

Azure Machine Learning



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Agenda

Azure Machine Learning Services

AutoML

Notebook VM

Visual Interface

Demo: Jupyter Notebook (local / remote proc)

Labs: Azure Notebooks

Familiar Data Science tools

Choose any python development environment



Visual Studio Code



Azure Notebooks



Jupyter



PyCharm

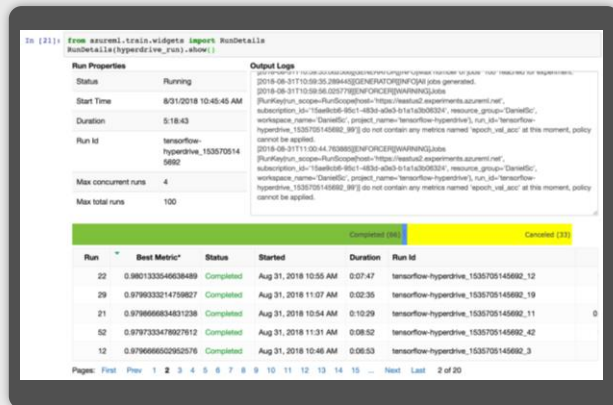


Zeppelin

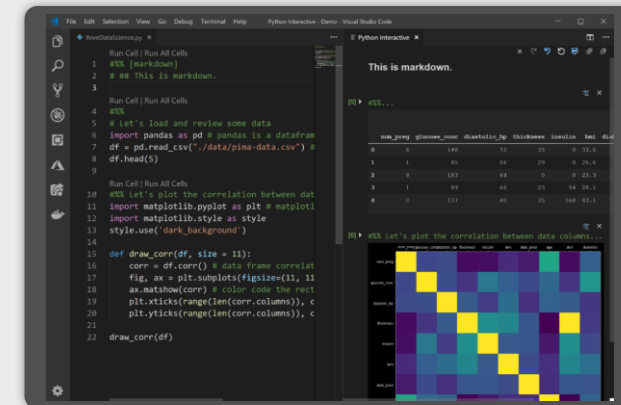


Command line

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>

Authoring Experiences in Azure Machine Learning Services

Azure Machine Learning Web Experience (Preview)

Quickly prep data, train, and deploy machine learning models.
Improve productivity and costs with autoscaling compute and pipelines.

Sign in



<https://ml.azure.com>



Authoring Experiences in Azure Machine Learning Services

Preview

Microsoft Azure | Machine learning

MachineLearningServicesWS > Home

Home

Author

Automated ML

Visual Interface

Notebooks

Assets

Datasets

Experiments

Models

Endpoints

Manage

Compute


Datastores

Notebook VMs


Welcome!

+


Create new ▾



Automated ML
Automatically train and tune a model using a target metric.
[Start now](#)




Visual interface
Drag-and-drop interface from prepping data to deploying models.
[Start now](#)




Notebooks
Code with Python SDK and run sample experiments.
[Start now](#)

My recent resources

Runs

Run Number	Experiment	Updated Time	Status
<div> No runs to display</div>			

<https://ml.azure.com>

Authoring Experiences in Azure Machine Learning Services



Automated
Machine Learning



Visual Interface



Notebooks



Authoring Experiences in Azure Machine Learning Services



Automated
Machine Learning



Visual Interface



Notebooks

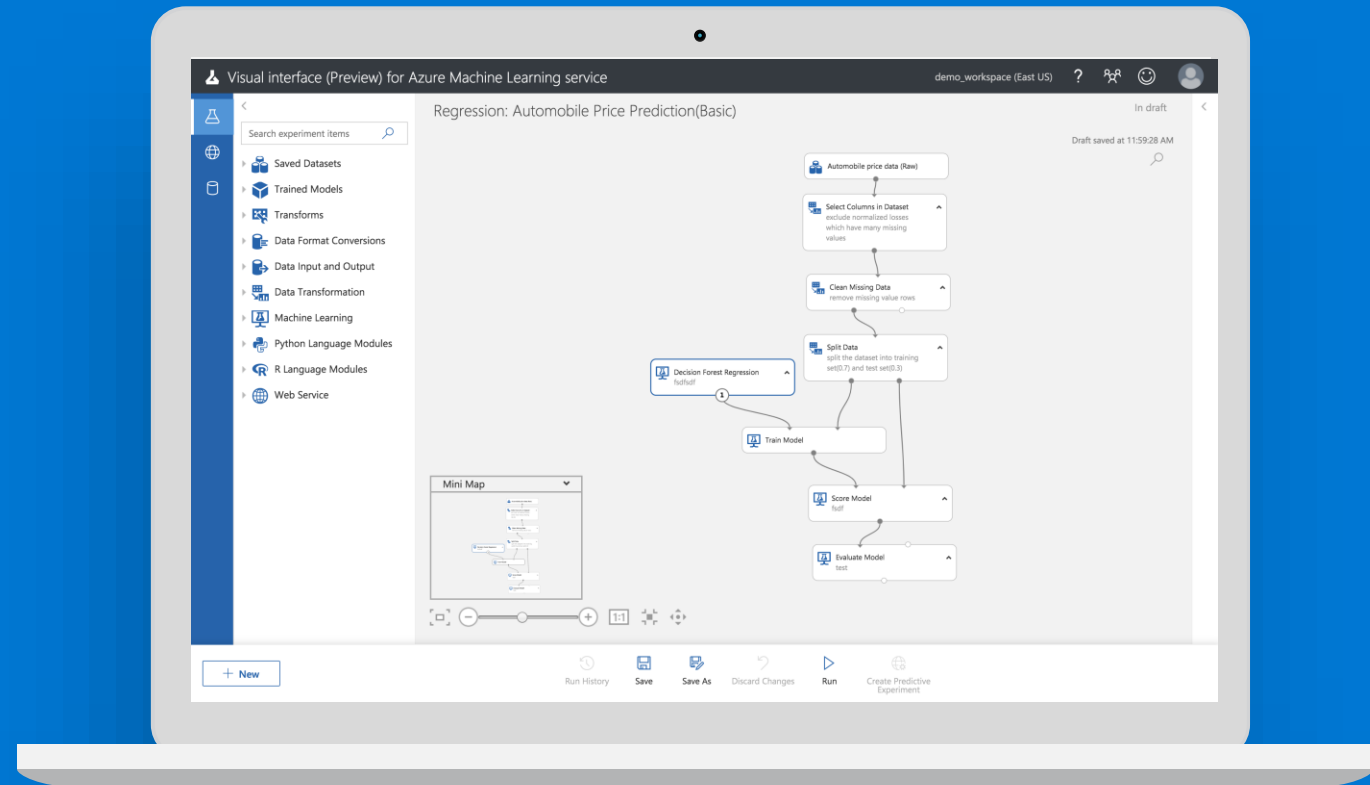




Visual Interface for Azure Machine Learning service

Visual workflow to build, test,
and deploy ML models more
easily and efficiently

<https://ml.azure.com>



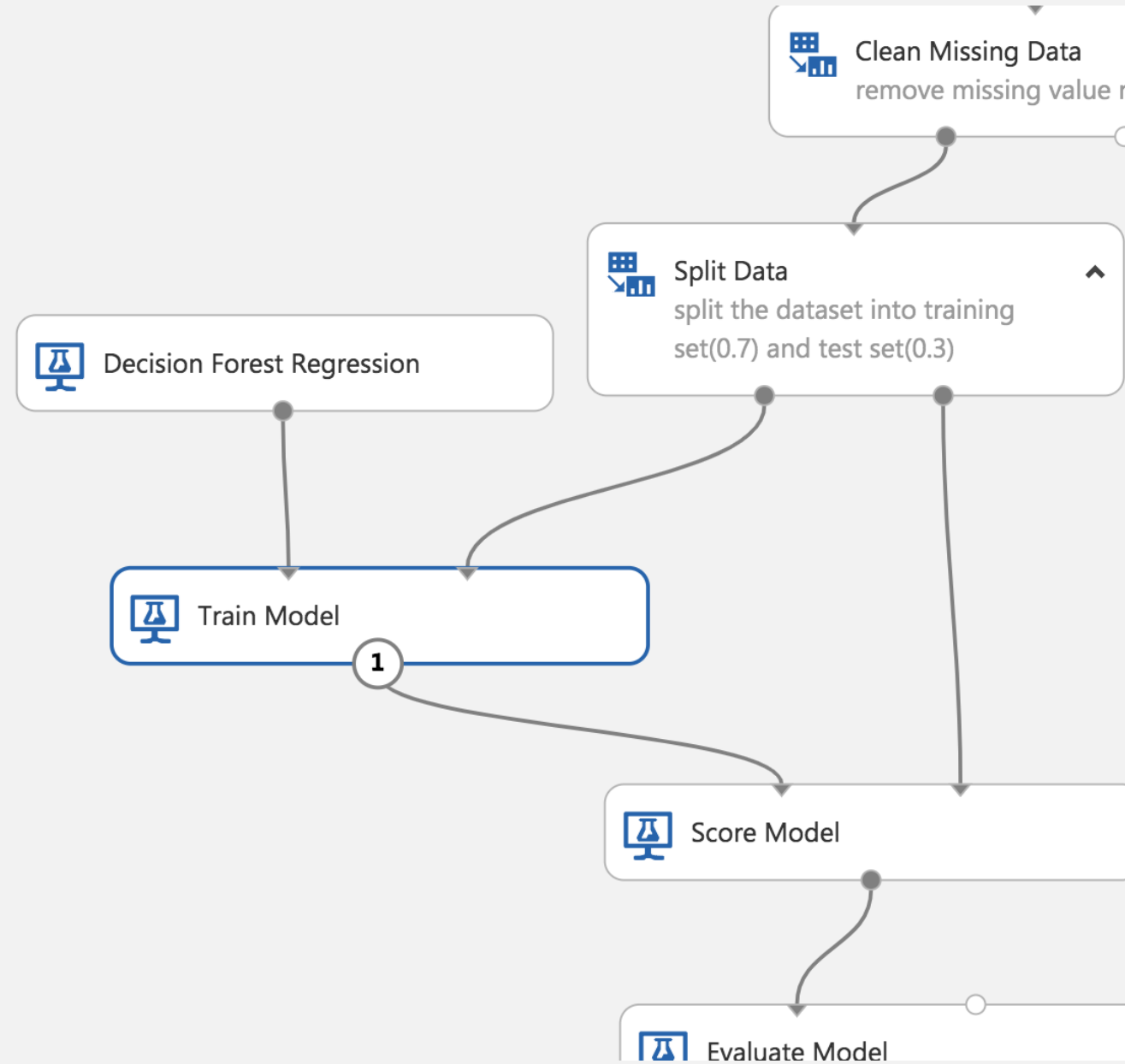
Demo

Visual Interface
for Azure Machine Learning service

<https://ml.azure.com>

Visual Interface

- Drag-n-drop
- Built-in modules
- Data visualization
- Model evaluation



Best from AML service

- Bring your own compute

- Scale align with data growth or model complexity

- Auto cool down for saving cost

- Deploy to your own environment

- Run history & versioning

- Debuggability

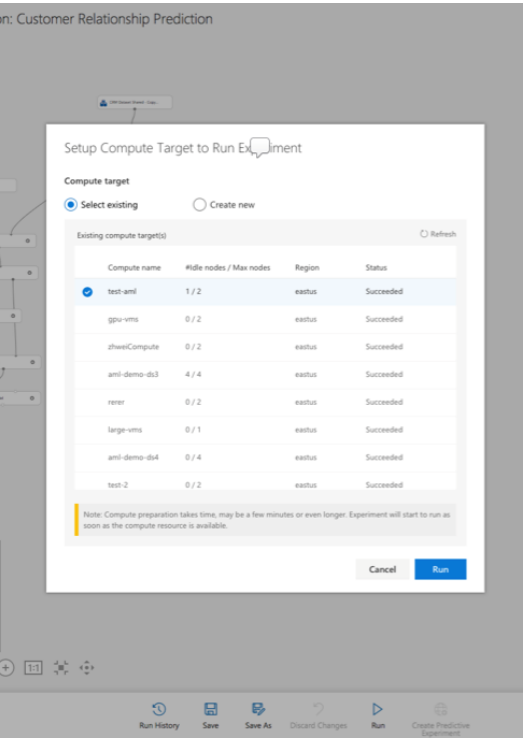


The screenshot displays the Azure Machine Learning (AML) environment. In the background, a workflow is visible with steps: 'CRM Dataset Shared - Copy...', 'CRM Churn Labels Shared', 'Add Columns', 'Split Data', 'Train Model', 'Score Model', and 'Evaluate Model'. A 'Map' view is also shown at the bottom left. Overlaid on this is a dialog box titled 'Setup Compute Target to Run Experiment'. The dialog has two radio buttons: 'Select existing' (which is selected) and 'Create new'. Below these is a table of 'Existing compute target(s)'. The table has columns for 'Compute name', '#Idle nodes / Max nodes', 'Region', and 'Status'. The first row, 'test-aml', is selected with a blue checkmark. At the bottom of the dialog are 'Cancel' and 'Run' buttons. A note at the bottom of the table states: 'Note: Compute preparation takes time, may be a few minutes or even longer. Experiment will start to run as soon as the compute resource is available.'

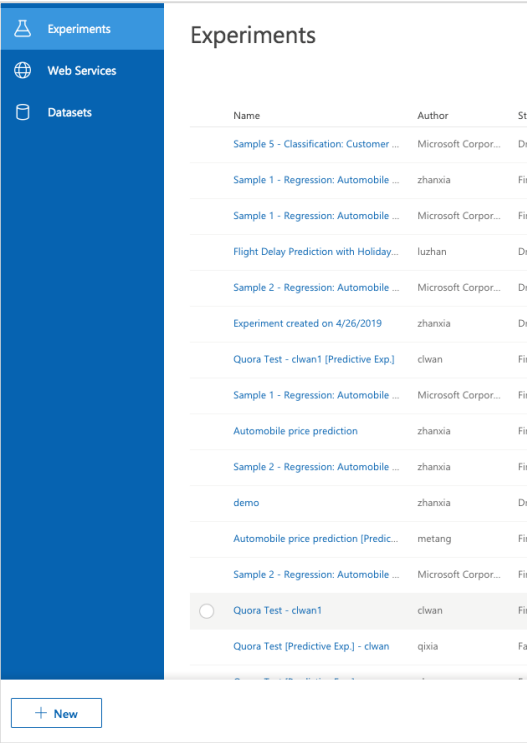
Compute name	#Idle nodes / Max nodes	Region	Status
test-aml	1 / 2	eastus	Succeeded
gpu-vm	0 / 2	eastus	Succeeded
zhweiCompute	0 / 2	eastus	Succeeded
aml-demo-ds3	4 / 4	eastus	Succeeded
rerer	0 / 2	eastus	Succeeded
large-vm	0 / 1	eastus	Succeeded
aml-demo-ds4	0 / 4	eastus	Succeeded
test-2	0 / 2	eastus	Succeeded

Fully Integrated with AML Service

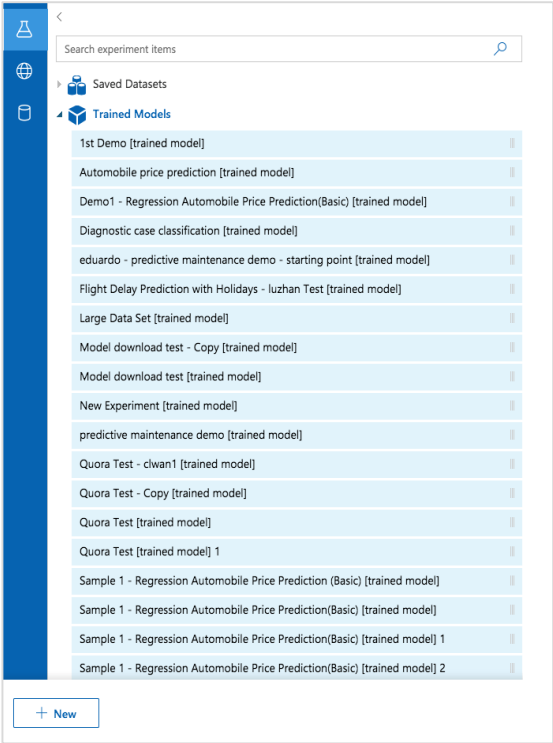
Computes



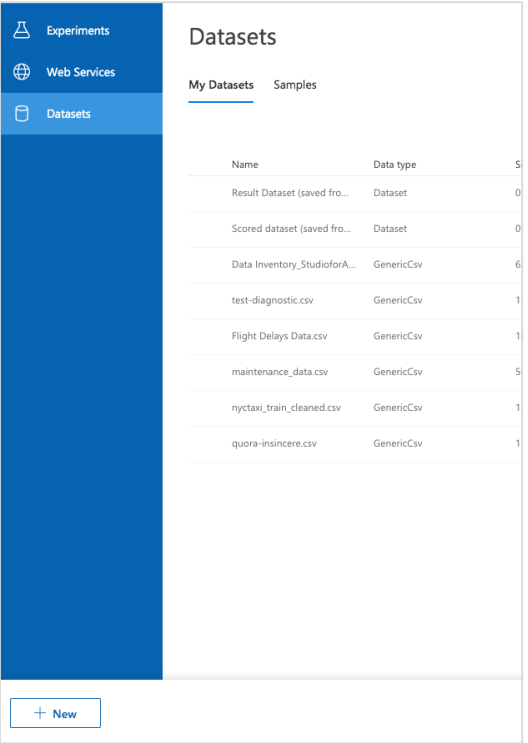
Experiments



Models



Web Services



Visual Interface



Fully Integrated with AML Service

Computes

Experiments Pipelines Compute Models Images Deployments Activi

Compute

+ Add Compute Refresh Delete Detach

<input type="checkbox"/>	NAME ↕	TYPE ↕	PROVISIONING STA
<input type="checkbox"/>	DefaultAKS	Kubernetes Service	Succeeded
<input type="checkbox"/>	Secure-AKS	Kubernetes Service	Failed
<input type="checkbox"/>	mem140GB	Machine Learning Compute	Succeeded (0 node
<input type="checkbox"/>	Basic	Machine Learning Compute	Succeeded (0 node
<input type="checkbox"/>	default-compute	Machine Learning Compute	Succeeded (0 node
<input type="checkbox"/>	test-compute	Machine Learning Compute	Succeeded (0 node

Experiments

Experiments Pipelines Compute Models Images Deployments Activi

Experiments

Refresh

NAME ↕
Quora_Test_-_clwan1_Predictive_Exp_...
Automobile_price_prediction_Predict
Automobile_price_prediction
Experiment_created_on_4_24_2019
Quora_Test_-_clwan1
Quora_Test_Predictive_Exp_-_clwan
Sample_3_-_Classification_Credit_Ri
Quora_Test_-_Copy_Predictive_Exp_...
Experiment_created_on_4_18_2019
Quora_Test_-_Copy
Quora_Test_Predictive_Exp_...
Quora_Test
Tutorial_-_Predict_Automobile_Price_...
Tutorial_-_Predict_Automobile_Price
Taxi_Weather_Join_Test
Experiment_created_on_4_16_2019

Models

Experiments Pipelines Compute Models Images Deployments Activities

Models

Refresh Create Image Add Model Delete

<input type="checkbox"/>	NAME	VERSION	DESCRIPTION
<input type="checkbox"/>	amlstudio-sample-1---regress...	3	Sample 1 - Regression: Autom
<input type="checkbox"/>	amlstudio-quora-test---clwan1	1	Quora Test - clwan1 [Predicti
<input type="checkbox"/>	amlstudio-sample-2---regres...	2	Sample 2 - Regression: Autom
<input type="checkbox"/>	amlstudio-automobile-price-...	1	Automobile price prediction [f
<input type="checkbox"/>	amlstudio-eduardo---predicti...	1	eduardo - predictive maintene
<input type="checkbox"/>	amlstudio-quora-test--predicti	1	Quora Test [Predictive Exp.]
<input type="checkbox"/>	amlstudio-tutorial---predict-a	2	Tutorial - Predict Automobile
<input type="checkbox"/>	amlstudio-tutorial---predict-a	1	Tutorial - Predict Automobile
<input type="checkbox"/>	amlstudio-predictive-mainte...	1	predictive maintenance demo
<input type="checkbox"/>	AutoML4646c1e90best	1	Automated Machine Learning

Back

Web Services

Experiments Pipelines Compute Models Images Deployments

Deployments

Refresh Edit Delete

<input type="checkbox"/>	NAME	LAST UPDATED	D
<input type="checkbox"/>	amlstudio-7d3998f76b27448ea...	04/28/2019, 6:41:25 AM UTC	S
<input type="checkbox"/>	amlstudio-0b43d7388e4c461e...	04/26/2019, 3:07:20 AM UTC	C
<input type="checkbox"/>	amlstudio-88349c67064d474e...	04/25/2019, 9:52:44 AM UTC	S
<input type="checkbox"/>	amlstudio-b8fe35b8a9a5467eb...	04/25/2019, 4:20:42 AM UTC	A
<input type="checkbox"/>	amlstudio-26696e005d1e420e...	04/18/2019, 10:03:22 PM UTC	e
<input type="checkbox"/>	amlstudio-77eb563356ac4cd9...	04/18/2019, 11:58:12 AM UTC	C
<input type="checkbox"/>	amlstudio-d63f4bf44ea94b698...	04/18/2019, 6:04:58 AM UTC	T
<input type="checkbox"/>	amlstudio-caf3ecf6056b48eaa...	04/18/2019, 3:18:51 AM UTC	p
<input type="checkbox"/>	amlstudio-eea1c27db7a649329...	04/15/2019, 2:03:49 AM UTC	N
<input type="checkbox"/>	amlstudio-3ab57ae936f548dd...	04/03/2019, 4:48:03 AM UTC	S



Easy Deployment

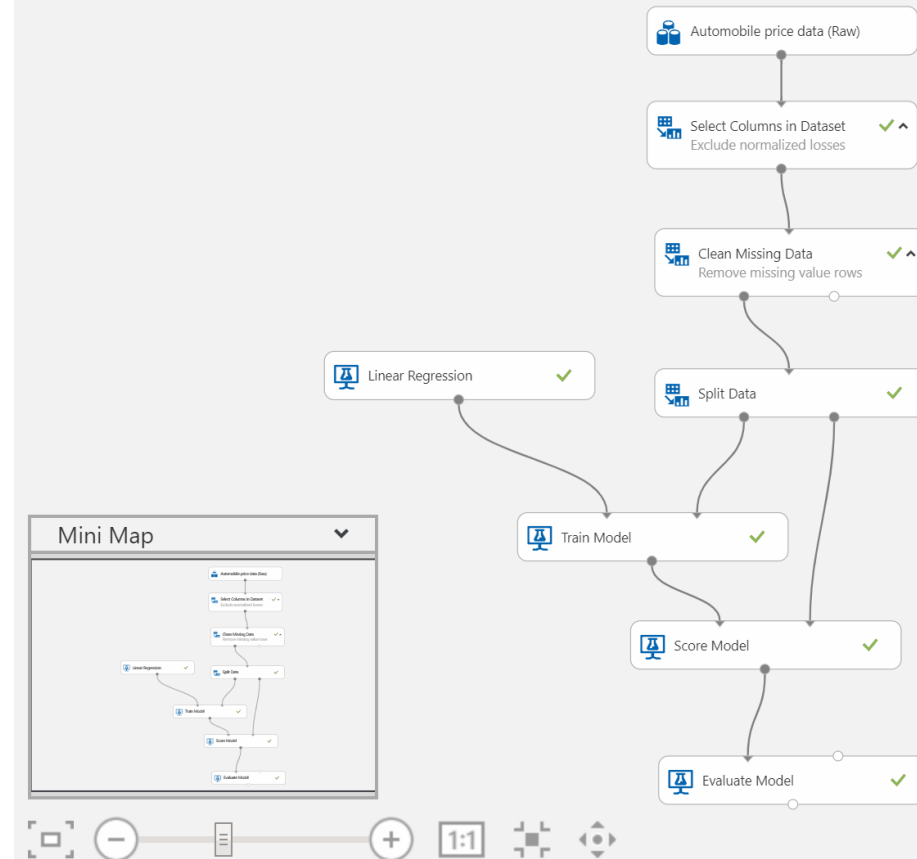
- A few clicks
- Automatic generate scoring file
- Model registration
- Build image
- AKS for scale

Preview) for Azure Machine Learning service

demo_workspace (East US)

Automobile price prediction

Finished



Run History

Save

Save As

Discard Changes

Run

Predictive Web
Service

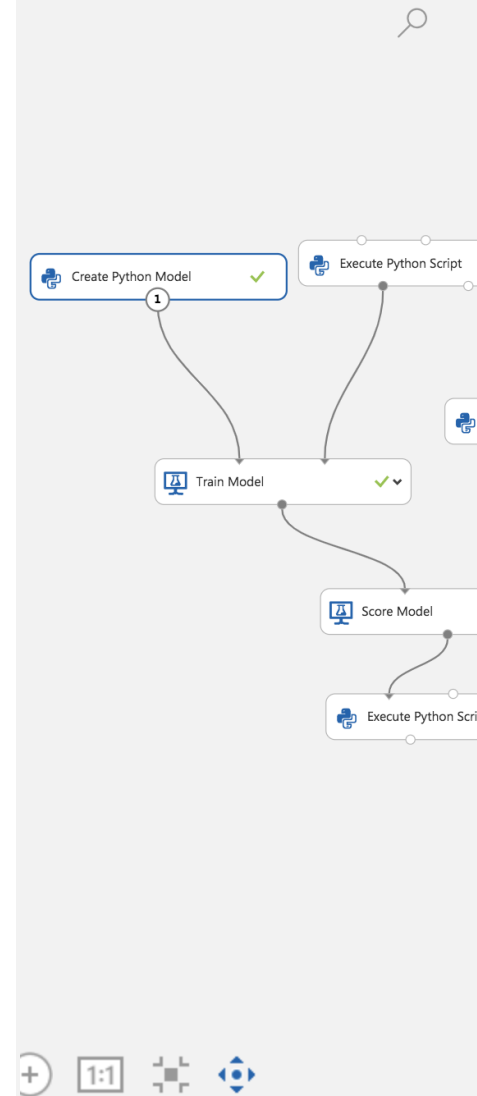


Custom Code

Run Python code

Create Model

on - PyModel Finished running ✓



Properties

▲ Create Python Model

Python script

```
2 from __future__ import print_function
3 import pickle
4 import time
5 import math
6 import csv
7 import sys
8 from PIL import Image
9 import io
10
11 import pandas as pd
12 import pyarrow.parquet as pq
13 import torch
14 import torch.nn as nn
15 import torch.optim as optim
16 import torch.nn.functional as F
17 from torch.utils.data import DataLoader
18 from torch.utils.data import Dataset
19 import torchvision.transforms as transforms
20
21
22 class CNNSetting:
```

Start time 4/25/2019 6:38:32 PM
End time 4/25/2019 6:38:59 PM
Elapsed time 0:00:26.999
Status code Finished
Status details None

[View output log](#)

? Quick Help



History

Save

Save As

Discard Changes

Run

Create Predictive
Experiment

Managed Notebook VM

Managed Notebook VM

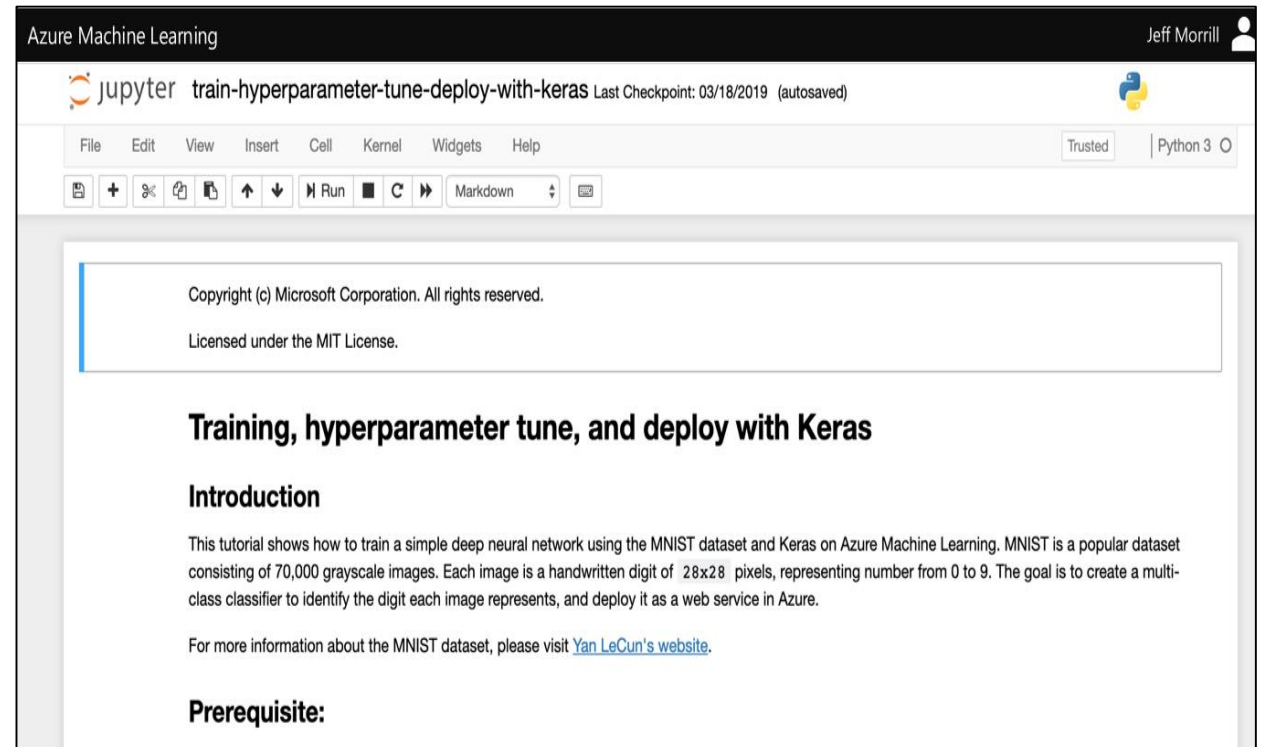
Service/feature description

Azure Machine Learning hosted notebooks provide a code-first experience where users can perform every operation supported by the Azure Machine Learning Python SDK using a familiar Jupyter notebook.

Service/feature value proposition

Hosted notebooks simplify the getting-started process by providing a secure, enterprise-ready environment for ML practitioners. In the private preview customers will be able to: access a notebook integrated into the Azure ML workspace, use preconfigured Azure ML notebooks with no set up required, fully customize their notebook VMs including having the ability to add packages and drivers.

Documentation: [Quickstart](#)

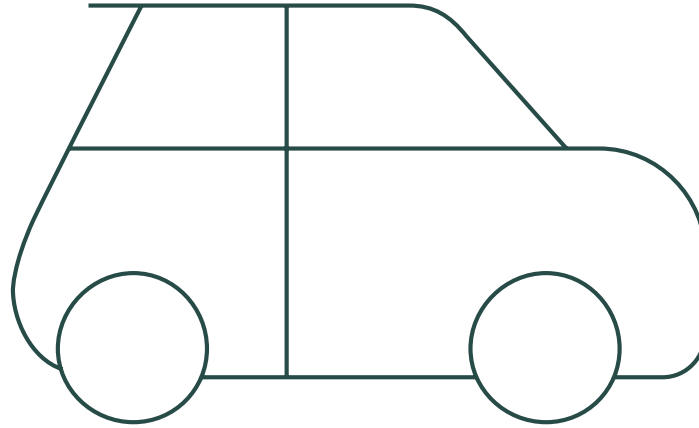


Automated Machine Learning

AutoML

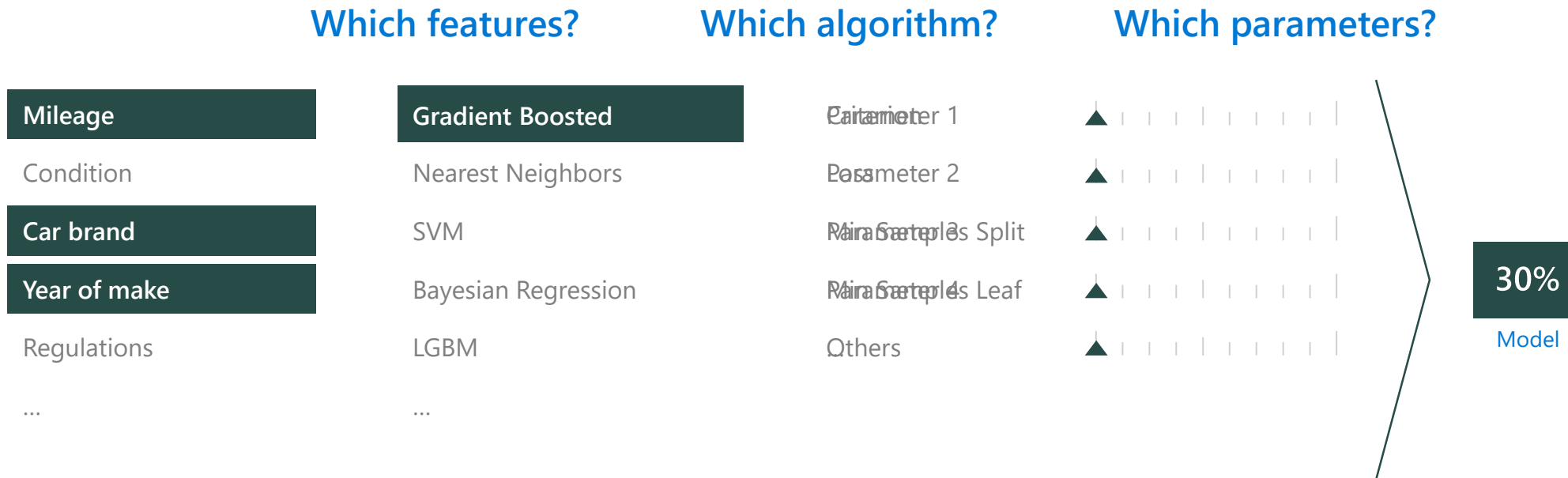
Azure Machine Learning

Automated machine learning



How much is this car worth?

Model creation is typically a time consuming process



Model creation is typically a time consuming process

Which features?

Mileage

Condition

Car brand

Year of make

Regulations

...

Which algorithm?

Gradient Boosted

Nearest Neighbors

SGD

Bayesian Regression

LGBM

...

Which parameters?

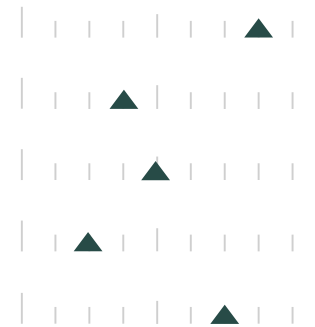
~~Critereion~~
Neighbors

~~Weights~~

~~Min Samples Split~~

~~Min Samples Leaf~~

~~XYX~~



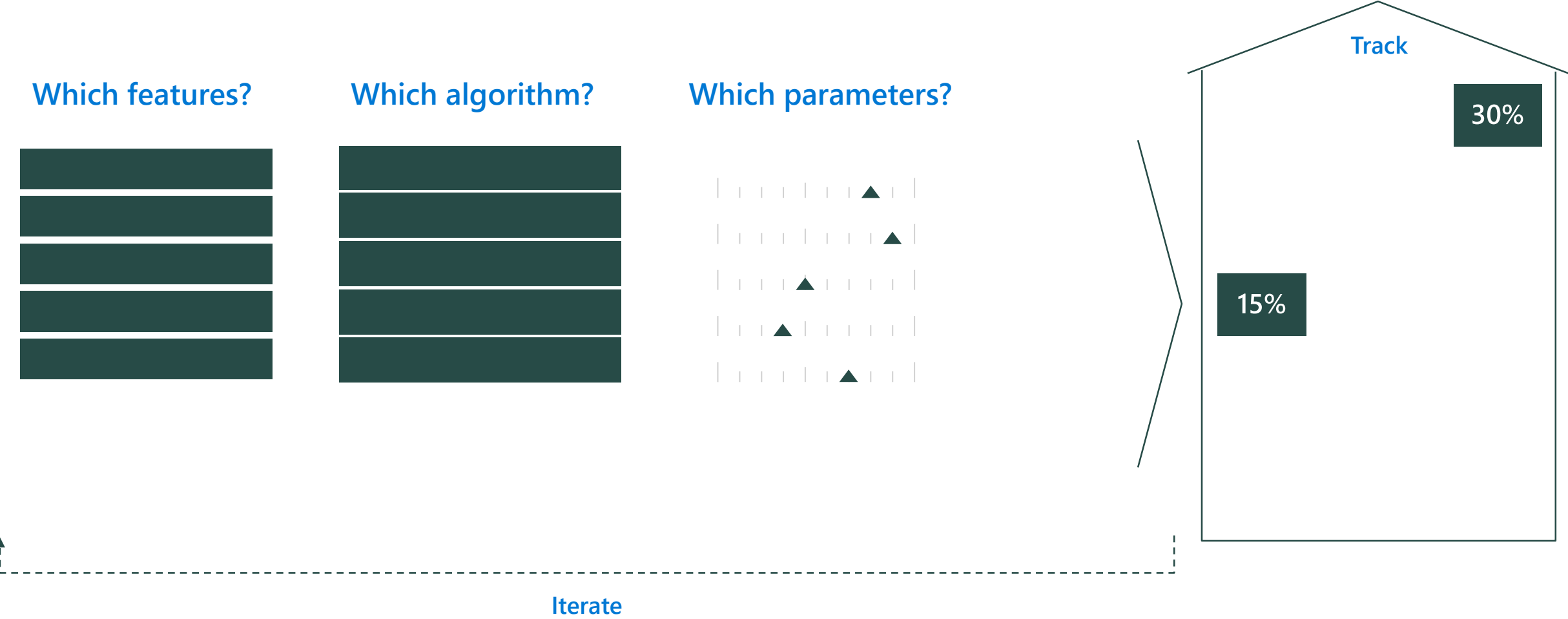
Track

30%

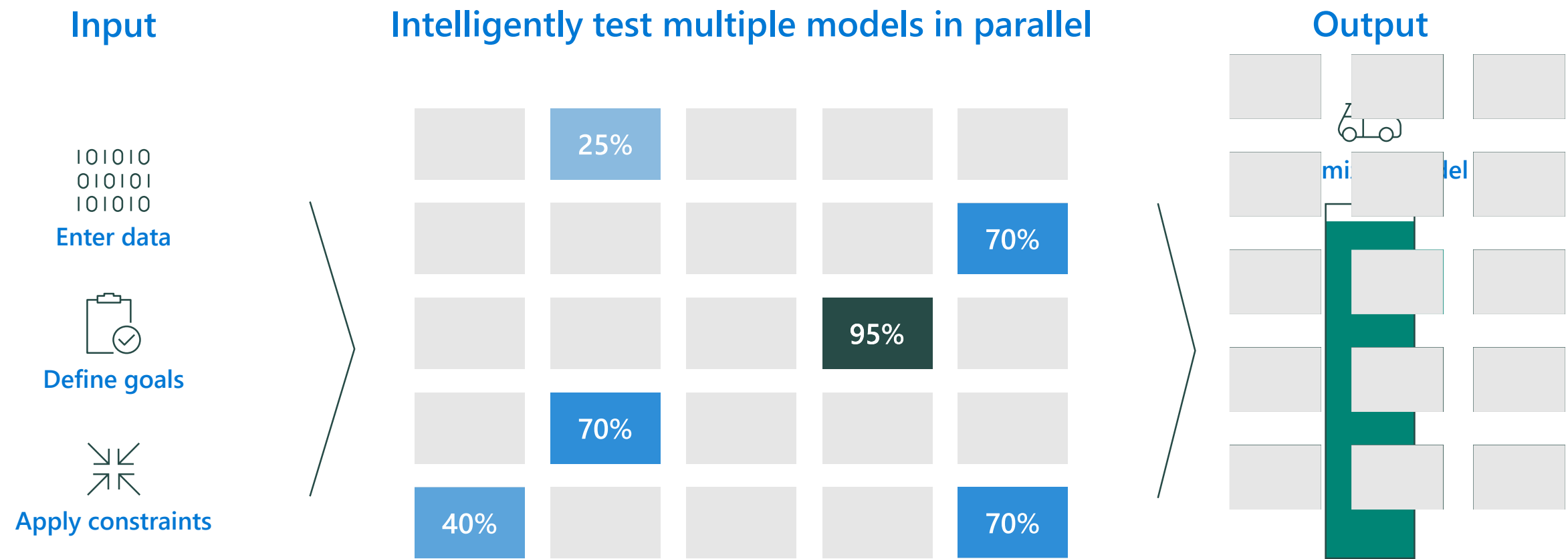
Model

Iterate

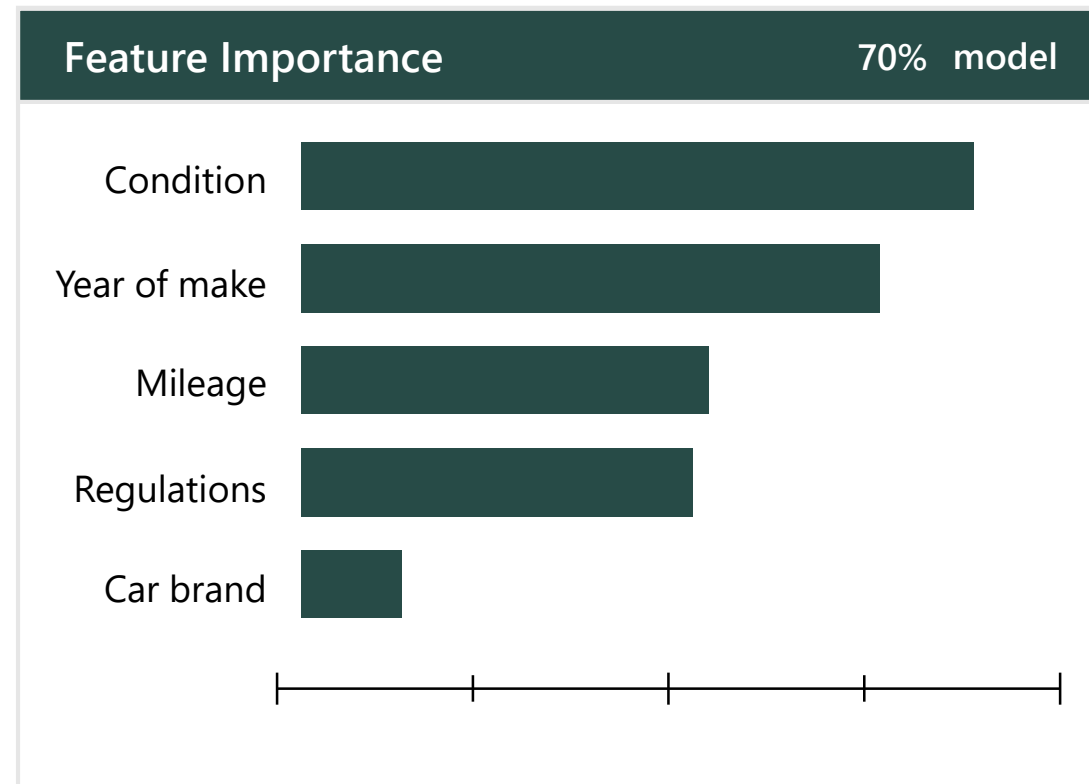
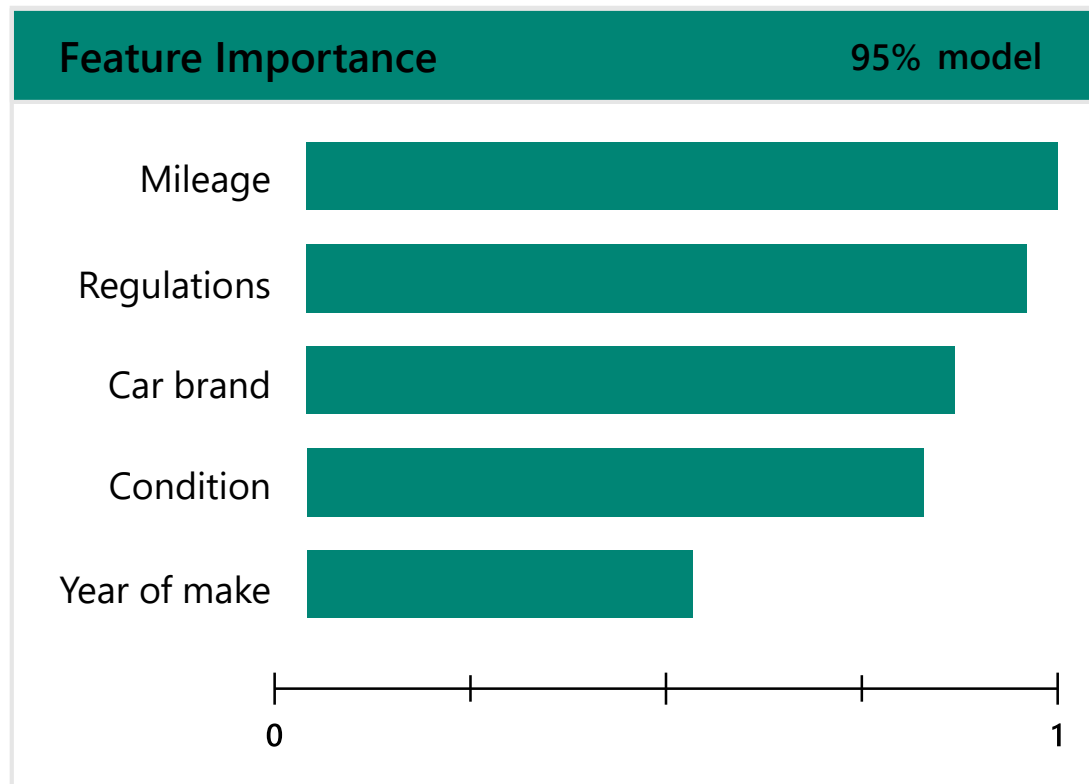
Model creation is typically a time consuming process



Automated Machine Learning accelerates model development



Understand the inner workings of ML by analyzing feature importance



Enable model explain-ability for every automated ML iteration, not just the optimal model

FPGA hardware accelerated models

Service/feature description

FPGAs are a machine learning inferencing option, based on Project Brainwave, a hardware architecture from Microsoft. Data scientists and developers can use FPGAs to accelerate real-time AI calculations.

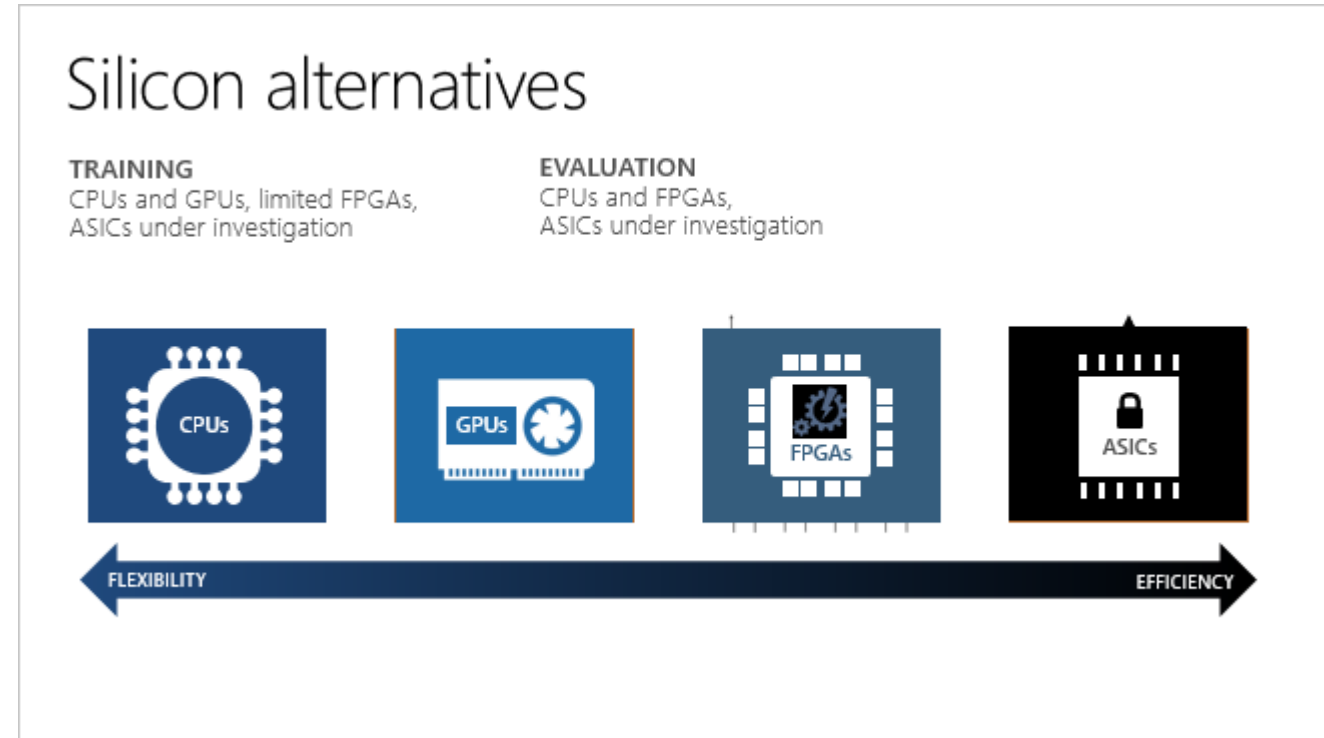
Service/feature value proposition

FPGAs offer performance, flexibility, and scale and are available only through Azure Machine Learning. They make it possible to achieve low latency for real-time inferencing requests, mitigating the need for asynchronous requests (batching).

Other important points or upcoming milestones such as:

FPGAs on Azure Machine Learning are going to build additional algorithm support.

Documentation: [Overview](#)



<https://github.com/Azure/MachineLearningNotebooks/tree/master/how-to-use-azureml/deployment/accelerated-models/>

MLOps

Service/feature description

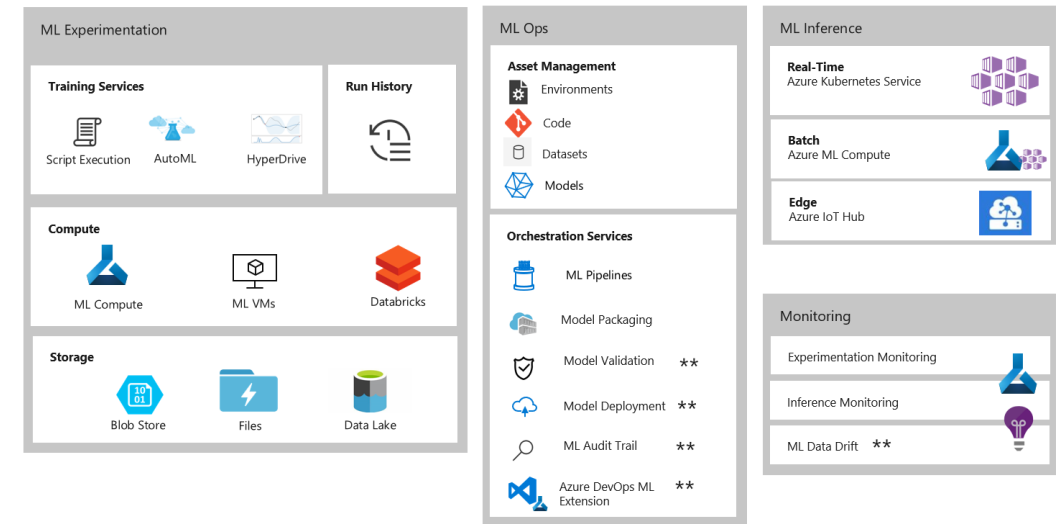
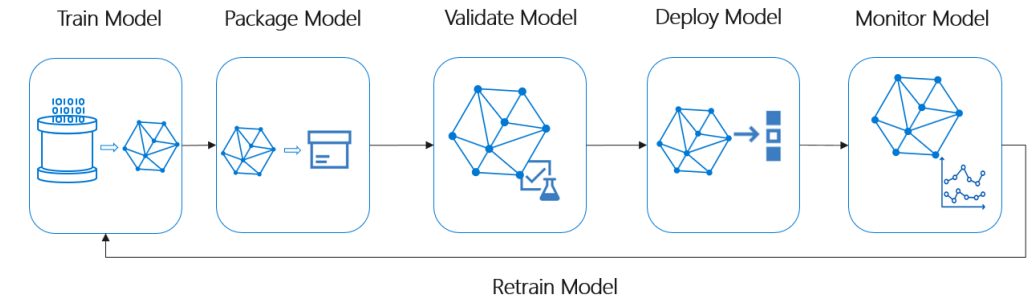
Azure Machine Learning has a mission to simplify the end to end machine learning lifecycle, including data prep, model training, model packaging, validation and model deployment. To enable this, we are launching the following services:

- **Environment, Code & Data versioning** services, integrated into the **Azure ML Audit Trail**
- The **Azure DevOps extension for Machine Learning** & the **Azure ML CLI**
- A simplified experience for **validating** and **deploying** ML models

Value proposition

Microsoft enables you to adopt ML quickly by accelerating your time to a production-ready, cloud-native ML solution. Production readiness is defined as:

- Reproducible model training pipelines
- Provably validate, profile and track model before release
- Enterprise-class rollout and integrated observability including all necessary respecting all appropriate security guidelines



Documentation: [Model Management](#) | [How & where to deploy](#) | [ML CLI](#) | [CI/CD workflow](#)

Model interpretability in the AzureML SDK

Service/feature description

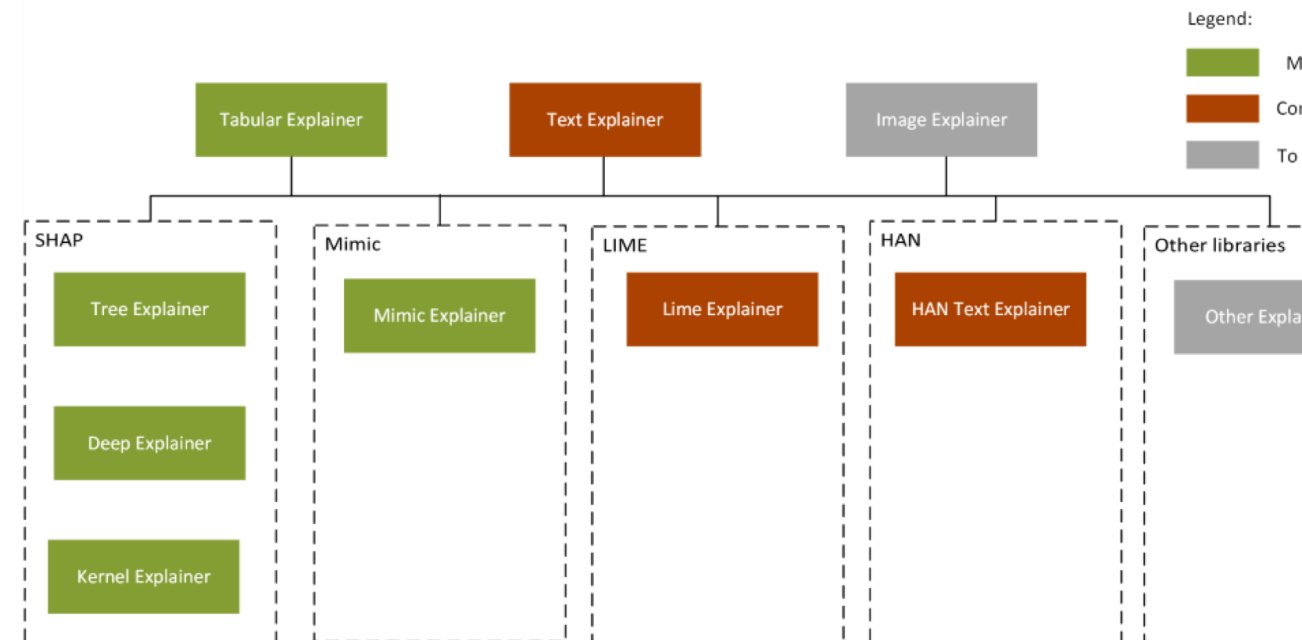
Machine learning interpretability allows data scientists to explain machine learning models globally on all data, or locally on a specific data point using the state-of-art technologies in an easy-to-use and scalable fashion.

Service/feature value proposition

Machine Learning interpretability incorporates technologies developed by Microsoft and proven third-party libraries (for example, SHAP and LIME). The SDK creates a common API across the integrated libraries and integrates Azure Machine Learning services. Using this SDK, you can explain machine learning models globally on all data, or locally on a specific data point using the state-of-art technologies in an easy-to-use and scalable fashion.

Compete comparison/talking points

Documentation: [Overview & examples](#)



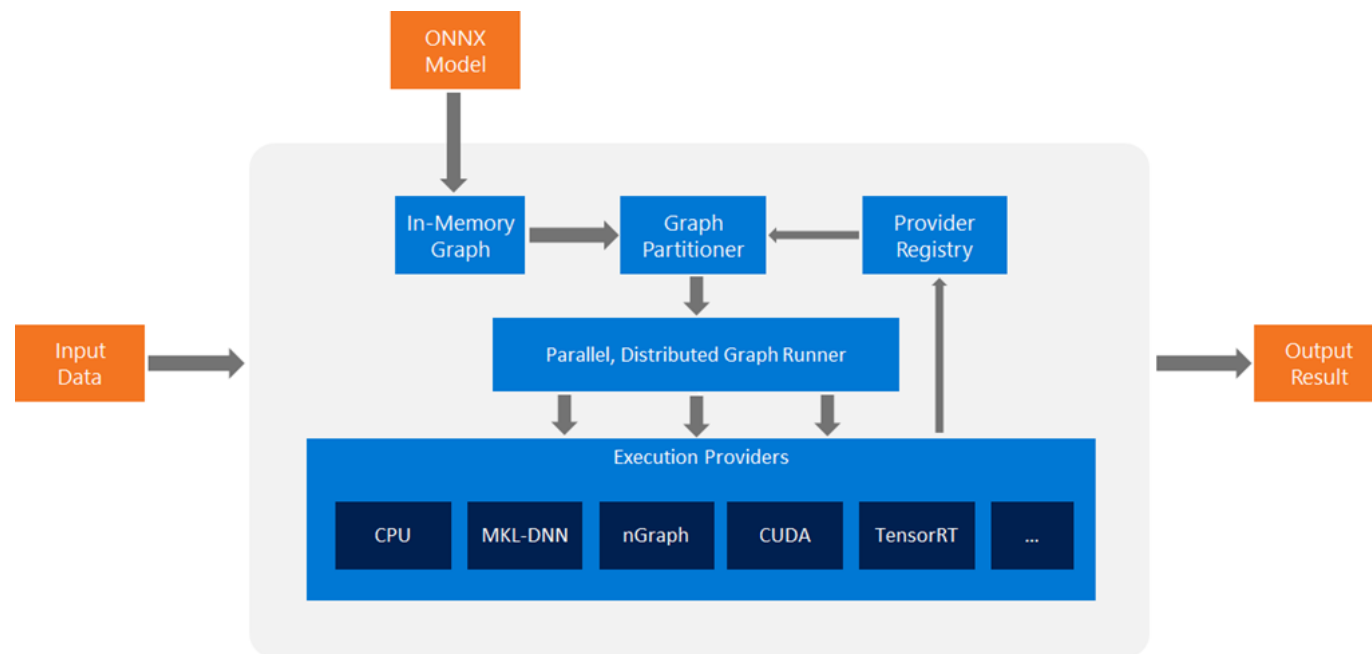
ONNX Runtime

Service/feature description We are excited to announce the GA of ONNX Runtime the NVIDIA TensorRT execution provider in [ONNX Runtime](#), enabling developers to easily leverage industry-leading GPU acceleration regardless of their choice of framework. Developers can accelerate inferencing of ONNX models, which can be exported or converted from PyTorch, TensorFlow, and many other popular frameworks.

Service/feature value proposition

ONNX Runtime together with its TensorRT execution provider accelerates the inferencing of deep learning models on NVIDIA hardware. This enables developers to run ONNX models across different flavors of hardware and build applications with the flexibility to target different hardware configurations. The architecture abstracts out the details of the hardware specific libraries that are essential to optimizing the execution of deep neural networks.

Documentation: [How-to](#)



Open Datasets

Service/feature description

Open Datasets are a collection of datasets from the public domain to accelerate the development of machine learning models built in Azure. Open Datasets integrates with Machine Learning Studio or can be accessed from python notebooks in Azure Machine Learning Service.

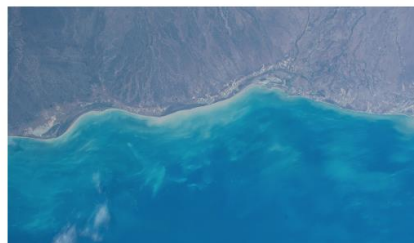
Service/feature value proposition

Azure Open Datasets offer good quality data from the public domain, which is often hard to find and expensive to curate. Data scientists will be more productive focusing on model building rather than data preparation.

Other important points or upcoming milestones such as:

- Improved SDK with enhanced AML SDK integration
- Many more datasets – looking for suggestions, please update dataset asks from your customers.

Featured Azure Open Datasets



[Historical Weather](#)

Worldwide data back to 2008, from the National Oceanic and Atmospheric Administration (NOAA)



[Weather Forecast](#)

Worldwide 15-day forecast data from NOAA



[Public Holidays](#)

Holidays of 116 countries, from 1970 to 2099

ML.NET

Service/feature description ML.NET 1.0 release is the first major milestone of a great journey in the open that started in May 2018 when we released ML.NET 0.1 as open source. Since then we've been releasing monthly, 12 preview releases plus this final 1.0 release.

Service/feature value proposition

ML.NET is an open-source and cross-platform machine learning framework for .NET developers. Using ML.NET, developers can leverage their existing tools and skillsets to develop and infuse custom AI into their applications by creating custom machine learning models for common scenarios like Sentiment Analysis, Recommendation, Image Classification and more.

You can use [NimbusML](#), the ML.NET Python bindings, to use ML.NET with Azure Machine Learning.

NimbusML enables data scientists to use ML.NET to train models in Azure Machine Learning or anywhere else they use Python. The trained machine learning model can easily be used in a .NET application with the ML.NET PredictionEngine like [this example](#).

Documentation: [ML.NET website](#)

```
Command Prompt
c:\demo\mlnet_cli>mlnet new --ml-task binary-classification --dataset ".\scenarios\sentiment_analysis\wikipedia-detox-250-line-all.tsv"
--label-column-name Sentiment --max-exploration-time 30
Exploring multiple ML algorithms and settings to find you the best model for ML task: binary-classification
For further learning check: https://aka.ms/mlnet-cli

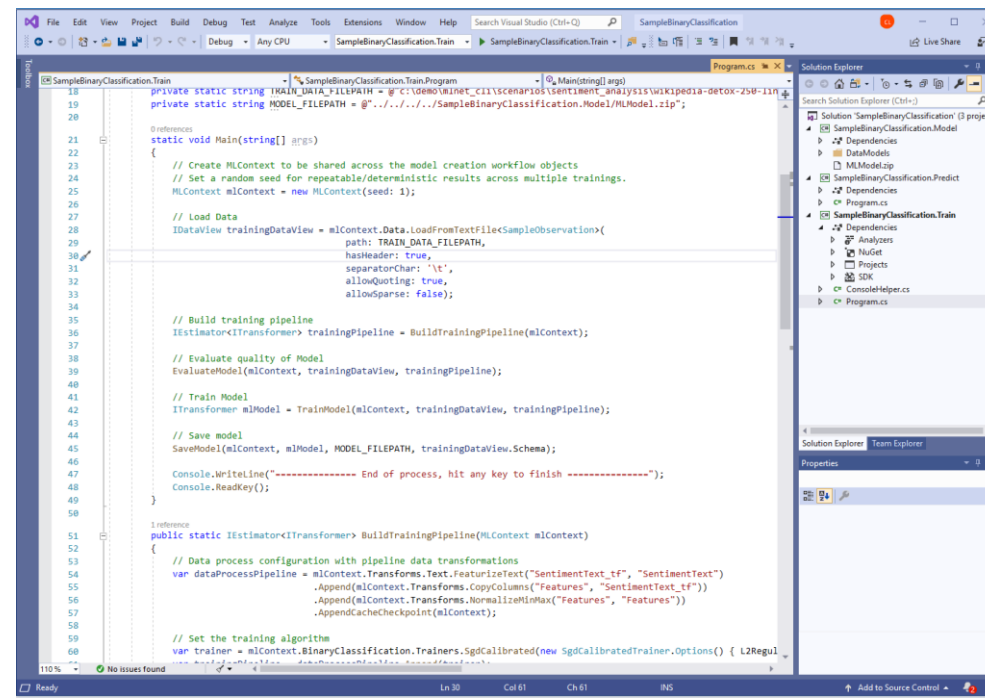
Best Accuracy: 0.8421, Best Algorithm: SgdCalibratedBinary, Last Algorithm: FastTreeBinary 00:00:34

=====Experiment Results=====
Summary
ML Task: binary-classification
Dataset: wikipedia-detox-250-line-all.tsv
Label : Sentiment
Exploration time: 30 Secs
Total number of models explored: 22

Top 5 models explored

Trainer                Accuracy    AUC    AUPRC    F1-score    Duration    #Iteration
1 SgdCalibratedBinary   0.8421     0.7500  0.8252    0.8889      0.7         18
2 FastTreeBinary        0.7895     0.7619  0.8464    0.8333      3.7         6
3 SgdCalibratedBinary   0.7895     0.7500  0.8076    0.8462      0.8         9
4 SgdCalibratedBinary   0.7895     0.7500  0.8252    0.8462      0.6         12
5 SgdCalibratedBinary   0.7895     0.7619  0.8161    0.8462      0.6         15

Generated trained model for consumption: c:\demo\mlnet_cli\SampleBinaryClassification\SampleBinaryClassification.Model\MLModel.zip
Generated C# code for model consumption : c:\demo\mlnet_cli\SampleBinaryClassification\SampleBinaryClassification.Predict
Generated C# code for model training : c:\demo\mlnet_cli\SampleBinaryClassification\SampleBinaryClassification.Train
```



Azure Notebooks

<https://notebooks.azure.com>

Ejemplos

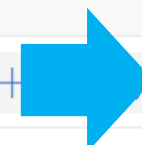
<https://github.com/Azure/MachineLearningNotebooks/>

LAB:

<https://notebooks.azure.com/bdwsantiago2019/projects/machinelearningnotebooks>

[Home](#) > My Projects

My Projects

[Run](#) [Download](#) [Delete](#)[Terminal](#)[Add Project](#)[Upload GitHub Repo](#)☒ ☐ Name

Status

Stars

Clones

Modified On

Created On



AzureNotebooks_BDWSCL2019

Running

0

0

Oct 12, 2019

Oct 12, 2019

Showing 1 project

<https://github.com/Azure/MachineLearningNotebooks>

Upload GitHub Repository

Create a project by uploading a repository from GitHub.

GitHub repository

<https://github.com/> Azure/MachineLearningNotebooks

☐ Clone recursively ?

Project Name

MachineLearningNotebooks

Project ID ?

bdwsantiago2019/projects/ machinelearningnotebooks

☒ Public

Private projects cannot be viewed by other users. Public projects can be viewed by anyone who has the URL. Public projects will also be listed in your profile. You can update this setting later if you change your mind.

Import

Cancel

Review

Azure Machine Learning Services

AutoML

Notebook VM

Visual Interface

Labs Jupyter Notebook (local / remote proc)

Labs Azure Notebooks

Gracias!!!!



Big Data Week Santiago



BIG DATA WEEK
A GLOBAL FESTIVAL OF DATA