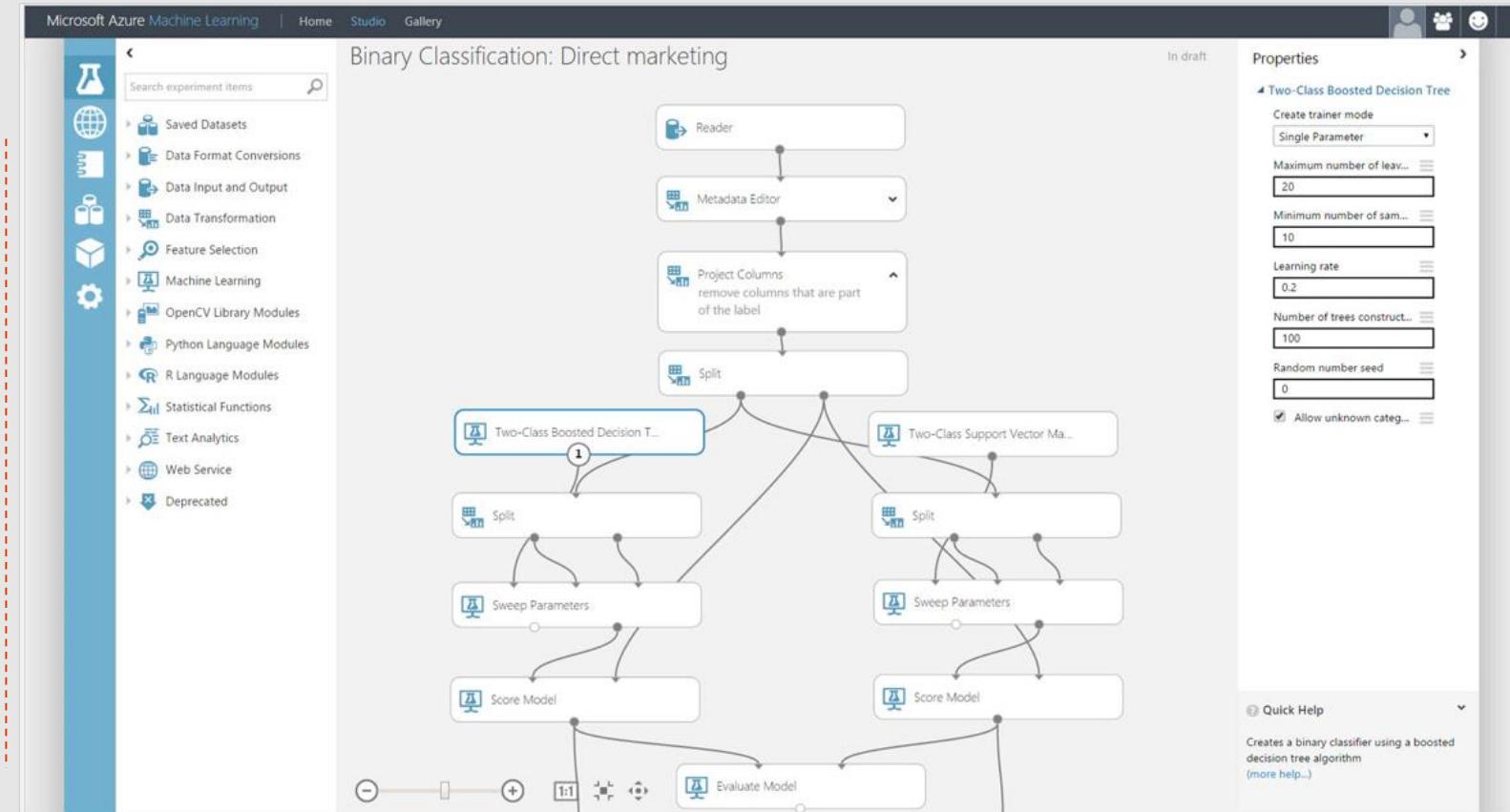
Azure Machine Learning Studio

Platform for emerging data scientists to graphically build and deploy experiments

- Rapid experiment composition
- > 100 easily configured modules for data prep, training, evaluation
- Extensibility through R & Python
- Serverless training and deployment

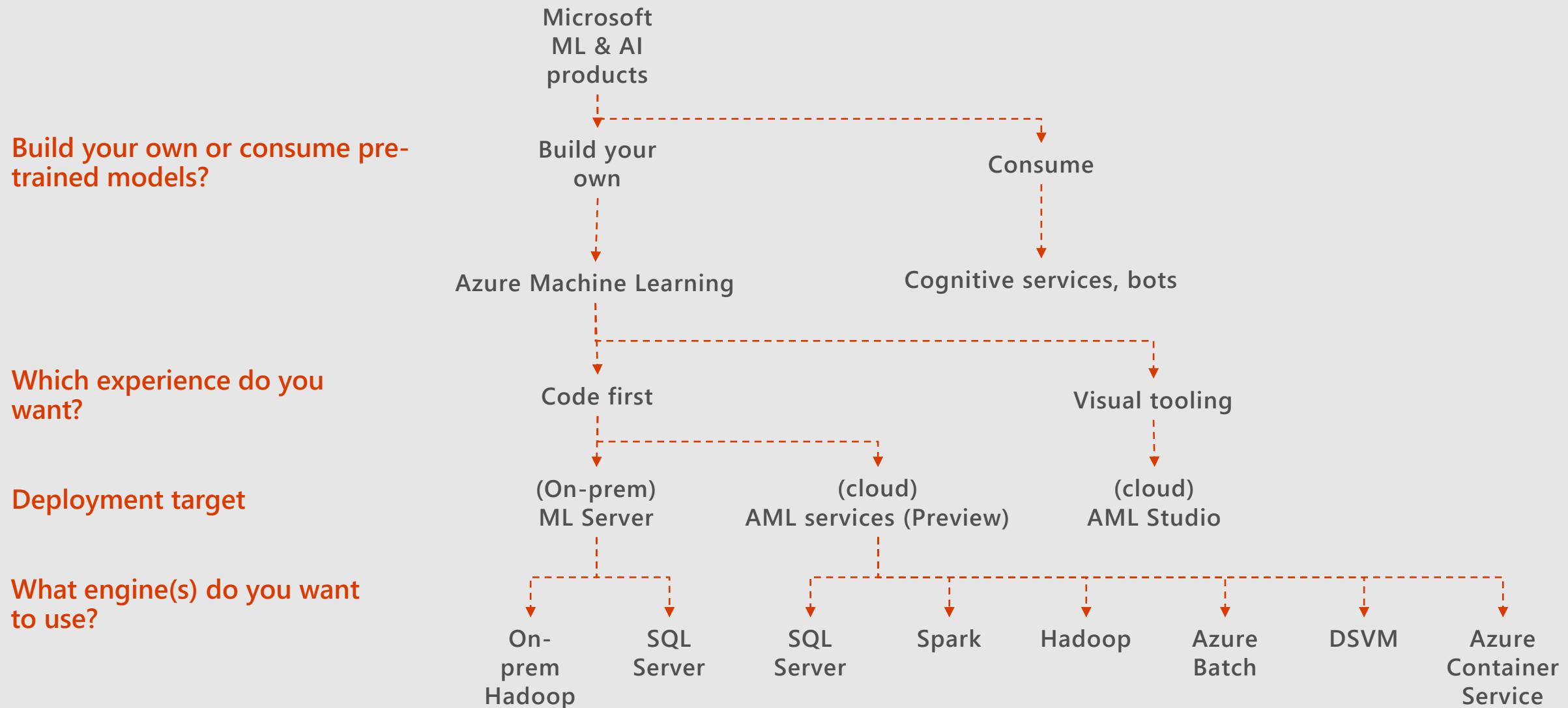
Some numbers:

- 100's of thousands of deployed models serving billions of requests



Machine Learning & AI Portfolio

When to use what?



DEMO



OBJECT DETECTION FOR COMPLEX IMAGE CLASSIFICATION SCENARIOS



Shelf APs

- validshelf1 = 0.4488AP
- validshelf2 = 0.6843AP
- validshelf3 = 0.6356

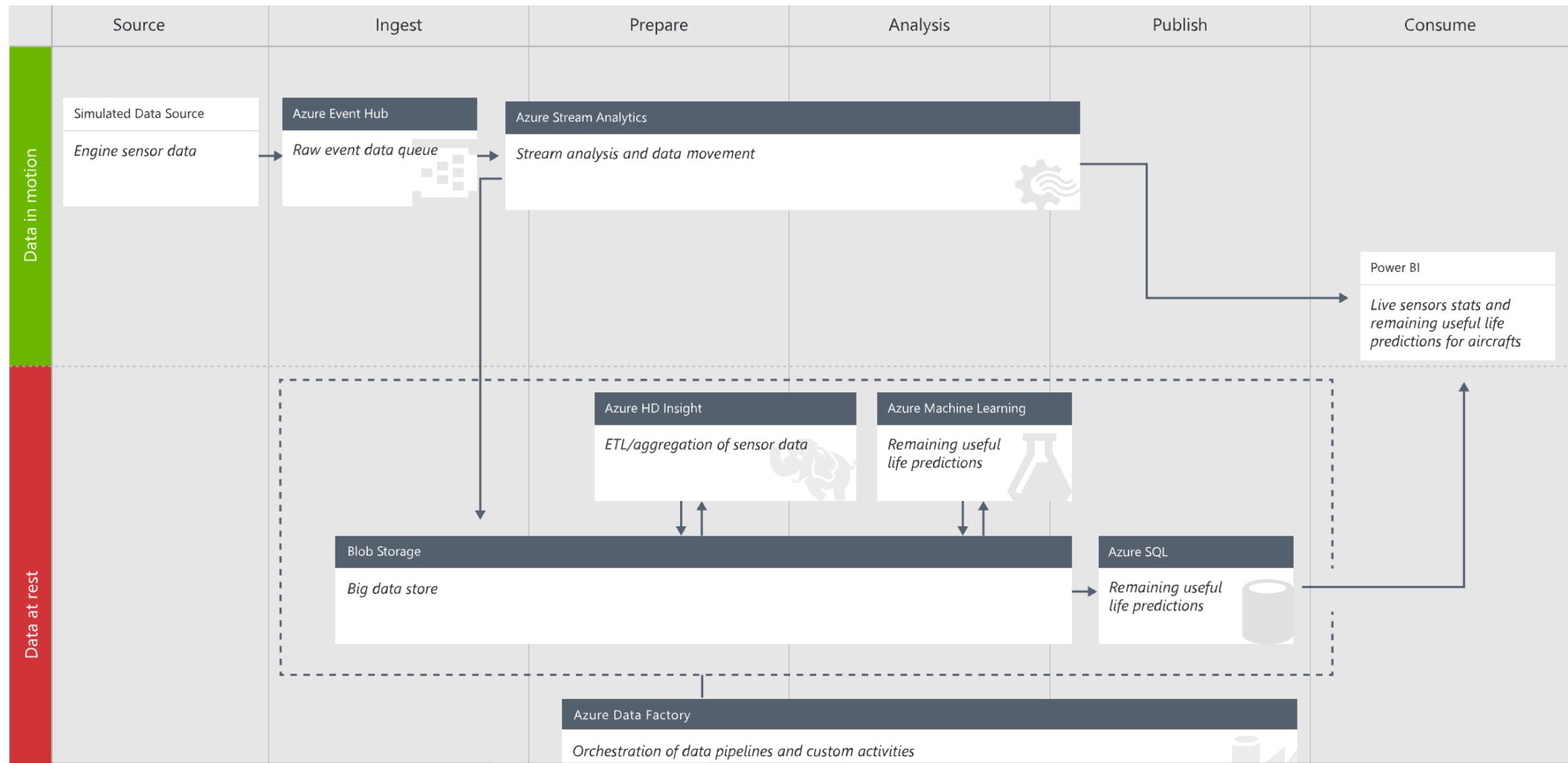
Mean AP = 0.5896

	Precision	Recall	F1-score	Support
False	0.63	0.40	0.49	116
True	0.74	0.88	0.80	225
Total	0.70	0.72	0.70	341

Overall Confusion Matrix

[46 70]
[27 198]

Predictive Maintenance Architecture (IoT / ML)



Get started today

azure.com/ai

github.com/kritcs18

