Microsoft

Machine Learning on Azure – An Overview

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Azure Data + AI Solution Areas

Data

Data Modernization on-premises

Data modernization to Azure

Globally distributed data

Cloud Scale Analytics

+

AI

AI apps & agents

Knowledge mining

Machine learning

Azure Data + AI Solution Areas

Data

Data Modernization on-premises

Data modernization to Azure

Globally distributed data

Cloud Scale Analytics

+

AI

AI apps & agents

Knowledge mining

Machine learning

Machine Learning on Azure

Domain specific pretrained models
To simplify solution development


Vision


Speech


Language


Search

Familiar Data Science tools
To simplify model development


Visual Studio Code


Azure Notebooks

Jupyter


Command line

Popular frameworks
To build advanced deep learning solutions


PyTorch


TensorFlow

Sci-kit Learn


ONNX

Productive services
To empower data science and development teams


Azure Databricks


Azure Machine Learning Service


Data Science VMs

Powerful infrastructure
To accelerate deep learning


CPU


GPU


FPGA


From the Intelligent Cloud to the Intelligent Edge

Cognitive Services (Pre-Trained Models)

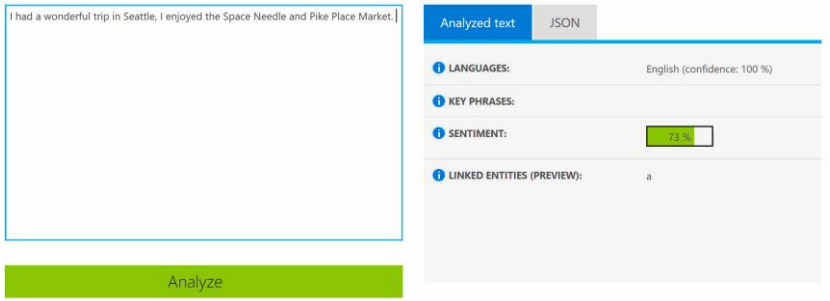
Infuse apps with powerful, pre-trained AI models

Customize easily and tailor to your needs

Vision

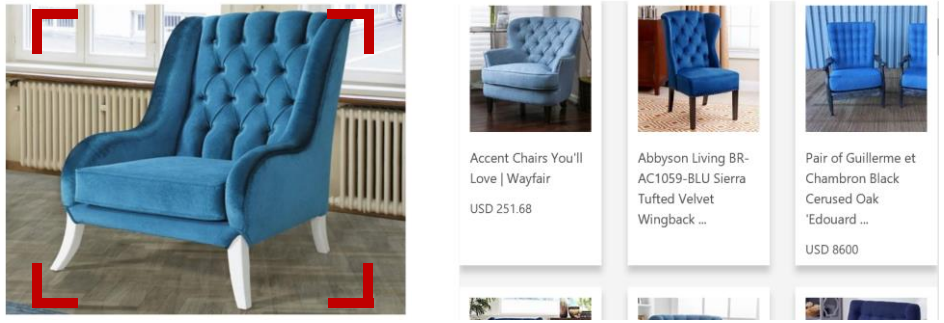
Computer Vision | Video Indexer | Face | Content Moderator

Language



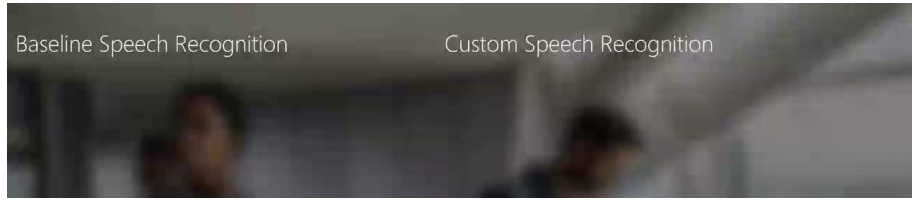
Text Analytics | Spell Check | Language Understanding | Text Translation | QnA Maker

Bing Search



Big Web Search | Video Search | Image Search | Visual Search | Entity Search | News Search | Autosuggest

Speech



Speech to Text | Text to Speech | Speech Translation | Speaker Recognition

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Familiar Data Science tools

Choose any python development environment

Visual Studio Code

Azure Notebooks

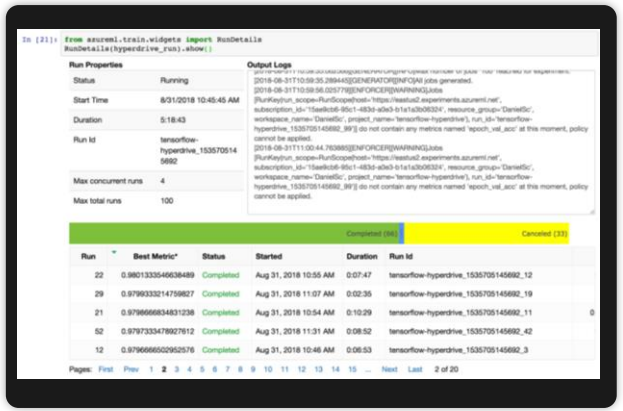
Jupyter

PyCharm

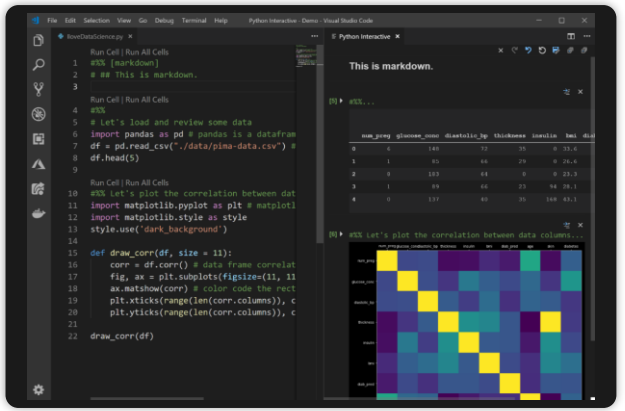
Zeppelin

Command line

And improve data science productivity



Interactive widgets for Jupyter Notebooks



Azure Machine Learning for Visual Studio Code extension

Get started with AML on Azure Notebooks: http://aka.ms/aznotebooks-aml

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Powerful frameworks

Build advanced deep learning solutions

Use your favorite deep learning frameworks

TensorFlow

PyTorch

Scikit-Learn

MXNet

Chainer

Keras

without getting locked into one framework

ONNX

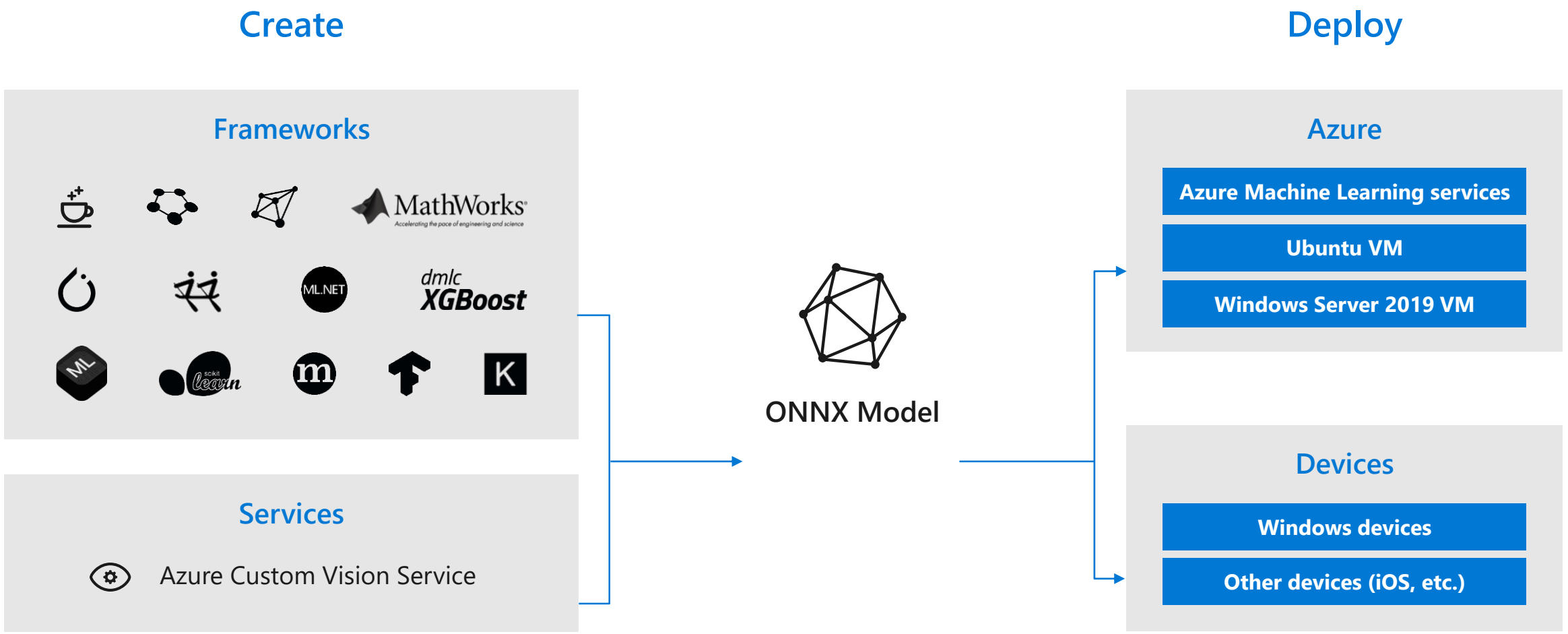
Community project created by Facebook and Microsoft

Use the best tool for the job. Train in one framework and transfer to another for inference

NVIDIA QUALCOMM Windows vespa SOPHON

intel skymizer MathWorks NETRON Visual DL

ONNX is the new open ecosystem for AI models



Click here to watch an ONNX in the Enterprise session from Build 2019

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Productive Services

To empower data science and development teams

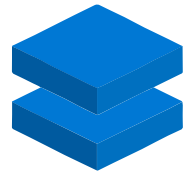
Azure Machine Learning

Python-based machine learning service

Develop models faster with automated machine learning

Use any Python environment and ML frameworks

Manage models across the cloud and the edge.



Azure Databricks

Apache Spark-based big-data service

Prepare data clean data at massive scale

Enable collaboration between data scientists and data engineers

Access machine learning optimized clusters

Azure Machine Learning service

Bring AI to everyone with an end-to-end, scalable, trusted platform

Boost your data science productivity

Increase your rate of experimentation

Deploy and manage your models everywhere

Built with your needs in mind

- Automated machine learning
- Managed compute
- DevOps for machine learning
- Simple deployment
- Tool agnostic Python SDK
- Support for open source frameworks

Seamlessly integrated with the Azure Portfolio

Azure Databricks

Fast, easy, and collaborative Apache Spark™-based analytics platform

Increase productivity

Build on a secure, trusted cloud

Scale without limits

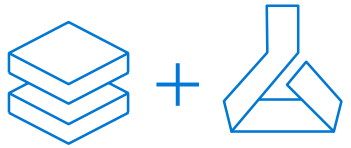
Built with your needs in mind

- Optimized Apache Spark environmnet
- Collaborative workspace
- Integration with Azure data services
- Autoscale and autoterminate
- Optimized for distributed processing
- Support for multiple languages and libraries

Seamlessly integrated with the Azure Portfolio

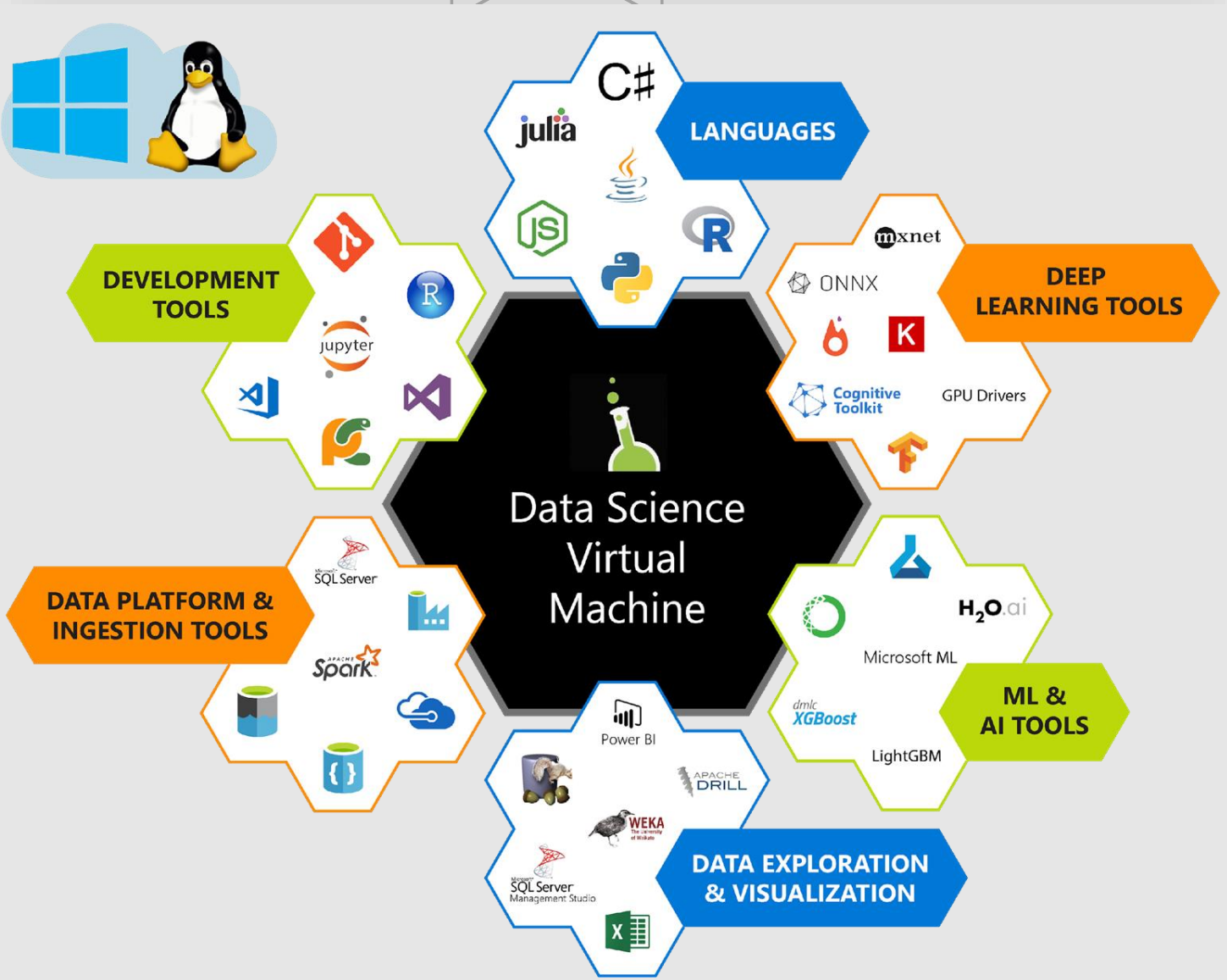
Productive Services

What to use when?

Customer journey	Data Prep	Build and Train	Manage and Deploy
Python ML developer	 **Azure ML service** (Pandas, NumPy etc. on AML Compute)	 **Azure ML service** (OSS frameworks, Hyperdrive, Pipelines, Automated ML, Model Registry)	 **Azure ML service** (containerize, deploy, inference and monitor)
Apache Spark / Big Data	 **Azure Databricks** (Apache Spark Dataframes, Datasets, Delta, Pandas, NumPy etc.)	 **Azure Databricks + Azure ML service** (Spark MLib and OSS frameworks + Automated ML, Model Registry)	 **Azure ML service** (containerize, deploy, inference and monitor)

Data Science Virtual Machines (DSVM)

- Pre-configured environments in the cloud for Data Science & AI Modeling, Development & Deployment
- Samples to help you get started



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FPGA


From the Intelligent Cloud to the Intelligent Edge

Powerful Infrastructure

Accelerate Deep Learning

CPUs

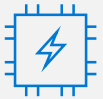
General purpose machine learning

D, F, L, M, H Series

GPUs

Deep learning

N Series



FPGAs

Specialized hardware accelerated deep learning

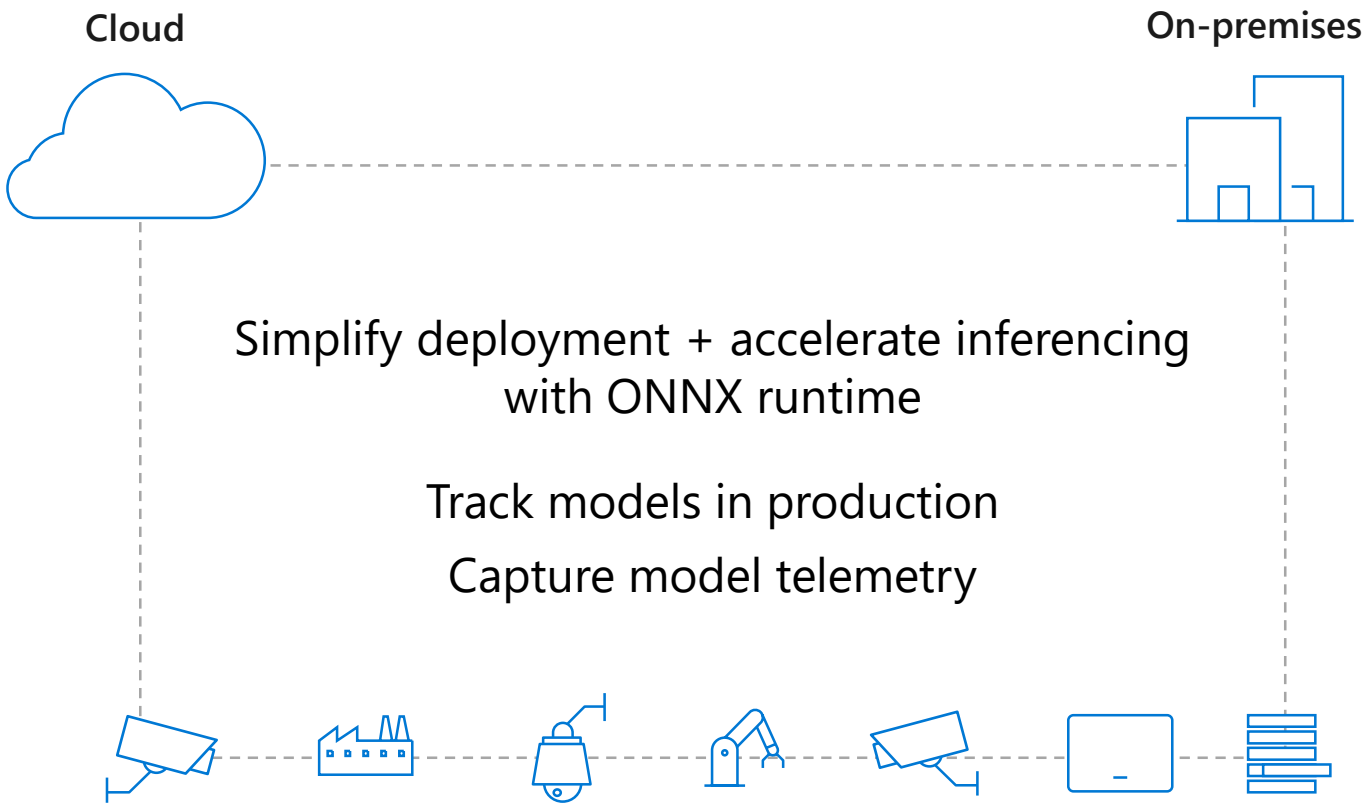
AML hardware accelerated models (Project Brainwave)

Optimized for flexibility

Optimized for performance

Flexible Deployment

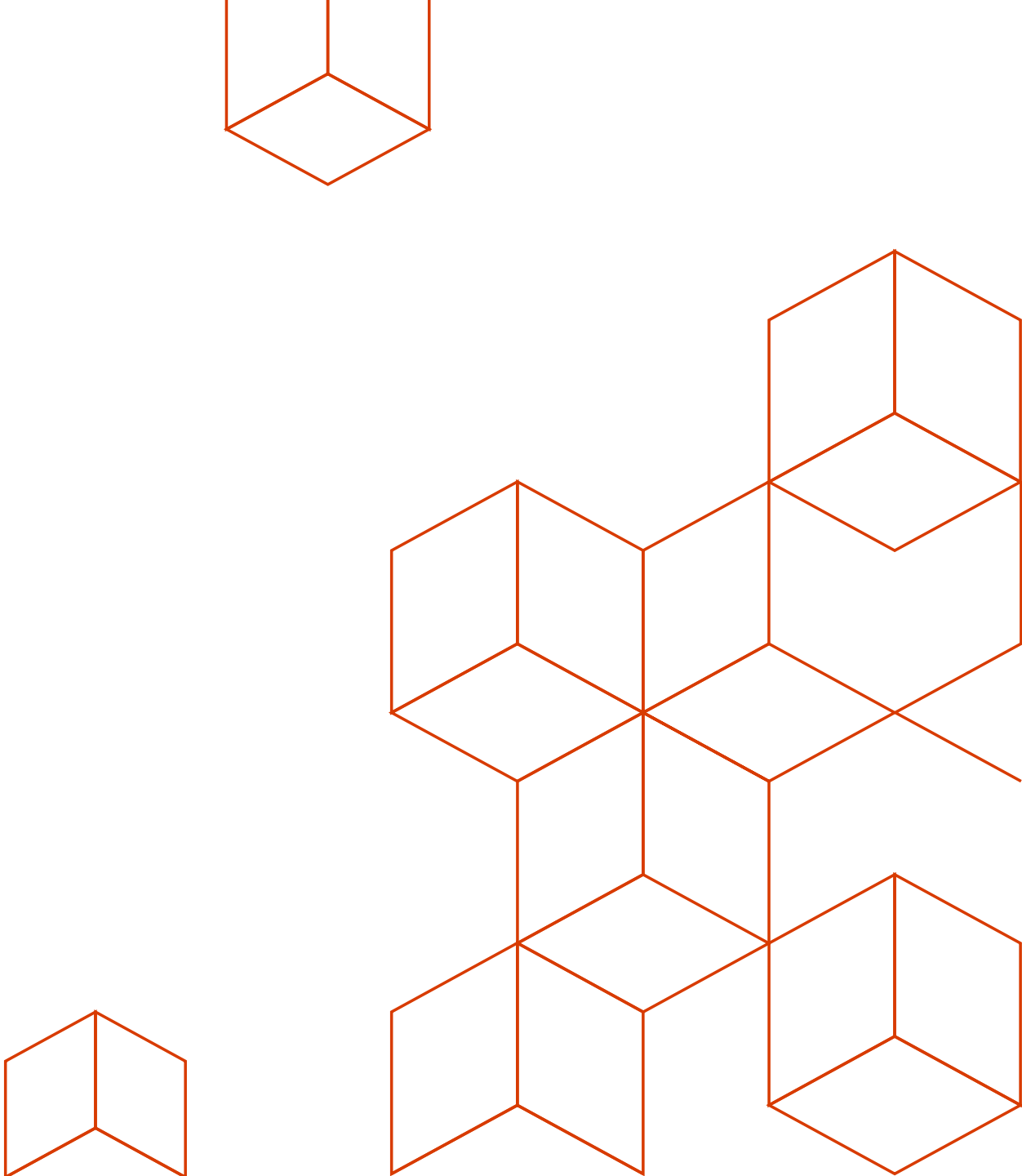
From the Intelligent Cloud to the Intelligent Edge



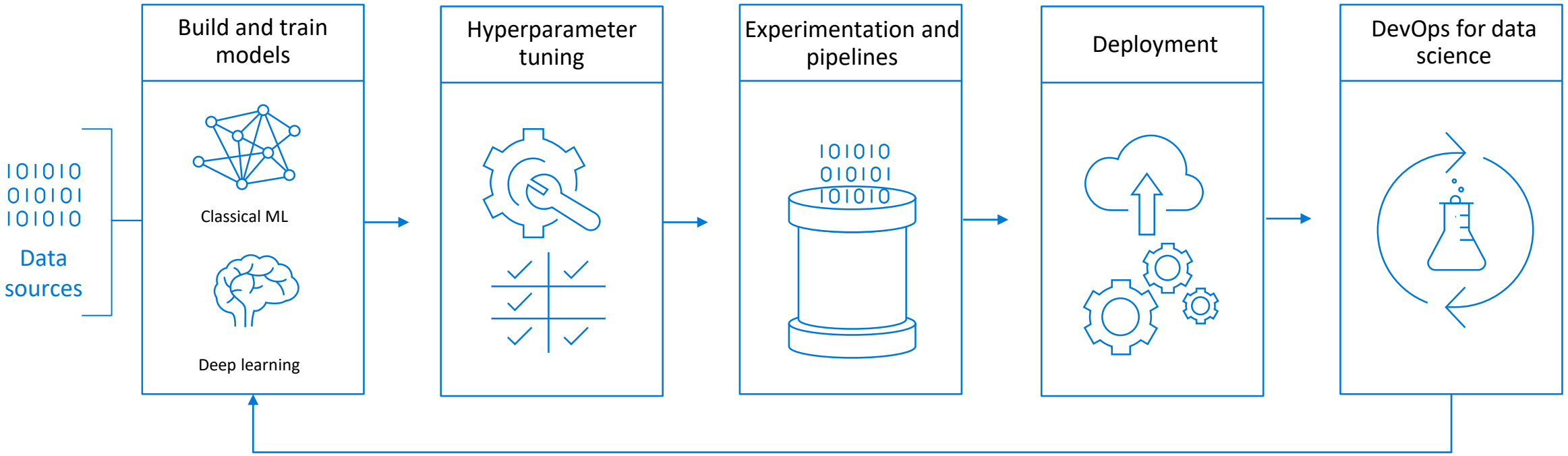
Deployments to Compute Targets

Compute target	Deployment type	Description
Azure Container Instances (ACI)	Web service	Fast deployment. Good for development or testing.
Azure Kubernetes Service (AKS)	Web service	Good for high-scale production deployments. Provides autoscaling, and fast response times.
Azure IoT Edge	IoT module	Deploy models on IoT devices. Inferencing happens on the device.
Field-programmable gate array (FPGA)	Web service	Ultra-low latency for real-time inferencing.

The Data Science Process on Azure



Building Blocks for a Data Science Project



DevOps

Code reproducibility

Code testing

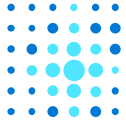
App deployment

MLOps

Model reproducibility

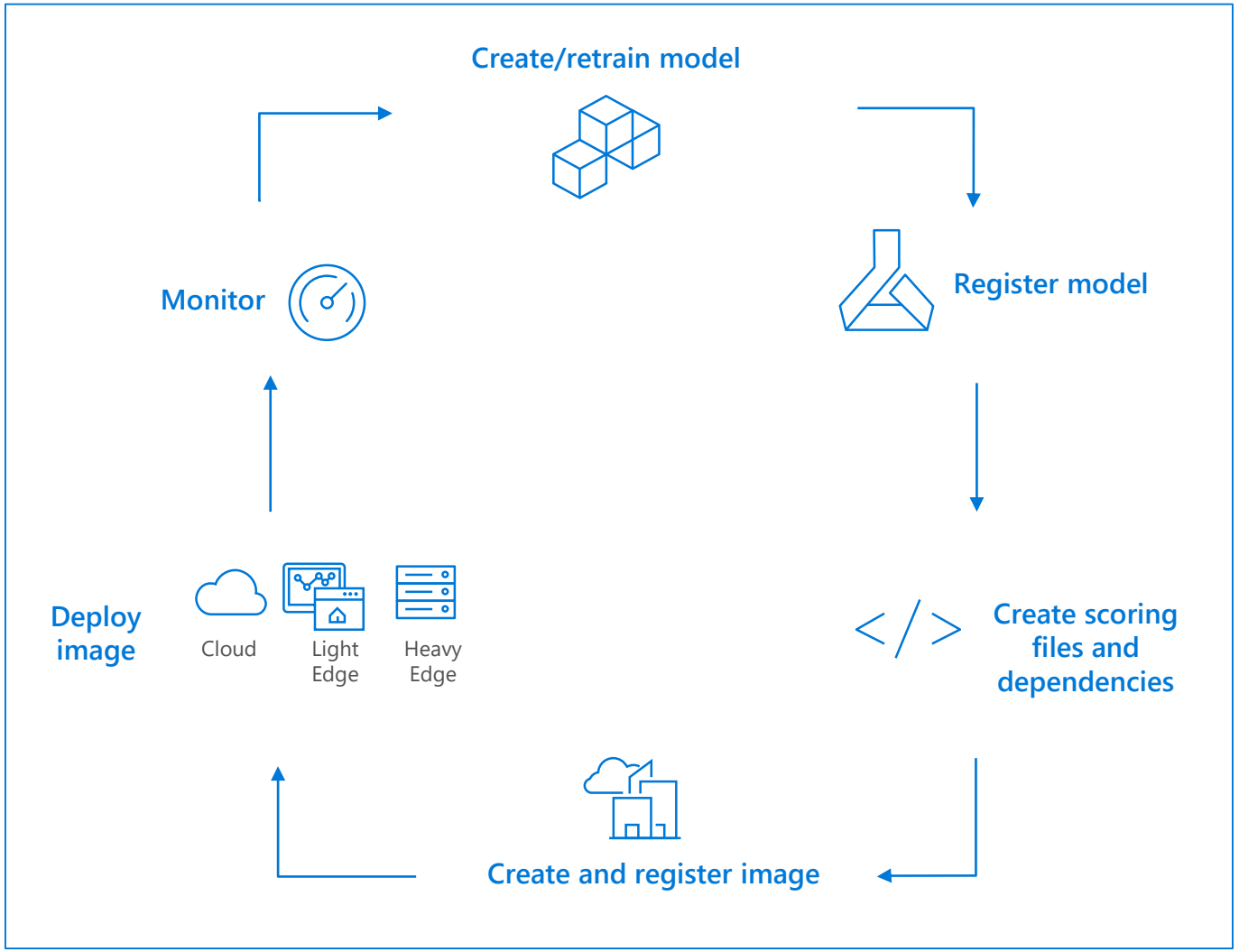
Model validation

Model deployment

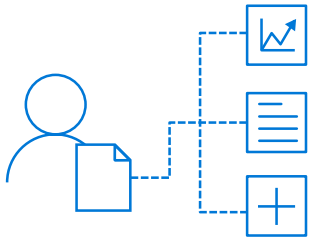


Model retraining

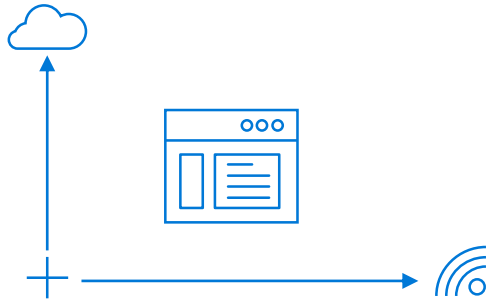
Model management in Azure Machine Learning



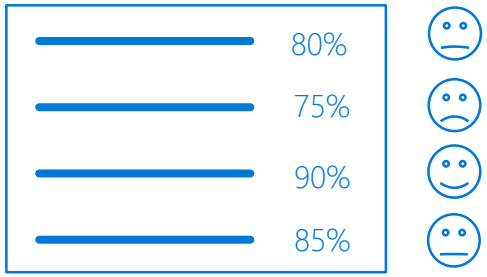
Experimentation



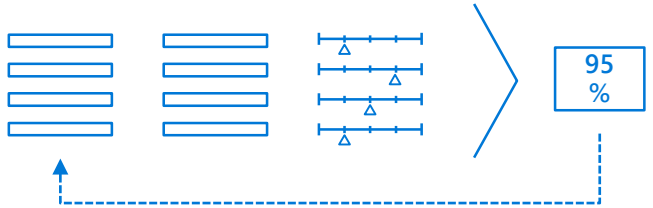
Leverage service-side capture of run metrics, output logs and models



Manage training jobs locally, scaled-up or scaled-out

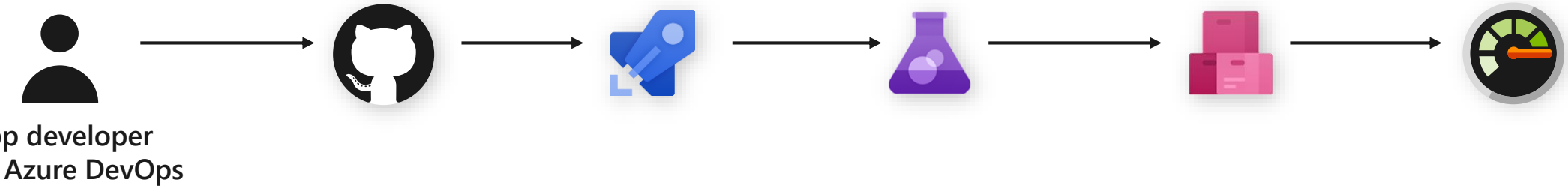


Use leaderboards, side by side run comparison and model selection



Conduct a hyperparameter search on traditional ML or DNN

MLOps with Azure Machine Learning

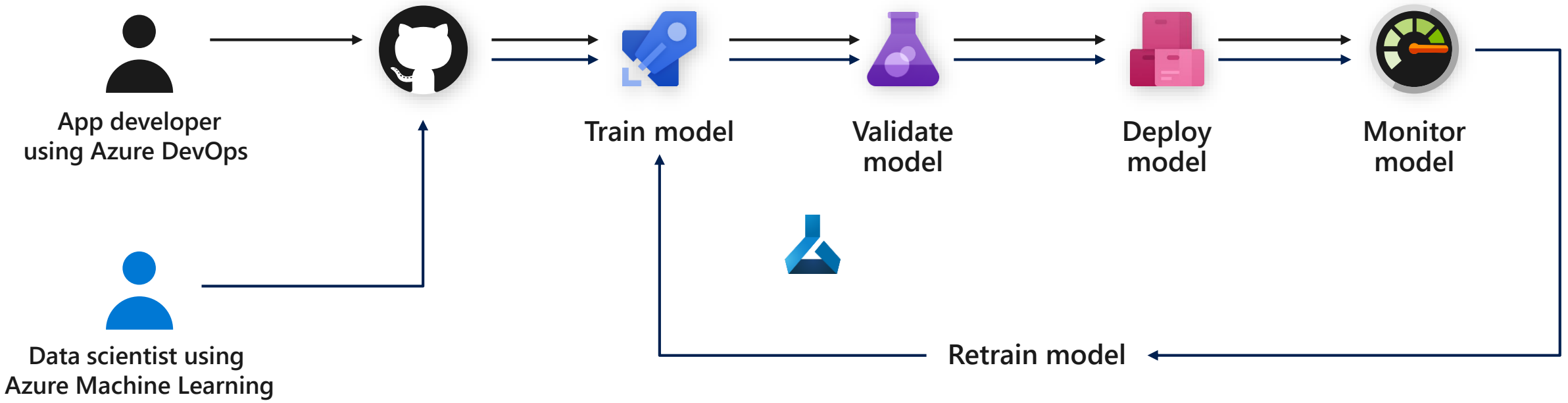


App developer
using Azure DevOps

Data scientist using
Azure Machine Learning

- Model reproducibility
- Model validation
- Model deployment
- Model retraining

MLOps with Azure Machine Learning



- Model reproducibility
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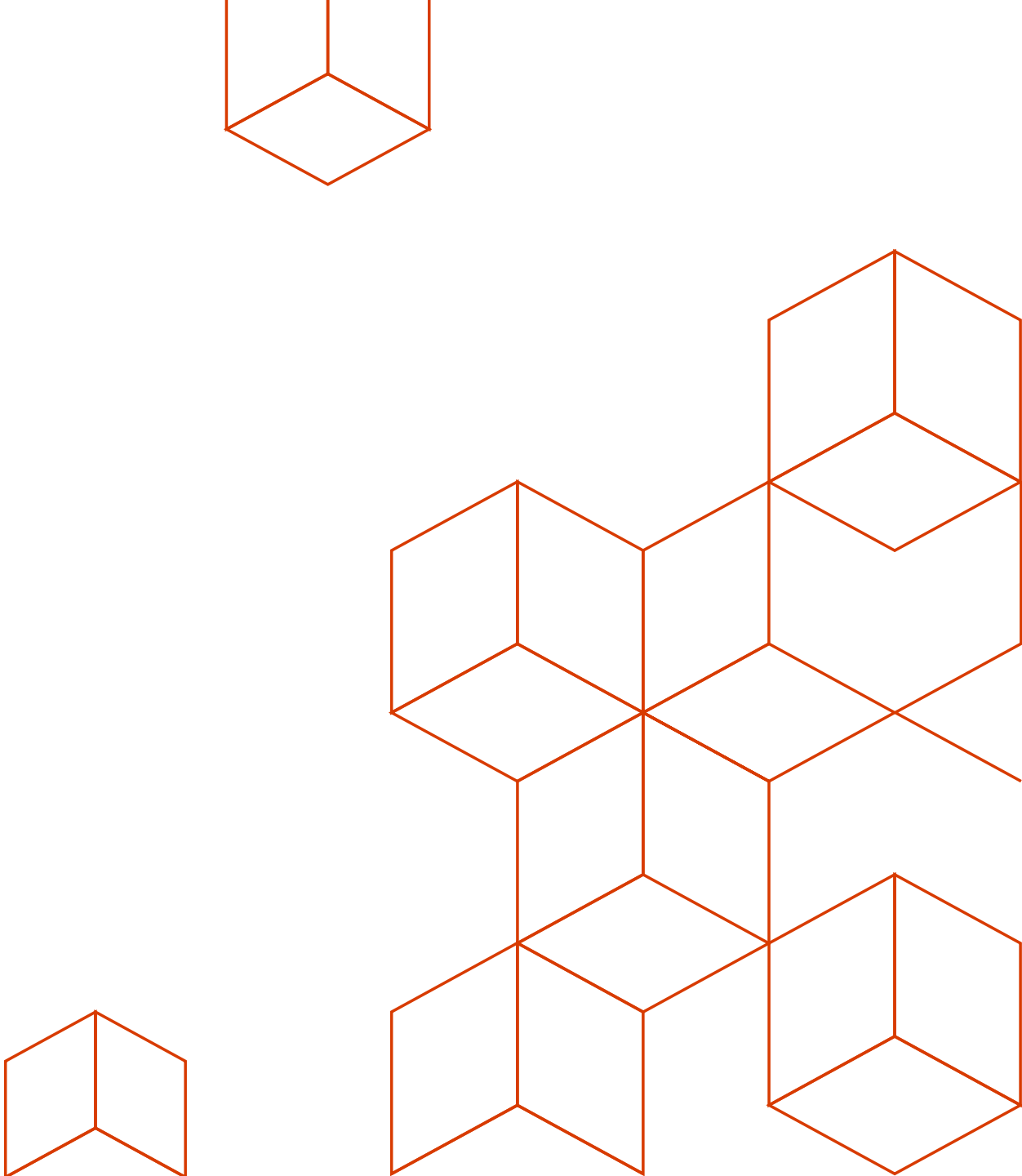
Machine Learning Product Investments



Machine Learning Investments

Enhance existing capabilities

Azure Databricks Remote support for other IDEs outside of native notebooks

MLFlow for better DevOps with Azure Databricks and other ML pipelines

Azure Machine Learning Python SDK support for popular IDEs & notebooks, including Azure Databricks

Azure Machine Learning managed compute capabilities

Introduce new models for FPGA scoring

Introduce new capabilities

Robust ONNX support - runtime engine in AML, model operationalization in SQL Server

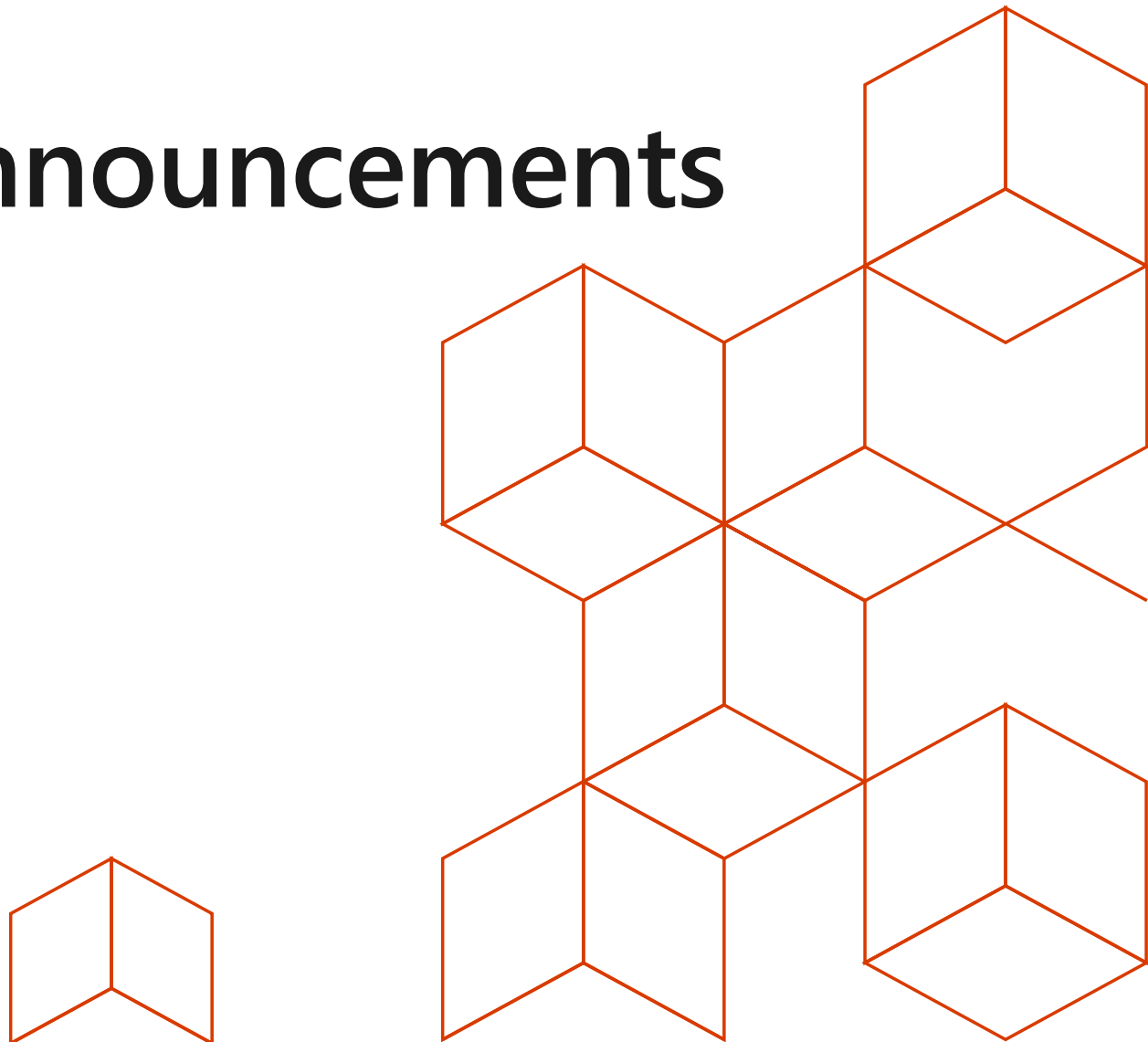
Automated machine learning

Deploy and manage models to IoT edge

Extend Machine Learning services to SQL DB

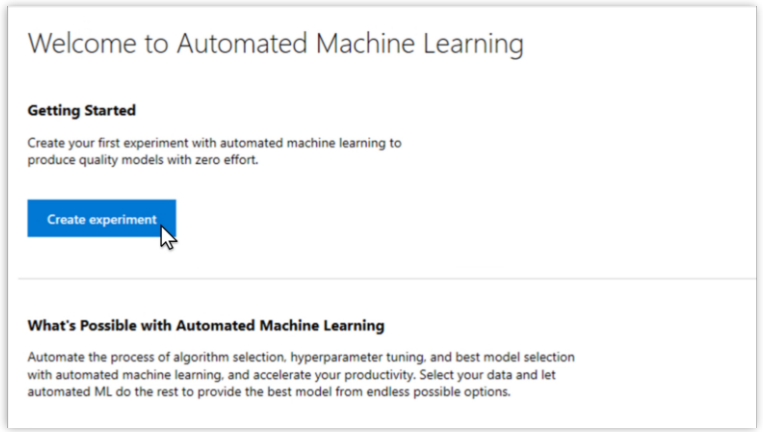
Continue simplify machine learning

Machine Learning Announcements from Build 2019

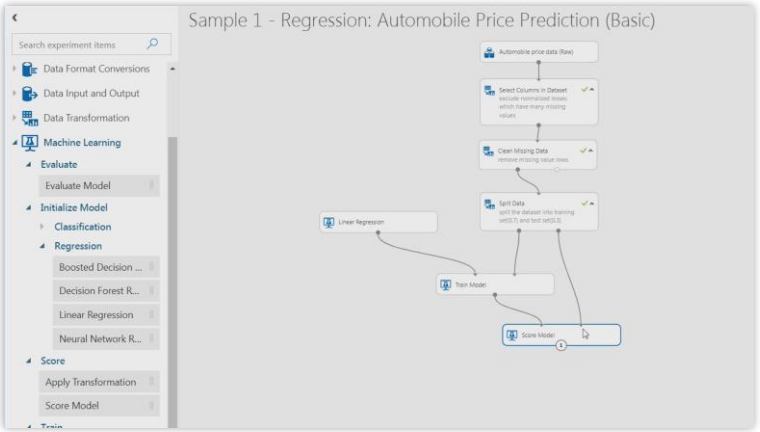


Simplify Machine Learning for any Skill Level

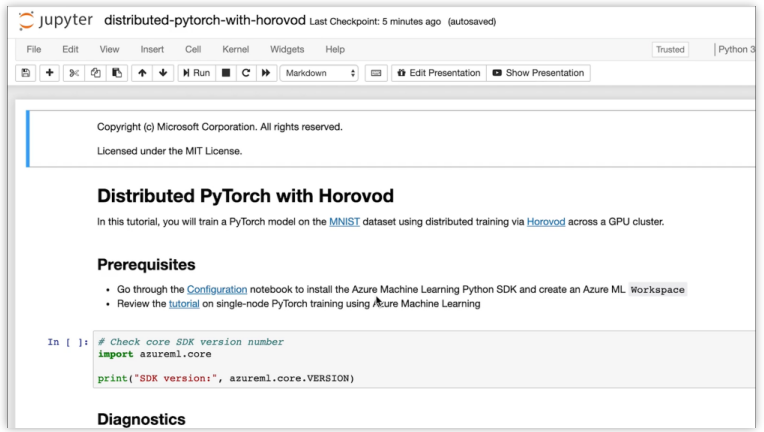
New capabilities in Azure Machine Learning service



Automated Machine Learning UI



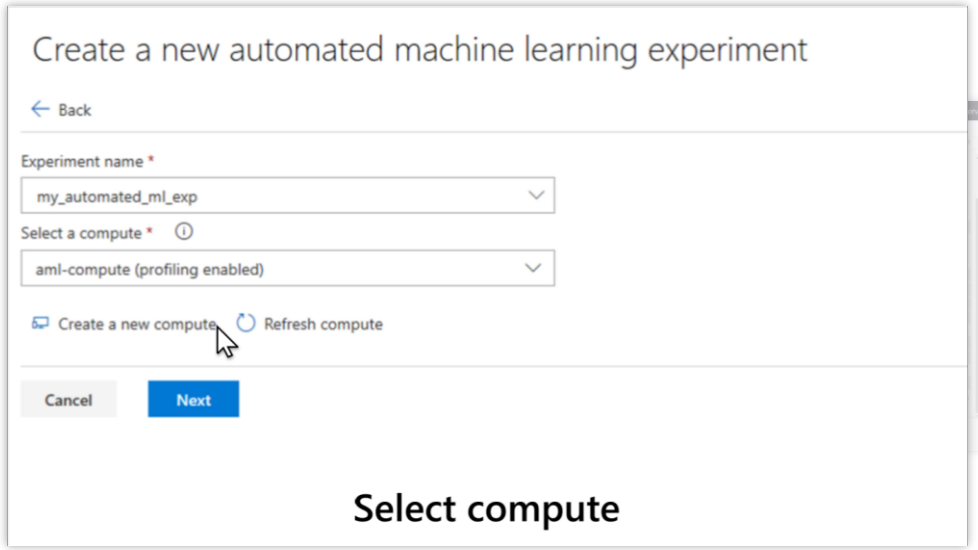
Visual Interface

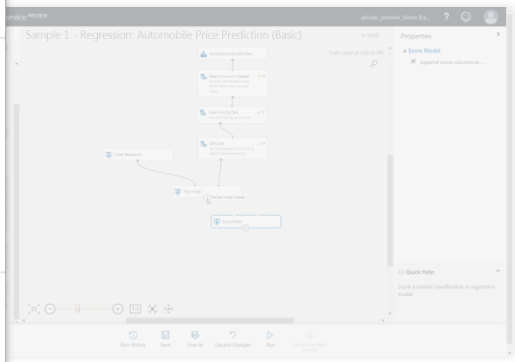


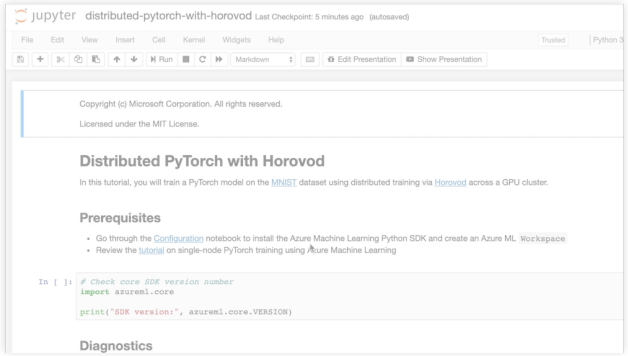
Machine Learning Notebooks

Automated ML UI

New capabilities in Azure Machine Learning service







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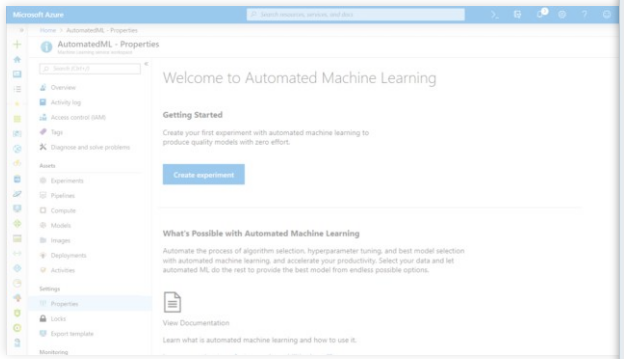

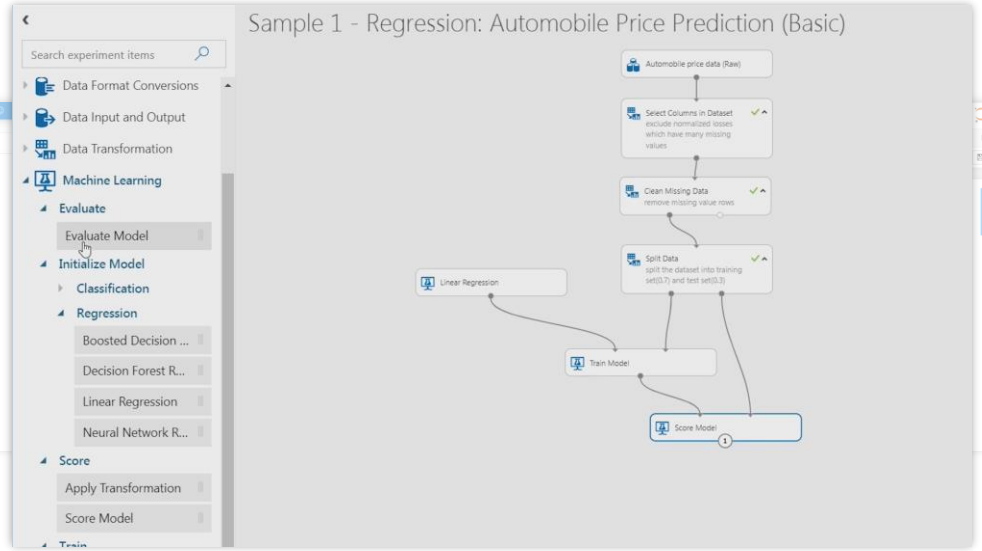

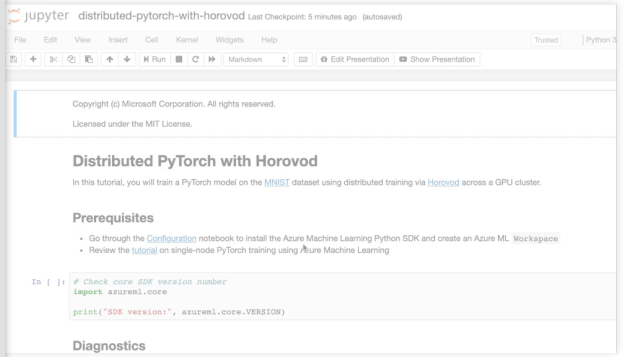

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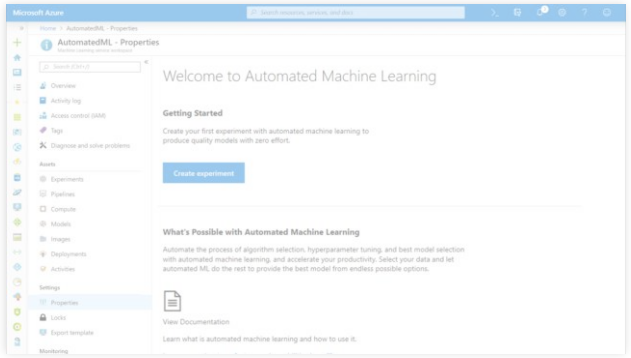

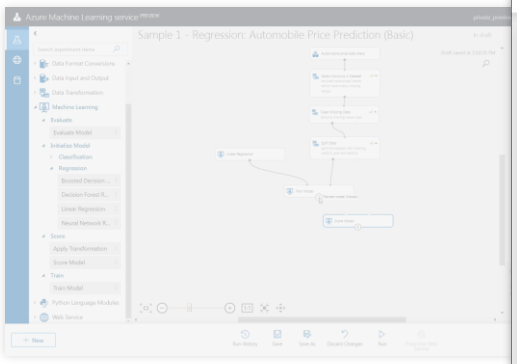

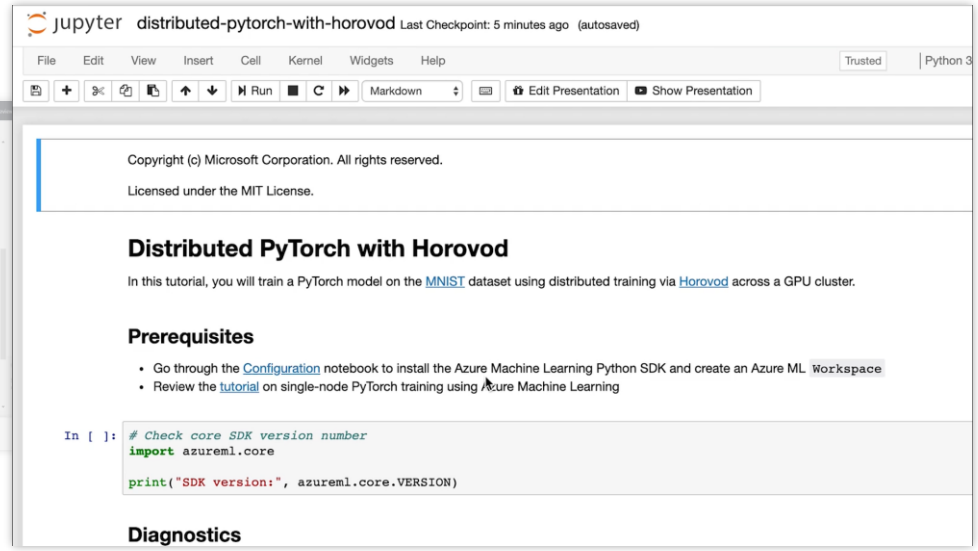

Microsoft

Thank you!