

AI ML

Deep Learning and Azure



Microsoft AI Approach

AI Platform

- Azure services

Infusing AI

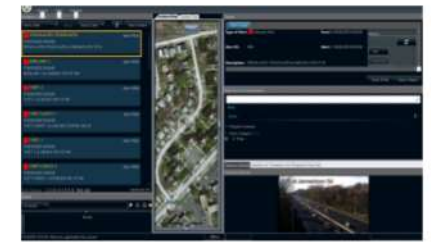
- Adding AI in all products

Business Solutions

- Vertical business solutions

Threat Detection for Any Public Safety Mission

The **Aware Threat Console** can be configured by each user or user group to address their unique needs (e.g. homicide, gang, robbery). The Threat Console provides a means to aggregate massive amounts of sensor, open source, and tactical data in real-time, to correlate and triage the data to identify potential threats, and to display these alerts with deep context for operators to take immediate action. Aware has the ability to act as a force multiplier, giving officers immediate insight to fight crime on a daily basis.

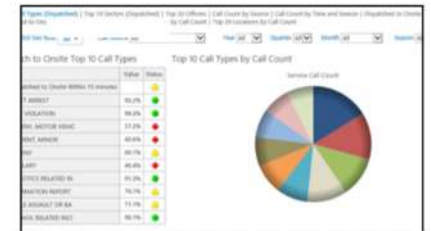


No More Investigation Silos

The **Aware Investigation Console** provides a fully integrated investigation case management capability with deep analytical tools such as enterprise search, correlation, link analysis, temporal analysis, and geospatial analysis. Case management functions are enhanced with the ability to configure alerts and workflow specific to the investigation and those personnel assigned to the case. Out-of-the-box integration with Microsoft Lync enhances the ability for investigators to communicate in real time via instant messaging, phone/radio, or email.

Data Driven Decision Making

Law enforcement leaders agree that the ability to effectively collect, manage, and collaborate around vital information is critical to effective crime fighting. The **Aware Management Console** provides enhanced information management, executive dashboards, reports, and search to help agencies overcome the obstacles to share information and gain operational insight.



Enhanced Intelligence Capabilities

Enabling the efficient processing and fusion of intelligence data, the **Aware Intelligence Console** automates core functions such as intake, analysis, dissemination, and archiving. Aware empowers an intelligence analyst to quickly collaborate with detectives, patrol, and other analysts. Aware also provides web based tip/lead and suspicious activity reporting to cross state, local, and Federal lines.

Automatic Alerting

A flexible rules engine empowers agencies to virtually patrol a community 24x7x365. Users can establish and fine tune alerting thresholds and logic to detect and route alerts to the right person in real time.

Geospatial Mapping

Visualize and correlate alerts and assets at the snap of a finger. Understand patterns, trends, and proximity of events as they relate to nearby centers of activity such as a school, stadium, or power stations.

Search and Correlation

Alerts instantly trigger queries across all connected sources to provide a deeper understanding of the crime, threat or hazard and rapidly discover non-obvious relationships and associations of the data.

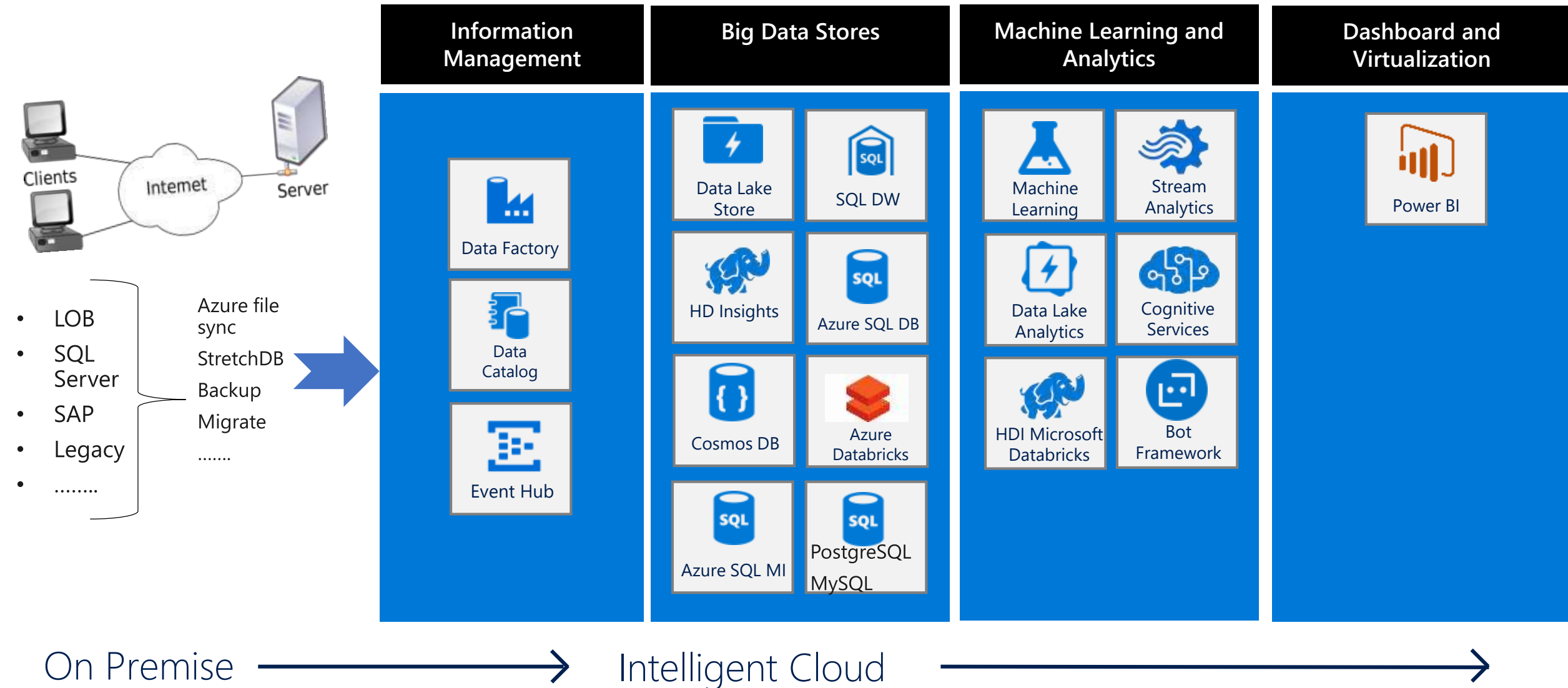
Video Integration

Unify existing video systems and assets. Authorized users in a command center or a mobile environment can view and control cameras and video feeds from across your community or geography.

Real Time Communication

Operators can instantly and directly communicate and collaborate with responding officers, management, and other users through the seamless integration of Microsoft Lync.

The tools to make it happen



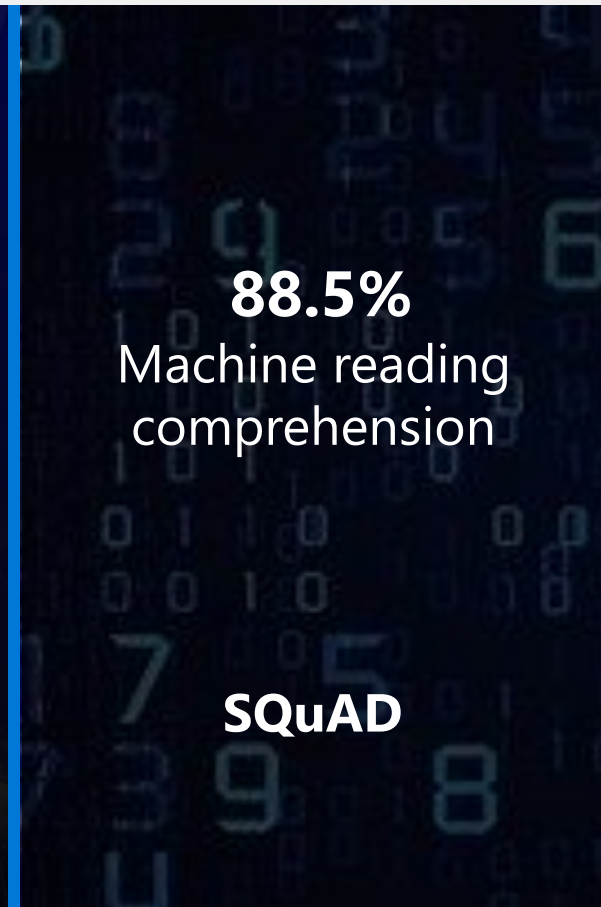
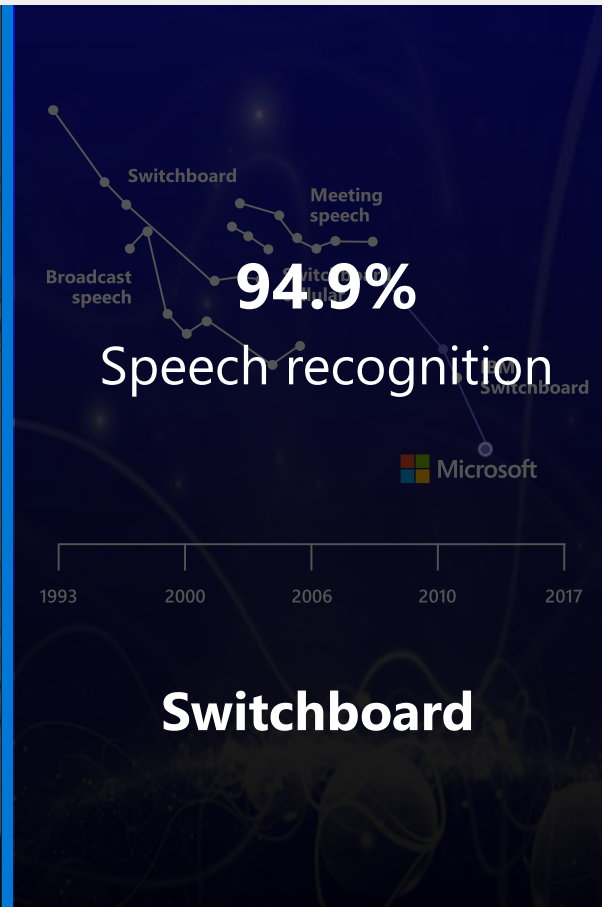
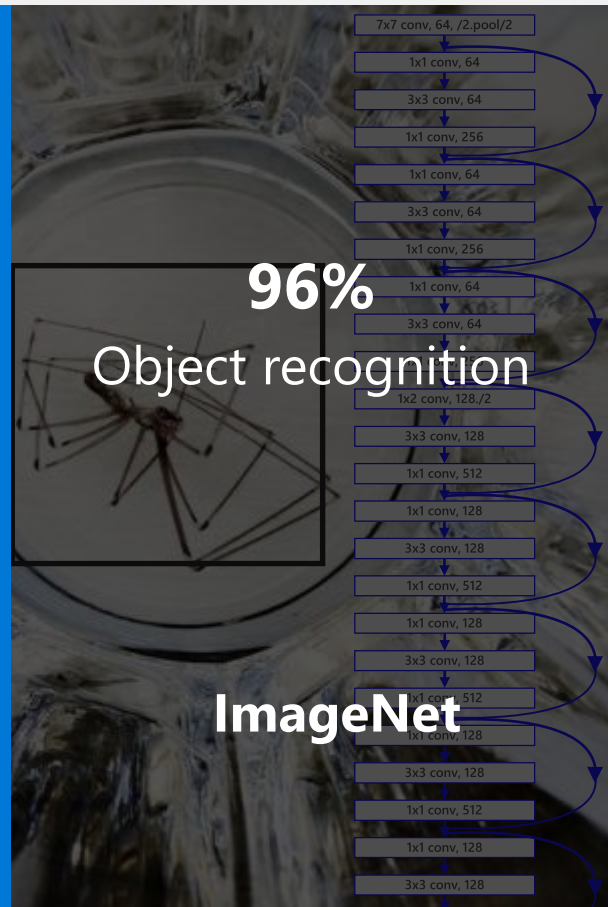
Microsoft AI: the first to reach human parity

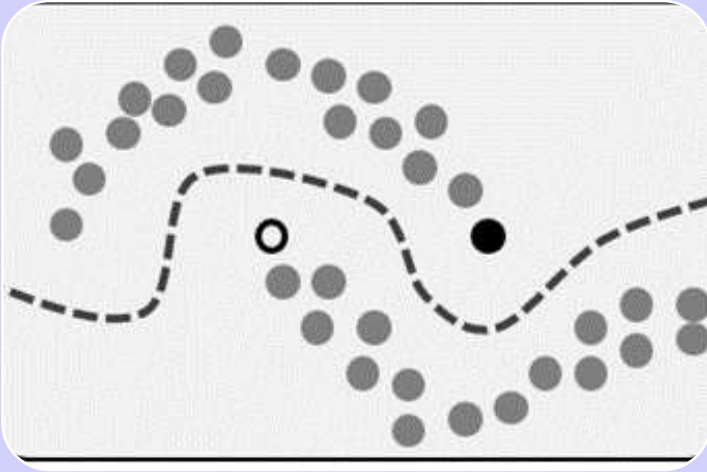
2015

2017

2018

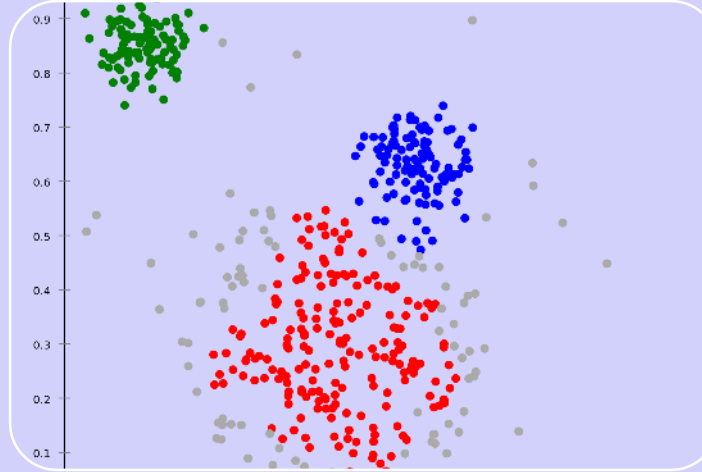
2018





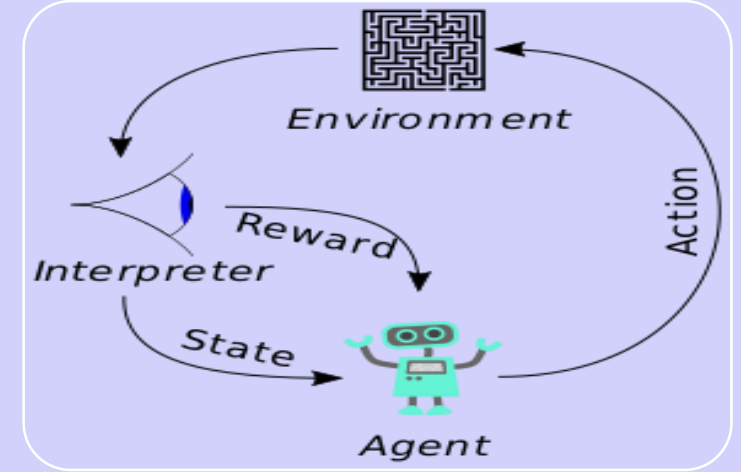
Supervised Learning

- Learning from data with the goal to predict the value of an outcome measure based on a number of input measures.
- The outcome Variable is known and guiding the learning process



Unsupervised Learning

- Observe only the features and have no measurements of the outcome
- Describe how the data are organized or clustered.



Reinforcement Learning

- Rewards or punishments teach the system how to act

Deep Learning Tasks

Image Classification

Is there a deer in the image?



Object detection

Where is the deer in the image?



Image segmentation

Where exactly is the deer?
What pixels?

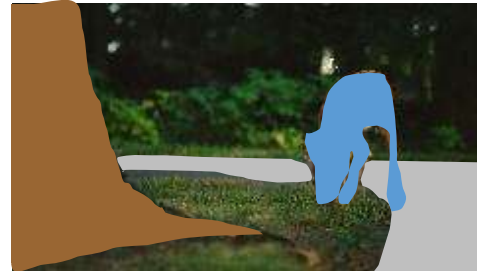
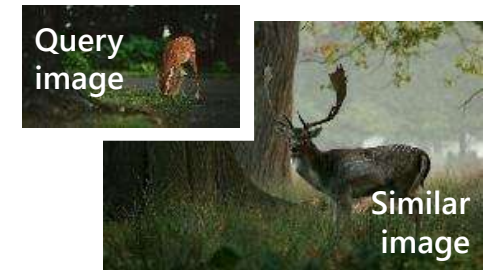


Image Similarity

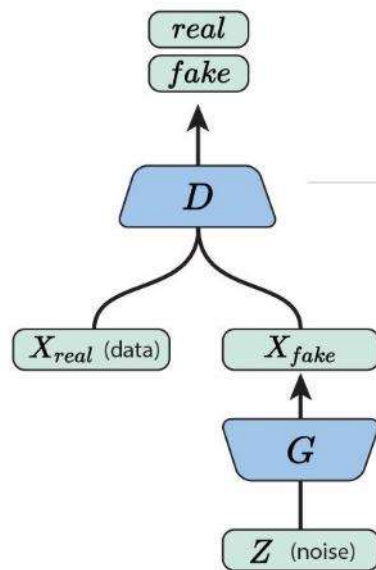
Which images are similar to the query image?



2017 Achievements

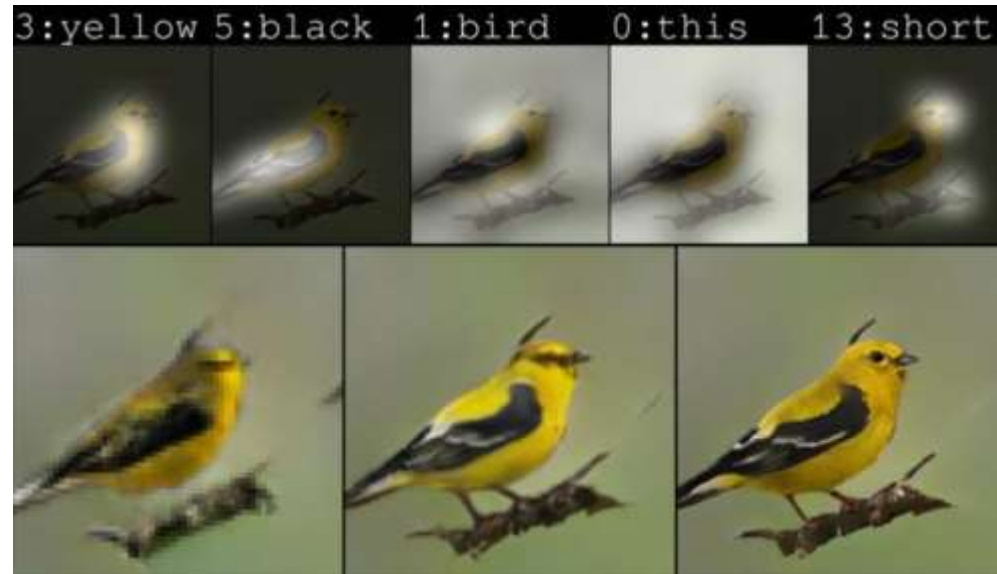
- Microsoft bot that draws images based on descriptions (Generative Adversarial Network)

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 imitations of the data, in an attempt to fool the discriminator.



Generative Adversarial Networks



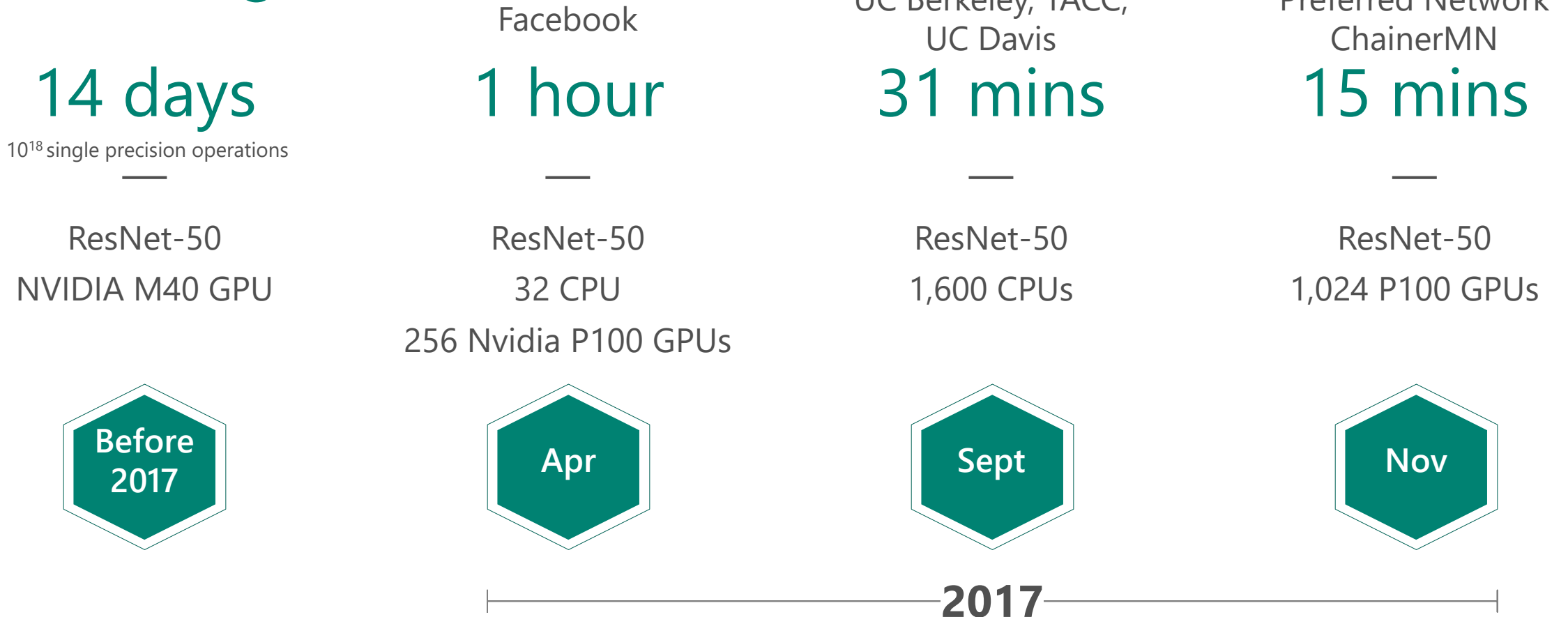
The Starry Night, van Gogh



Created by a GAN

Imagenet image database

- ~1.3 million images
- How long does it take to train?



Azure is the best place for machine learning

Sophisticated pretrained models

Most comprehensive set of pretrained services



Vision



Speech



Language



Search

Popular frameworks

Open & interoperable



Pytorch



TensorFlow



Keras



Onnx

Productive services

Machine learning at scale



Azure
Databricks



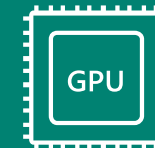
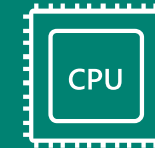
Azure
Machine Learning



Machine Learning
VMs

Powerful Infrastructure

Most comprehensive
Lowest cost inferencing using FPGAs



Flexible deployment

From cloud to edge



On-premises



Cloud



Edge

Powerful infrastructure

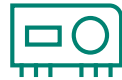
Accelerate deep learning



CPUs

General purpose machine
learning

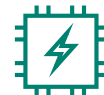
D, F, L, M, H Series



GPUs

Deep learning

N Series



FPGAs

Specialized hardware
accelerated deep learning

Project Brainwave

Optimized for flexibility

Optimized for performance

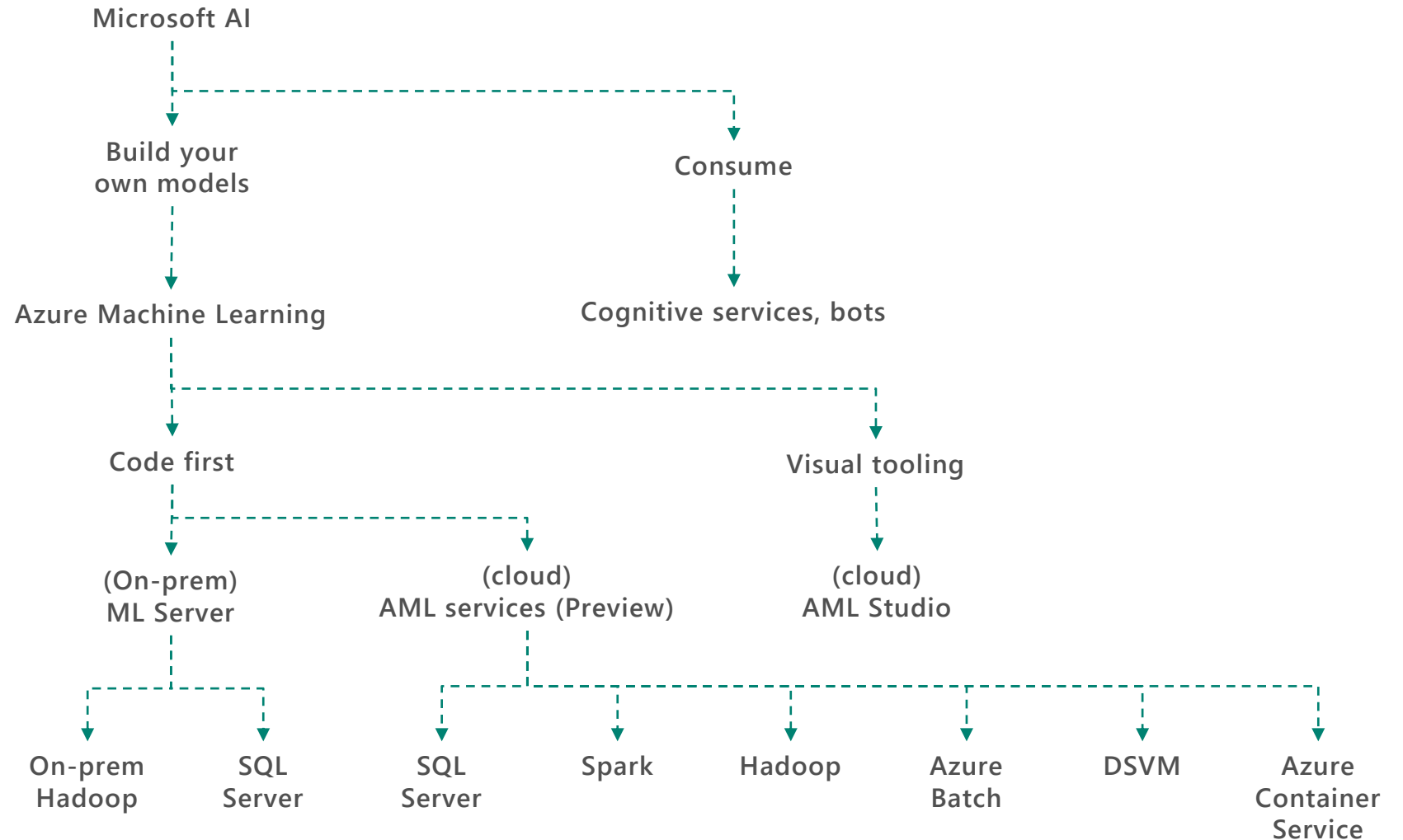
Where should I get started?

Build your own or consume pre-trained models?

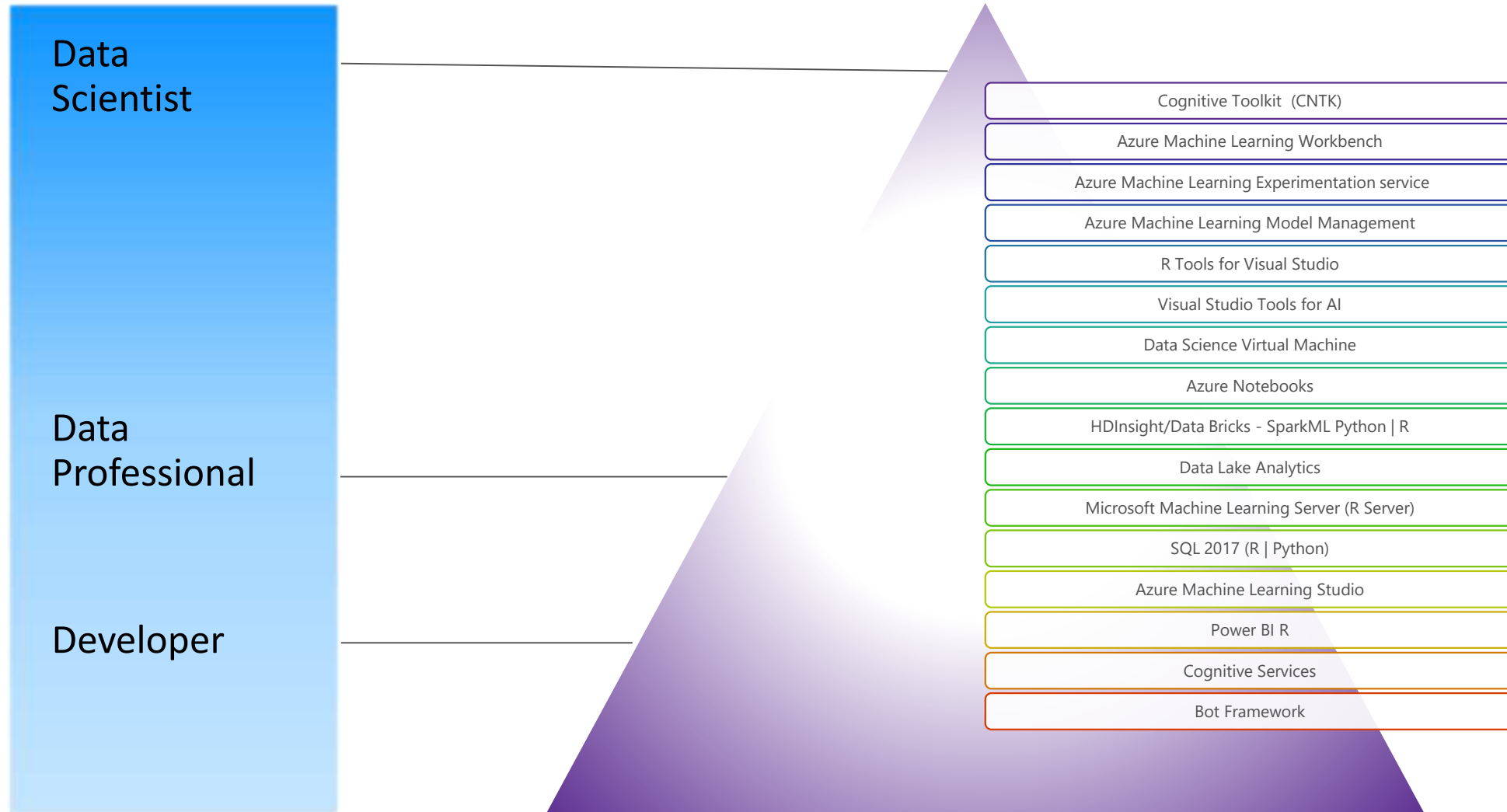
Which experience do you want?

Deployment target

What engine(s) do you want to use?



Tooling by Skill Set





Microsoft