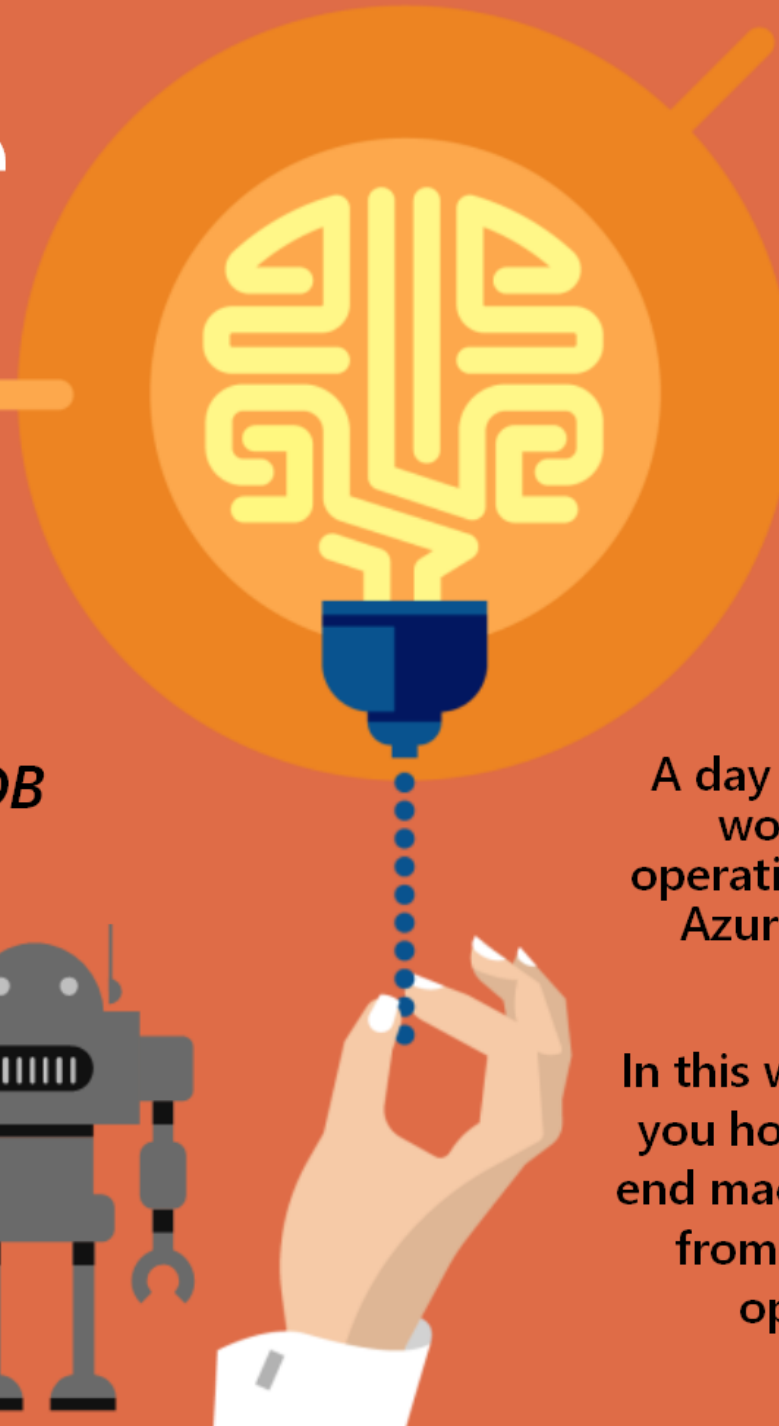
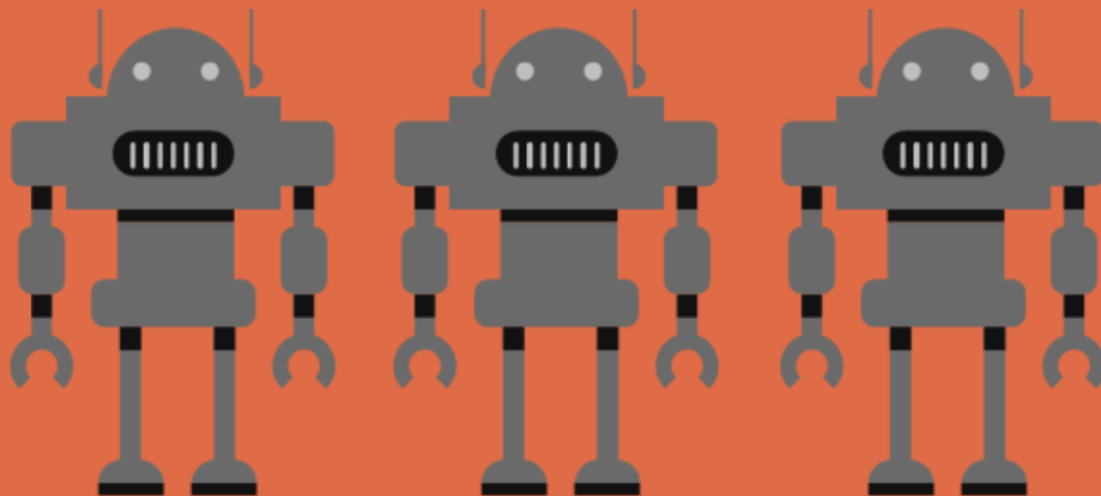


Azure Machine Learning Hackathon

10—5pm 17th April

Microsoft Reactor

70 Wilson Street London EC2A 2DB



A day of hands on learning workshop on how to operationalise a model using Azure Machine Learning Service.

In this workshop we will show you how to build an end-to-end machine learning pipeline from experimentation to operationalisation.



Introduction to Azure Machine Learning Service

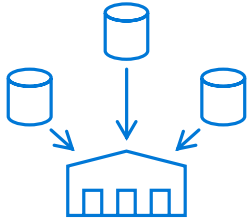
Fatos Ismali, Dr. Mufajjul Ali, Lorea Arrizabalaga, Holly Manley



How companies are transforming



Serving business users and end users with **intelligent** and **dynamic** applications



Build a unified and usable
data pipeline



Train ML and DL models to
derive insights



Operationalize models and
distribute insights at scale

Overview of Microsoft's Data Science & Machine Learning Portfolio

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



Scikit-Learn



ONNX

Productive services

To empower data science and development teams



Azure
Databricks



Azure Machine
Learning



Machine
Learning VMs

Powerful infrastructure

To accelerate deep learning



CPU



GPU

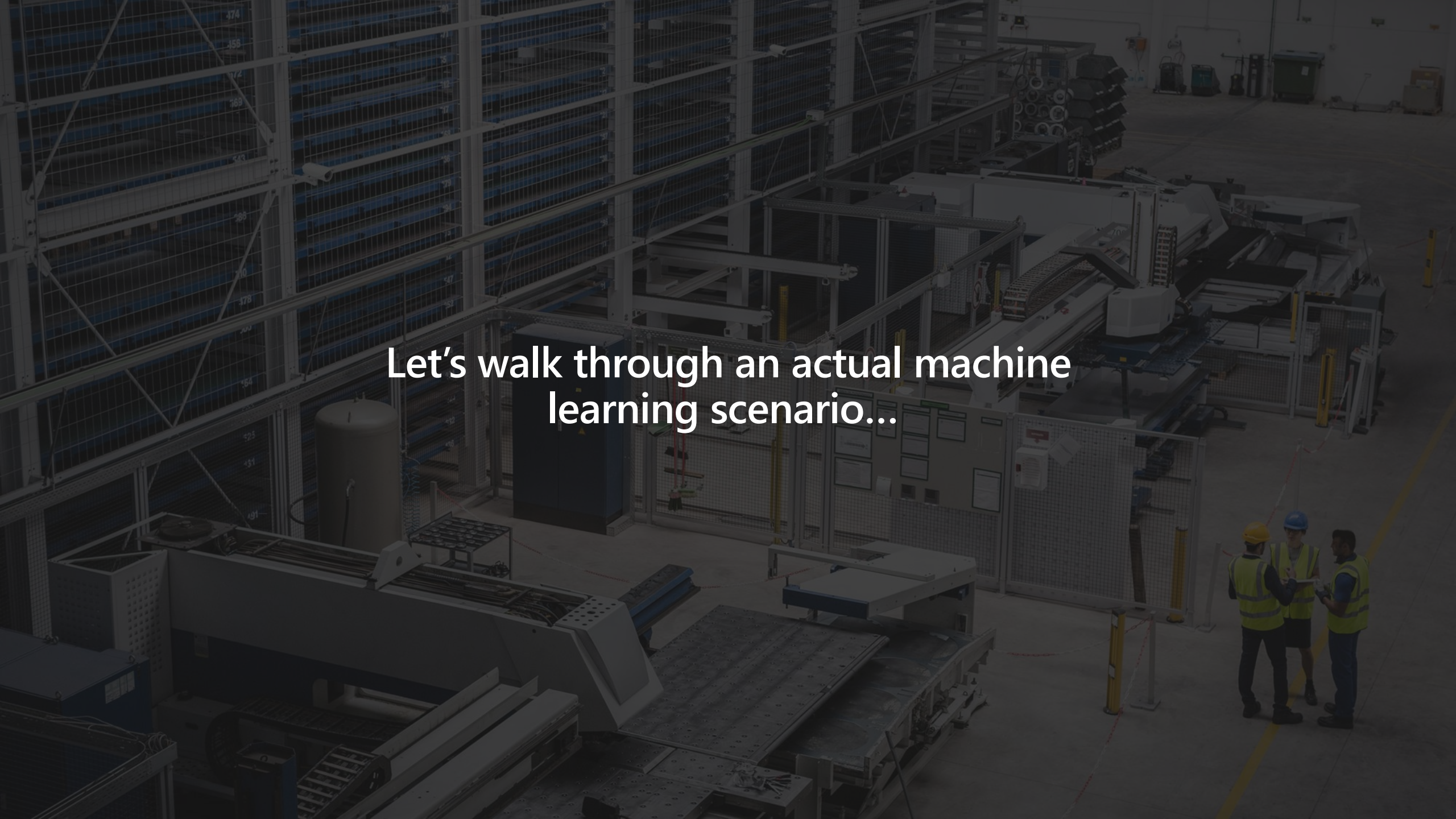


FPGA



From the Intelligent Cloud to the Intelligent Edge





Let's walk through an actual machine learning scenario...





Flammable equipment
near heat source

Missing equipment

No hardhat



No hardhat



How can we accurately identify hazardous situations with machine learning?

Machine Learning on Azure

Domain specific pretrained models

To simplify solution development



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From the Intelligent Cloud to the Intelligent Edge



Sophisticated pretrained models

Infuse apps with powerful, pre-trained AI models

Customize easily and tailor to your needs



Vision



Computer Vision | Video Indexer | Face | Content Moderator

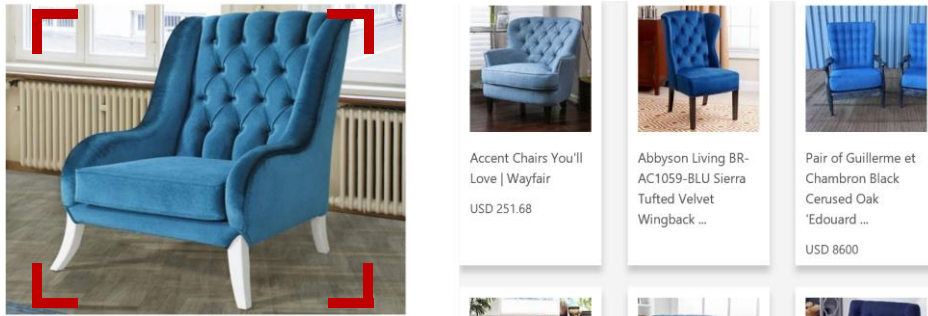


Language

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



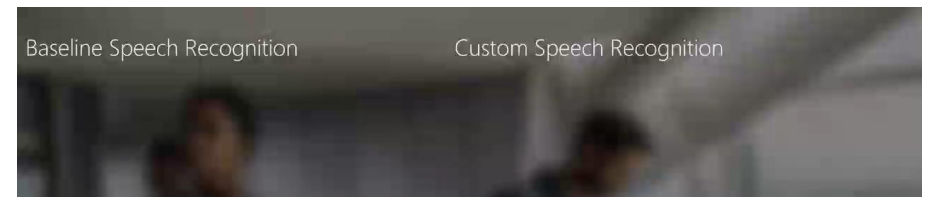
Bing Search



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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From the Intelligent Cloud to the Intelligent Edge



Familiar Data Science tools

Choose any python development environment



Visual Studio Code



Azure Notebooks



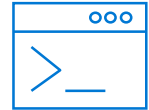
Jupyter



PyCharm

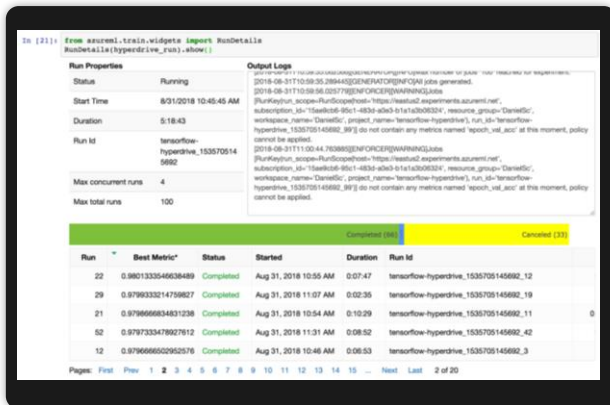


Zeppelin

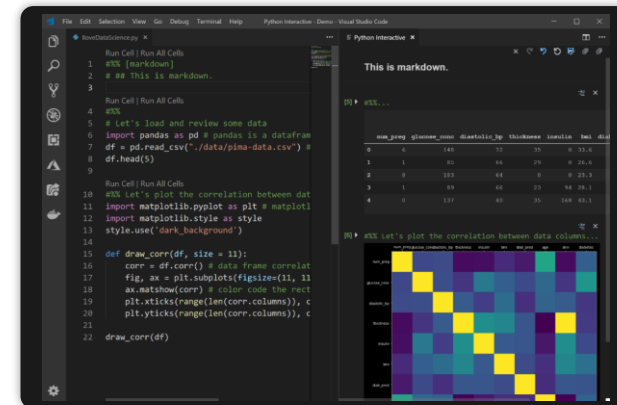


Command line

And improve data science productivity



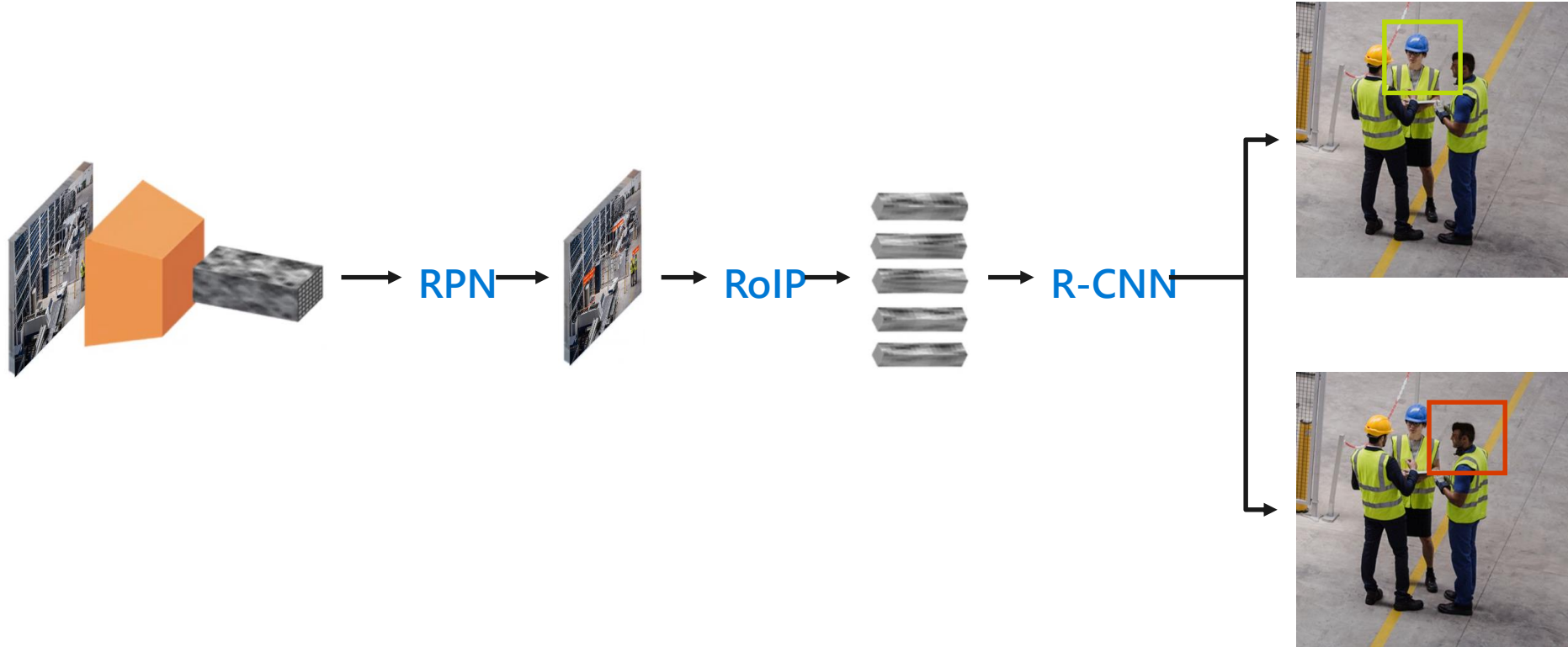
Interactive widgets for Jupyter Notebooks



Azure Machine Learning for Visual Studio Code extension

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

Next challenge is to build a model



Time-consuming



Needs specialized knowledge



Complex

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From the Intelligent Cloud to the Intelligent Edge



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

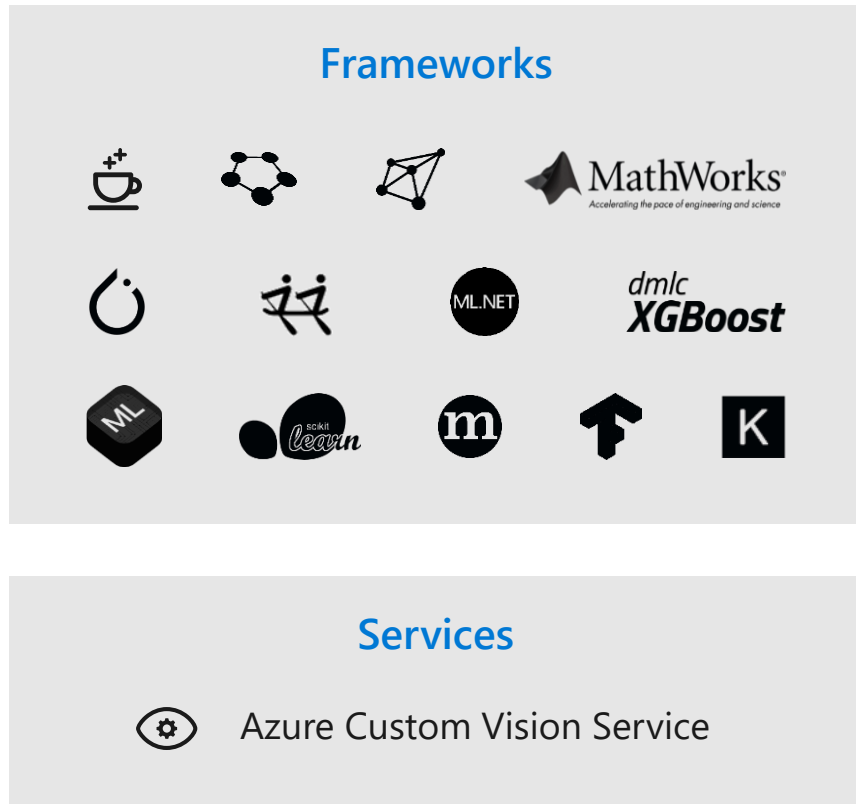
Community project created by Facebook and Microsoft

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

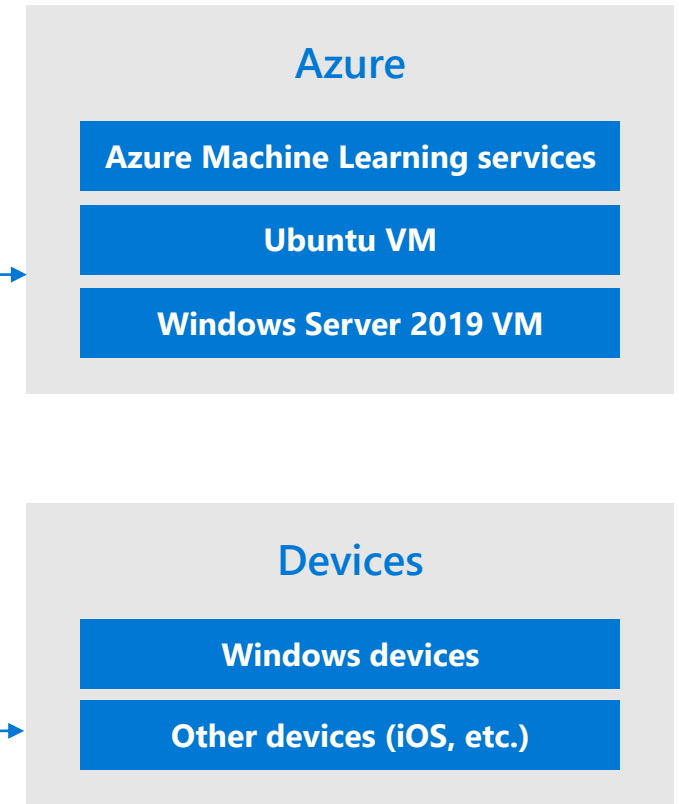


ONNX is the new open ecosystem for AI models

Create



Deploy



Machine Learning on Azure

Domain specific pretrained models

To simplify solution development



Vision



Speech



Language



Search

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To simplify model development



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Productive Services

To empower data science and development teams



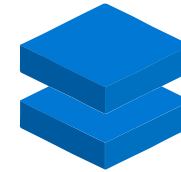
Azure Machine Learning

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

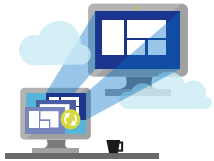


Azure Machine Learning service

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 environment
- 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

Leverage deep learning services and frameworks



AZURE ML SERVICE



Bring AI to the edge



Increase your rate of experimentation



Deploy and manage your models everywhere



AZURE DATABRICKS



Accelerate processing with the fastest Apache Spark engine



Integrate natively with Azure services



Access enterprise-grade Azure security

Leverage your favorite deep learning frameworks



TensorFlow



MS Cognitive Toolkit



PyTorch



Scikit-Learn



ONNX



Caffe2



MXNet



Chainer

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

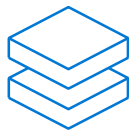
(OSS frameworks, Hyperdrive, Pipelines, Automated ML, Model Registry)



Azure ML service

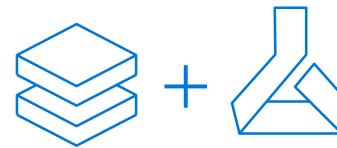
(containerize, deploy, inference and monitor)

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)

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



Scikit-Learn



ONNX

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Databricks



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Powerful infrastructure

To accelerate deep learning



CPU



GPU



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Powerful infrastructure

Accelerate deep learning



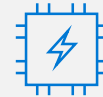
CPUs

General purpose
machine learning
D, F, L, M, H Series



GPUs

Deep learning
N Series



FPGAs

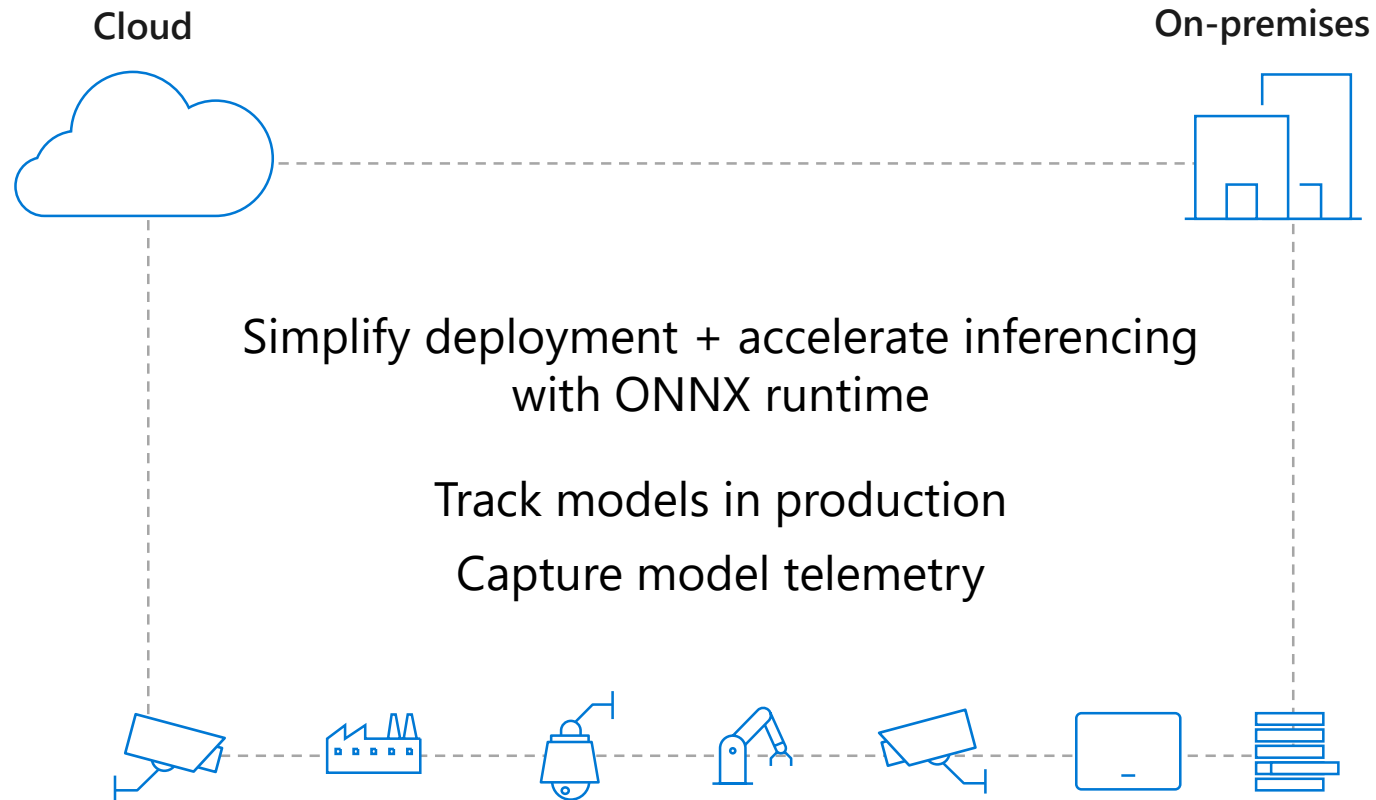
Specialized hardware
accelerated deep learning
AML hardware accelerated
models (Project Brainwave)

← Optimized for flexibility

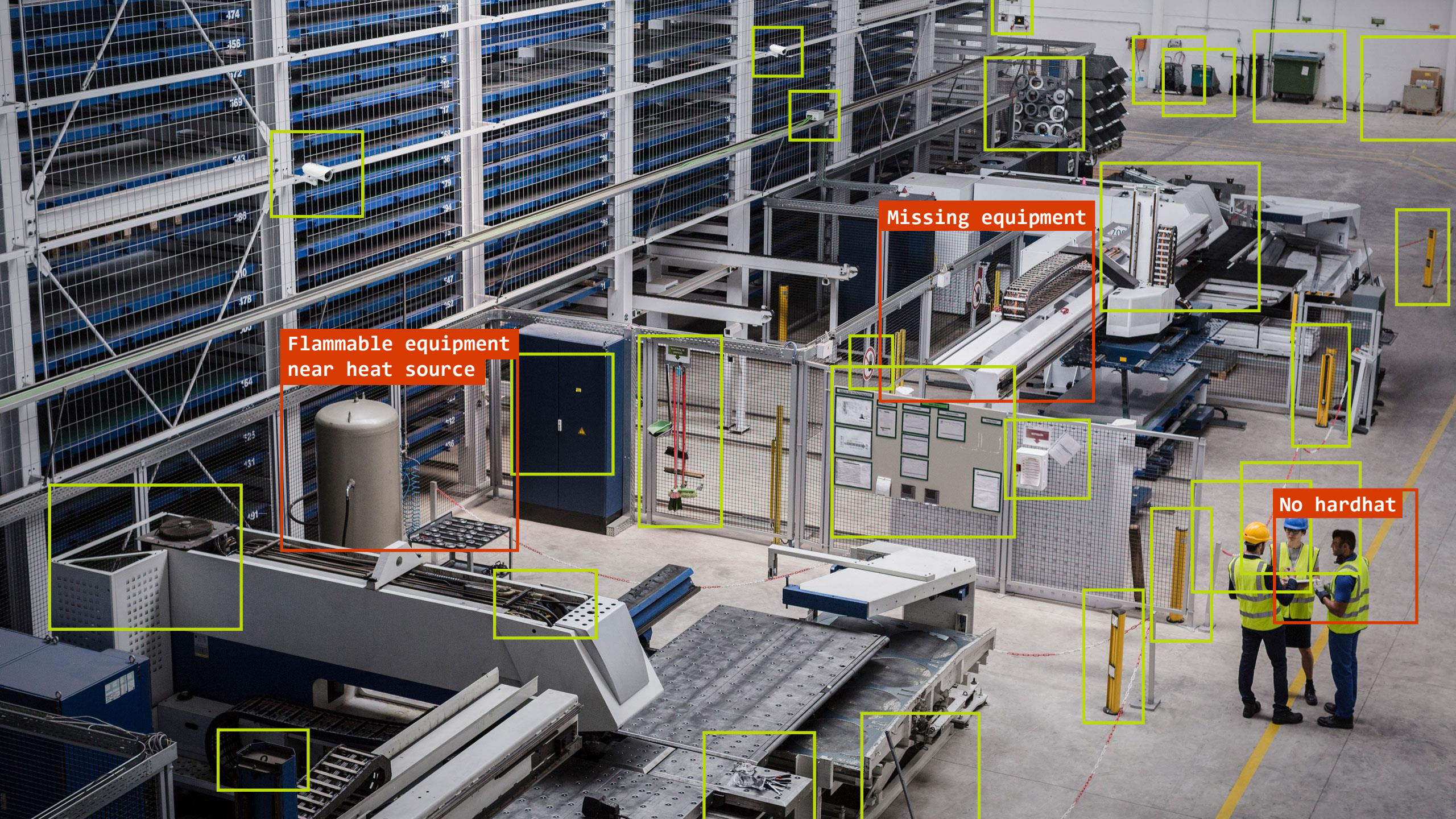
→ Optimized for performance

Flexible deployment

From the Intelligent Cloud to the Intelligent Edge







Flammable equipment
near heat source

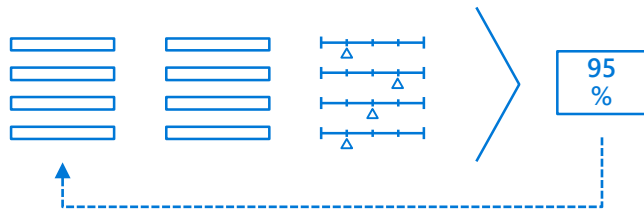
Missing equipment

No hardhat

Differentiators

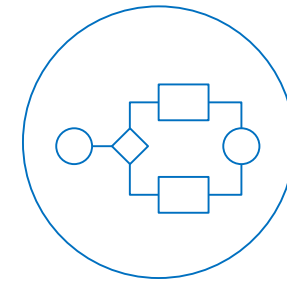
Machine Learning

Automated machine learning



Accelerated model building

Machine learning DevOps

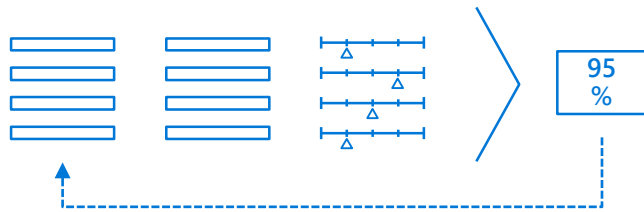


Azure DevOps integration for CI/CD

Differentiators

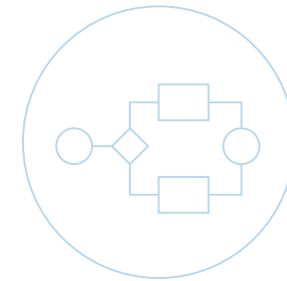
Machine Learning

Automated machine learning



Accelerated model building

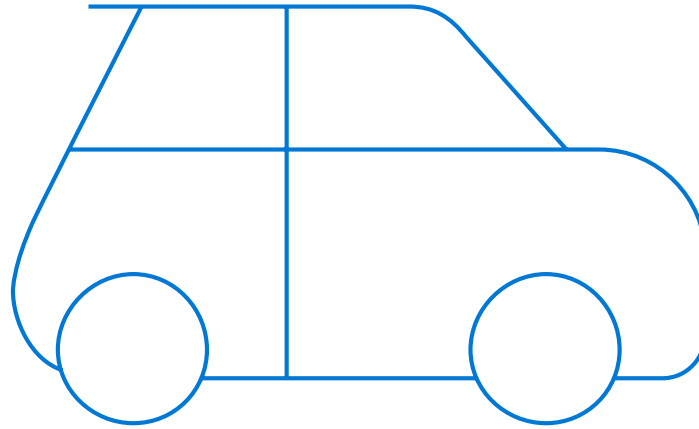
Machine learning DevOps



Azure DevOps integration for CI/CD

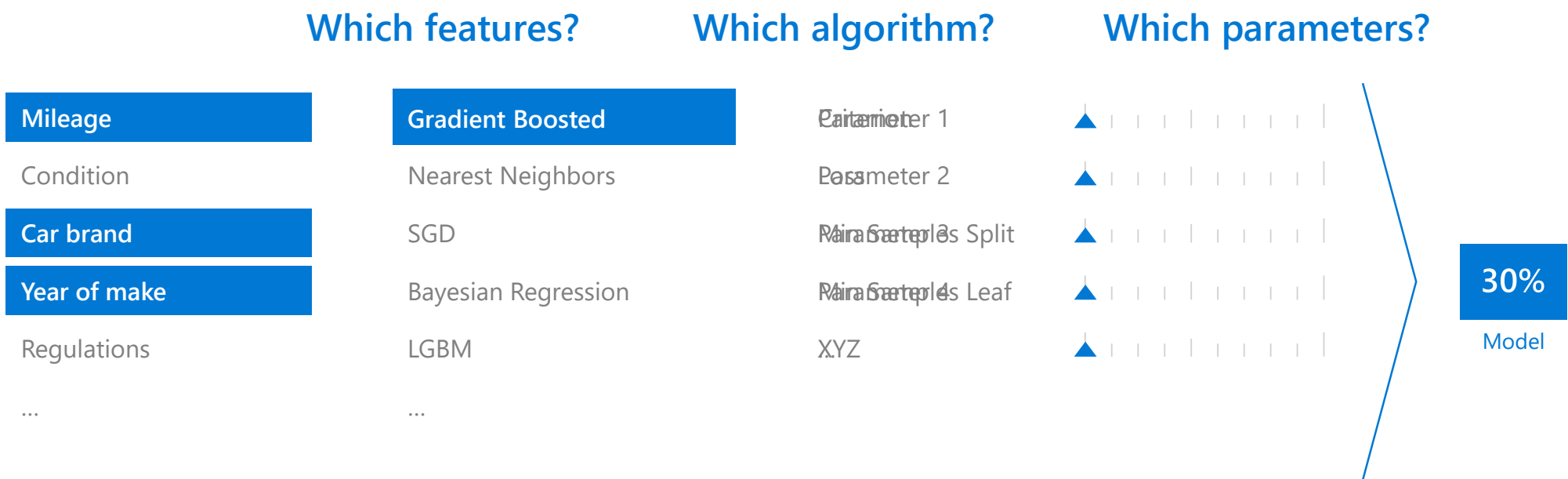
Azure Machine Learning

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?

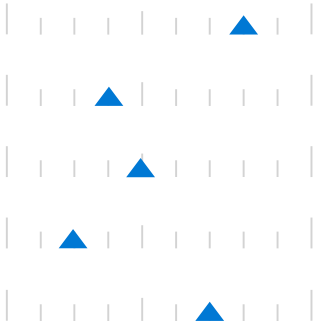
Neighbors

Weights

Min Samples Split

Min Samples Leaf

XYZ



30%

Model

Iterate

Model creation is typically a time consuming process

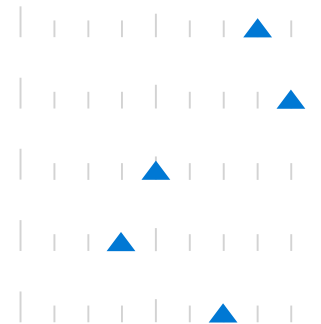
Which features?



Which algorithm?



Which parameters?



30%

15%

Iterate

Azure Machine Learning accelerates model development

with automated machine learning

Input

101010
010101
101010

Enter data

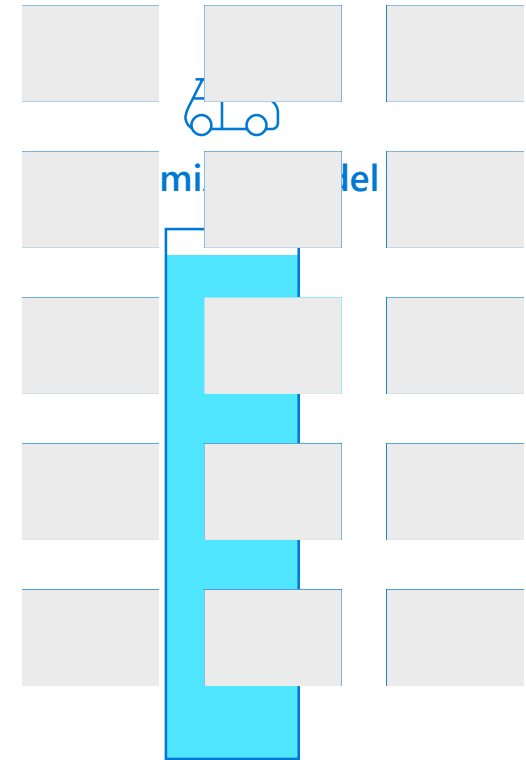
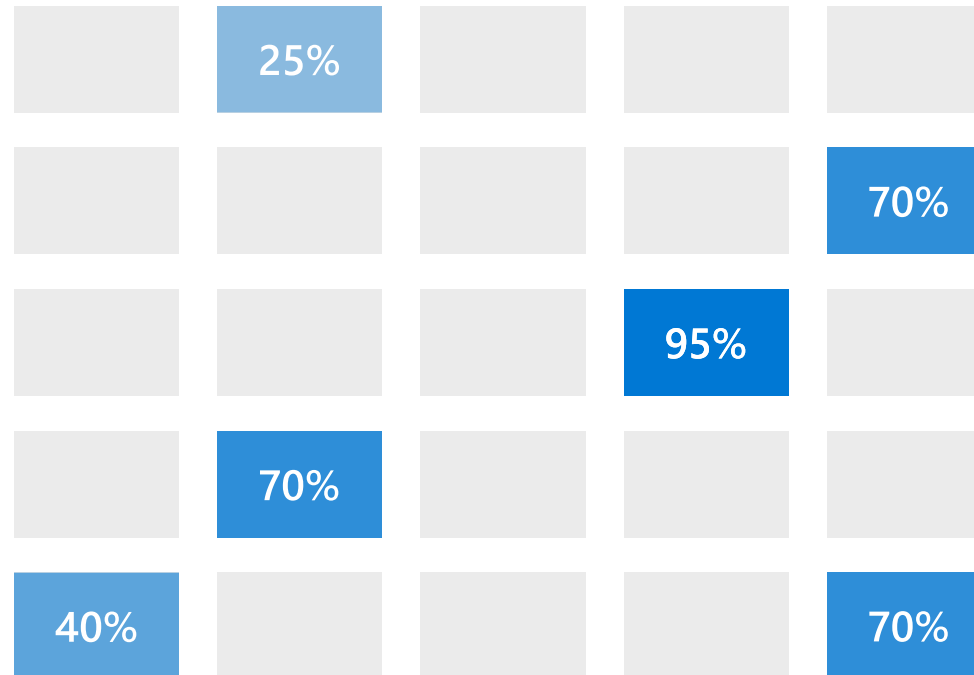


Define goals



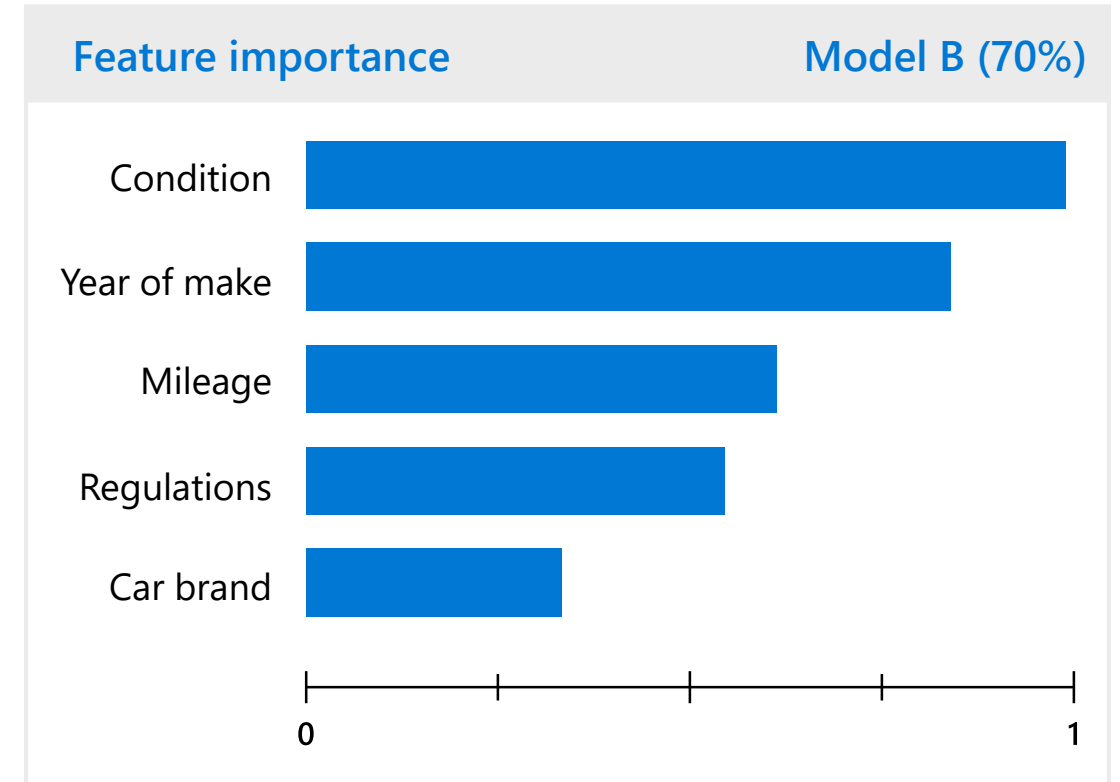
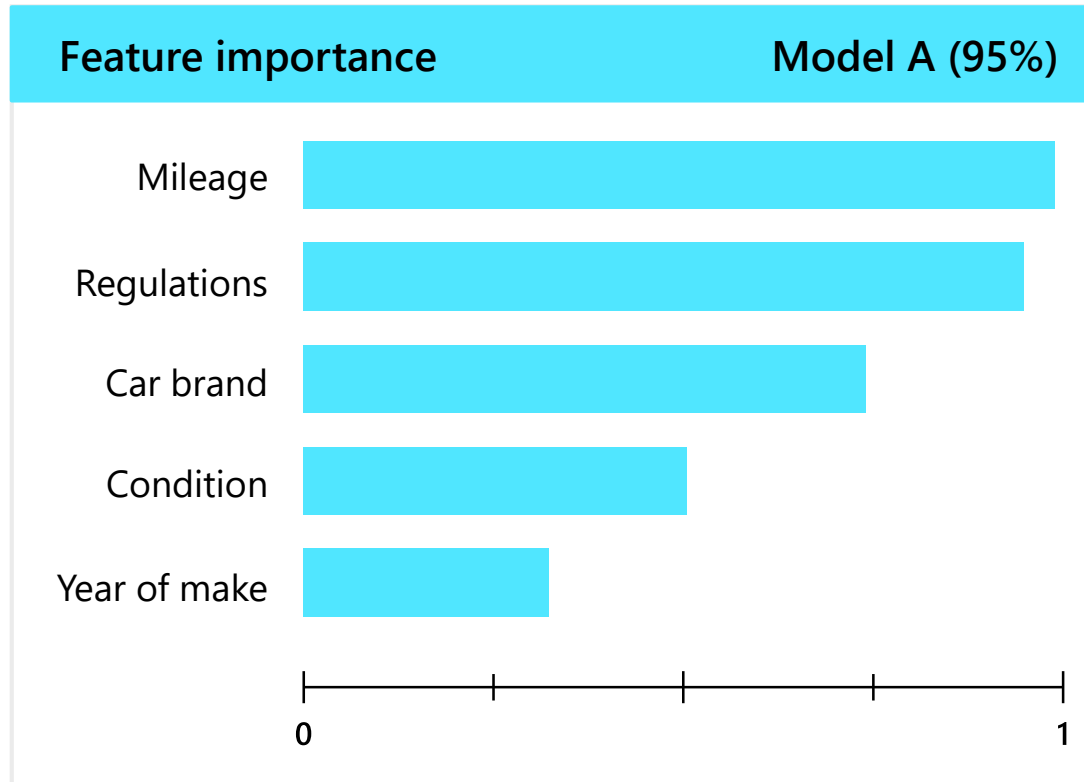
Apply constraints

Intelligently test multiple models in parallel



Azure Machine Learning accelerates model selection

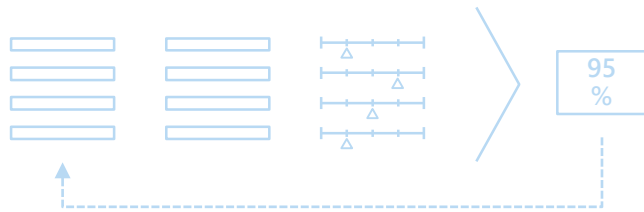
with model explainability



Differentiators

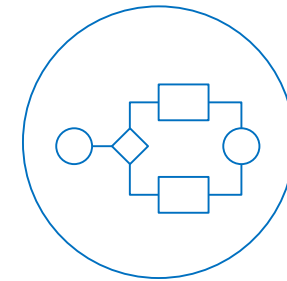
Machine Learning

Automated machine learning



Accelerated model building

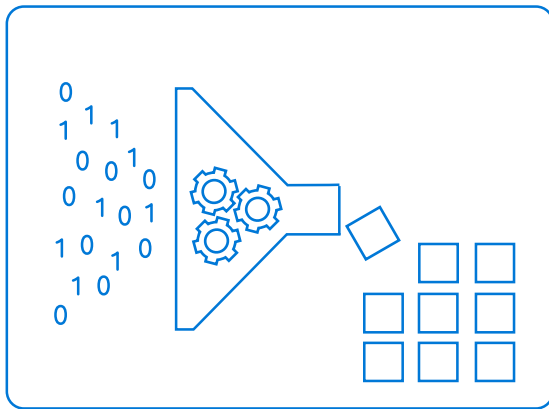
Machine learning DevOps



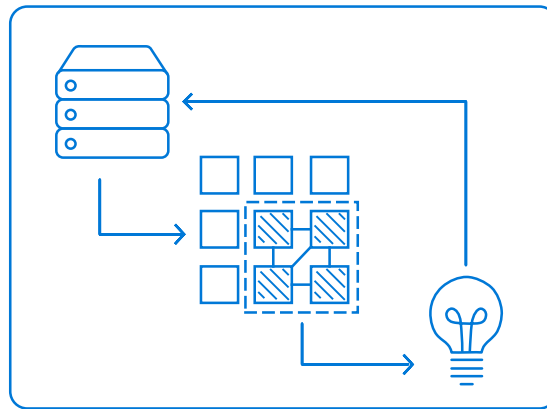
Azure DevOps integration for CI/CD

Understanding the Data Science Process on Azure

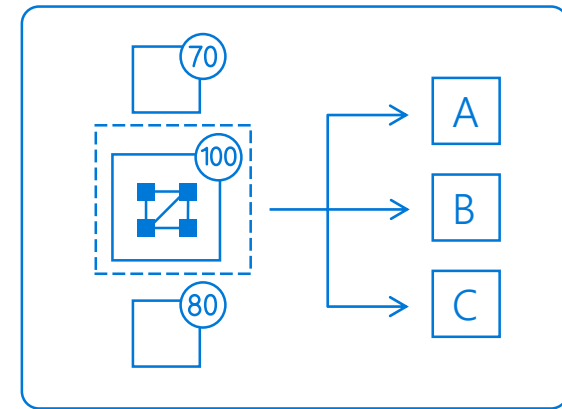
PREP & TRAIN



Collect and prepare data

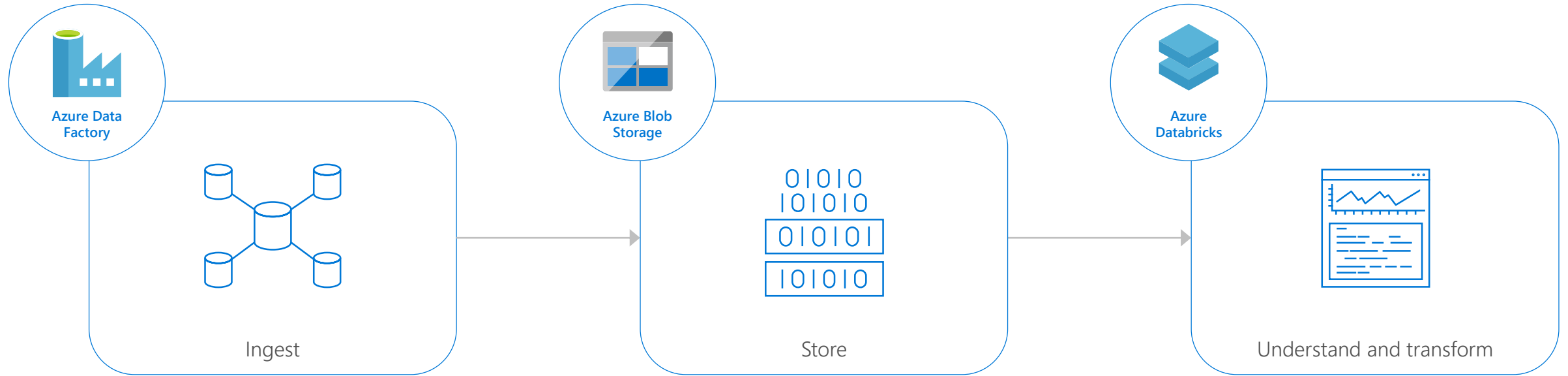


Train and evaluate model



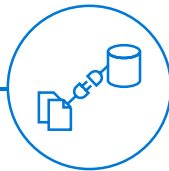
Operationalize and manage

Collect and prepare all of your data at scale



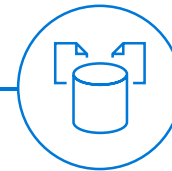
Connect to data from any source

- Integrate with all of your data sources
- Create hybrid pipelines
- Orchestrate in a code-free environment



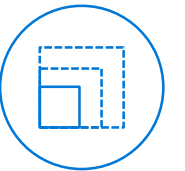
Leverage best-in-class analytics capabilities

- Leverage open source technologies
- Collaborate within teams
- Use ML on batch streams

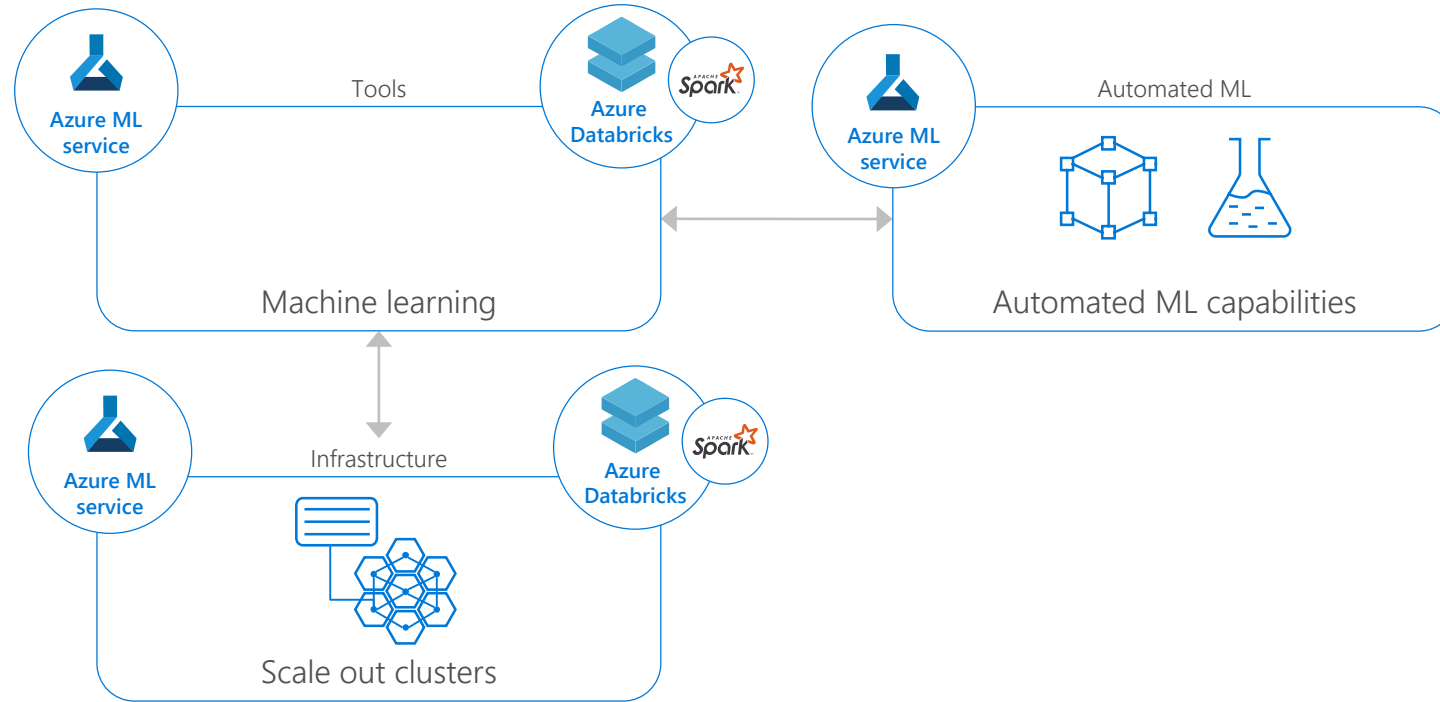


Scale without limits

- Build in the language of your choice
- Leverage scale out topology
- Scale compute and storage separately

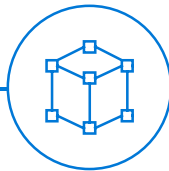


Train and evaluate machine learning models



Simplify model development

- Collaborate in interactive workspaces
- Access a library of battle-tested models
- Automate job execution



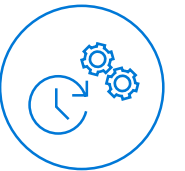
Scale compute resources to meet your needs

- Easily scale up or scale out
- Autoscale on serverless infrastructure
- Leverage commodity hardware

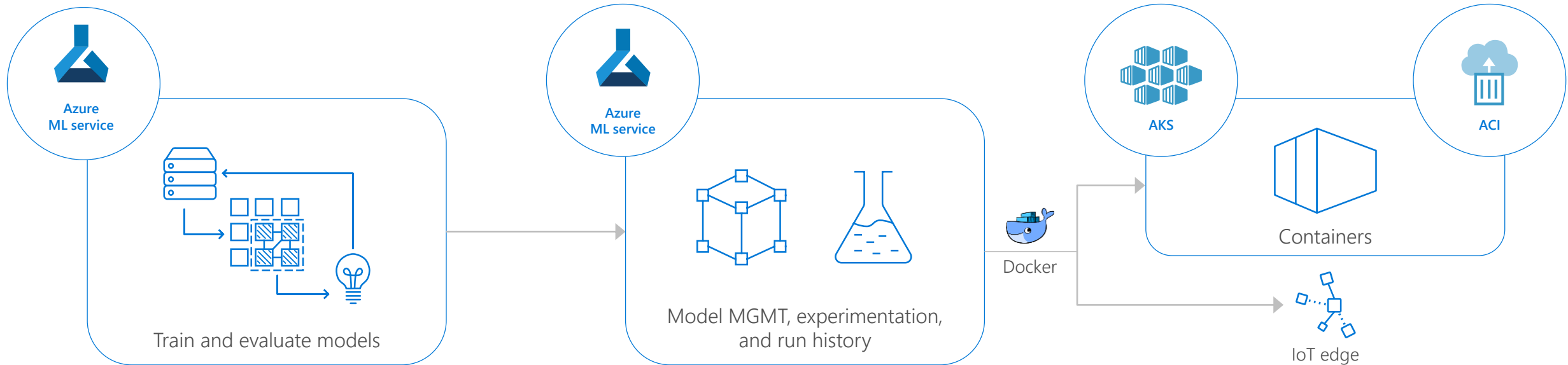


Quickly determine the right model for your data

- Determine the best algorithm
- Tune hyperparameters to optimize models
- Rapidly prototype in agile environments

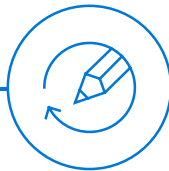


Operationalize and manage models with ease



Bring models to life quickly

- Build and deploy models in minutes
- Iterate quickly on serverless infrastructure
- Easily change environments



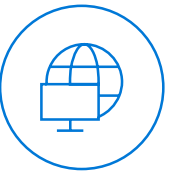
Proactively manage model performance

- Identify and promote your best models
- Capture model telemetry
- Retrain models with APIs



Deploy models closer to your data

- Deploy models anywhere
- Scale out to containers
- Infuse intelligence into the IoT edge



It's all on Microsoft Azure