Microsoft

Azure Machine Learning service:
A Technical Overview

Shijun Liu
shliup@microsoft.com
Strategic Technical Software Engineer
Commercial Software Engineering

Azure AI

AI apps & agents

Azure Bot Service
Azure Cognitive Services

Machine learning

Azure Databricks
Azure Machine Learning

Knowledge mining

Azure Cognitive Search

Machine Learning on Azure

Domain specific pretrained models
To reduce time to market


Vision


Speech


Language


Search

Familiar Data Science tools
To simplify model development


PyCharm


Jupyter


Visual Studio Code


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

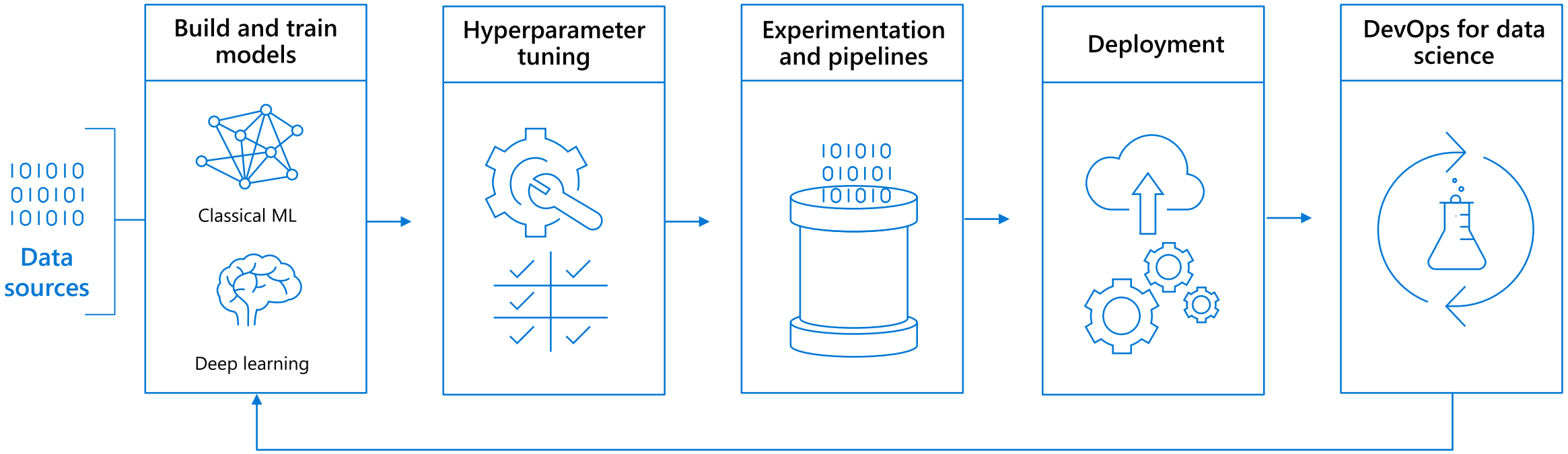

CPU


GPU


FPGA


From the Intelligent Cloud to the Intelligent Edge

Building blocks for a Data Science Project



What can make this simple and streamlined?

Azure Machine Learning service

Set of Azure Cloud Services

Python SDK

That enables you to:

- ✓ Prepare Data
- ✓ Build Models
- ✓ Train Models
- ✓ Manage Models
- ✓ Track Experiments
- ✓ Deploy Models

Azure Machine Learning service

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

Boost your data science productivity

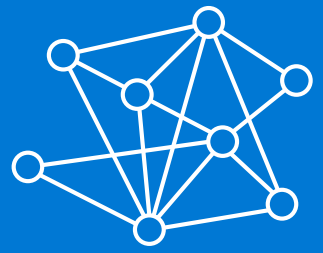
Increase your rate of experimentation

Deploy and manage your models everywhere

Built with your needs in mind

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

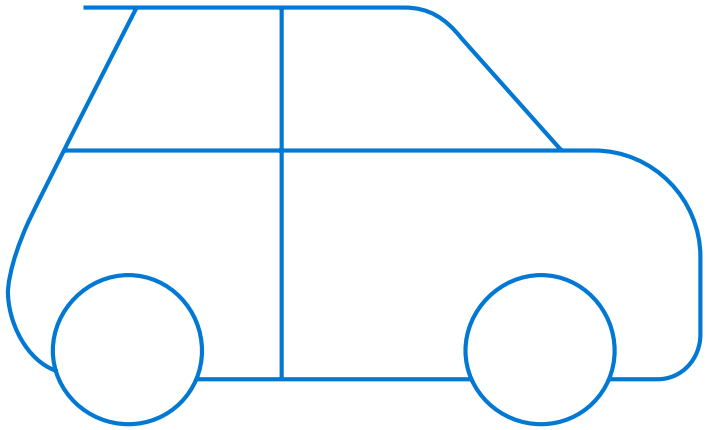
Seamlessly integrated with the Azure Portfolio



Automated machine learning

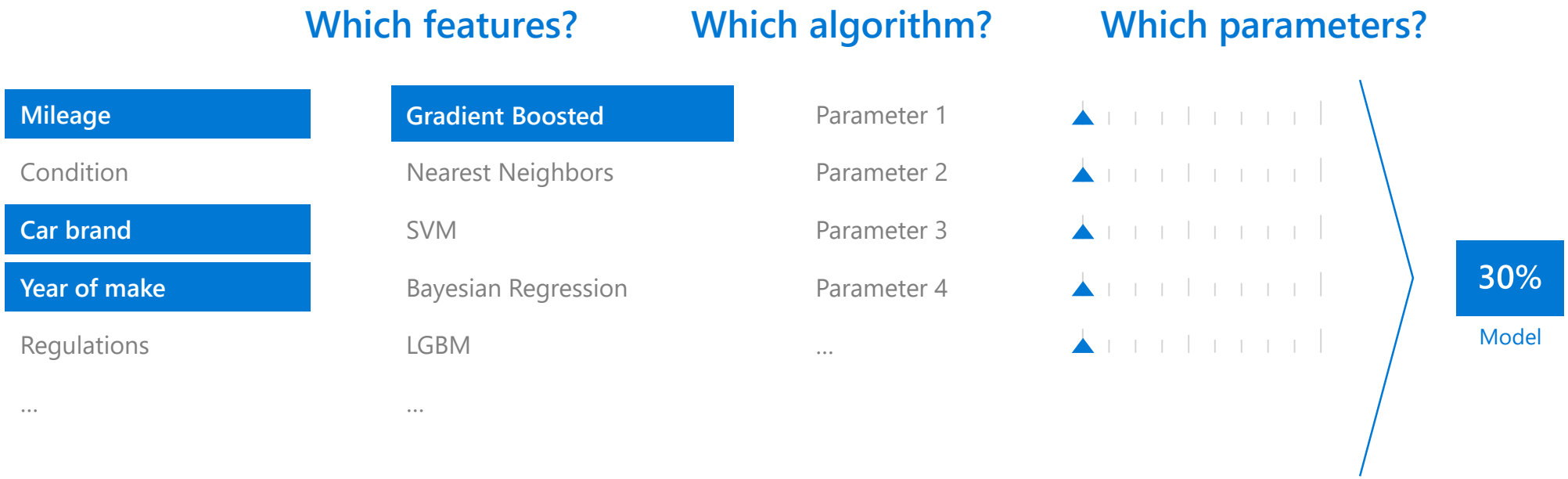
Azure Machine Learning

Automated machine learning



How much is this car worth?

Model creation is typically a time consuming process



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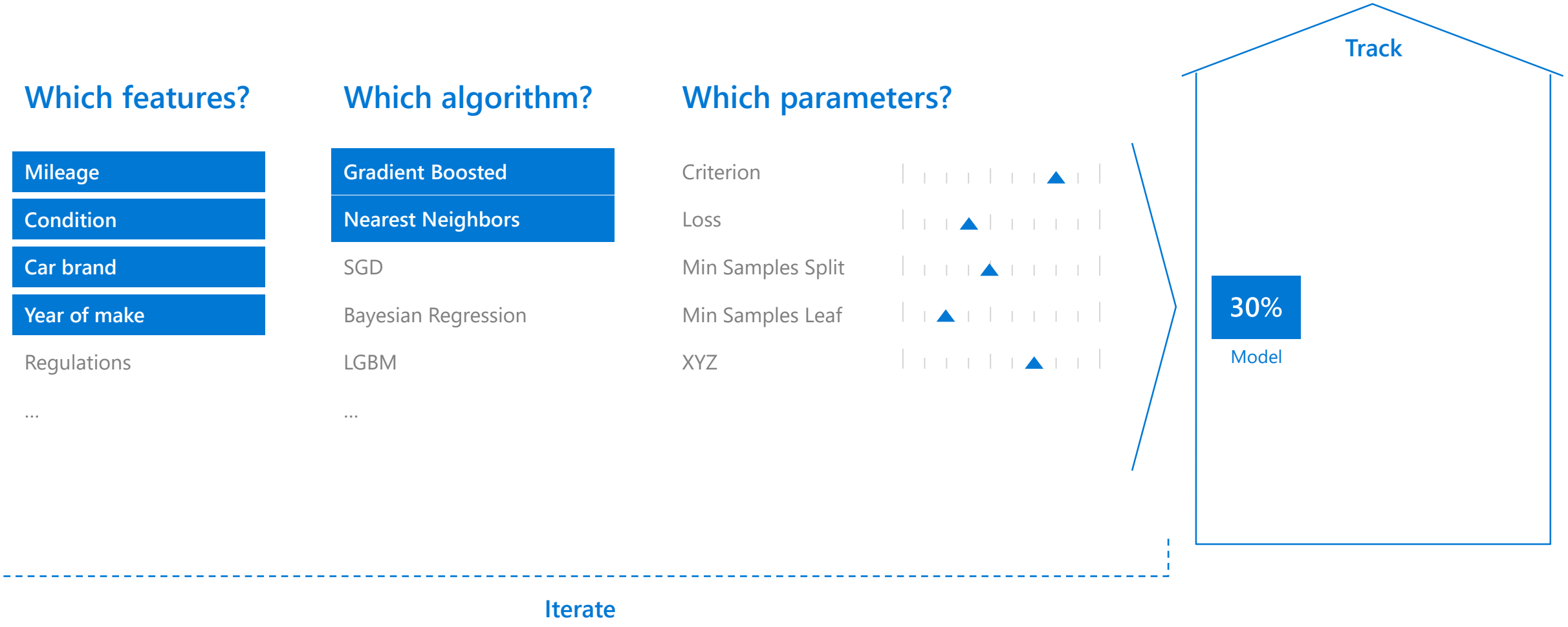

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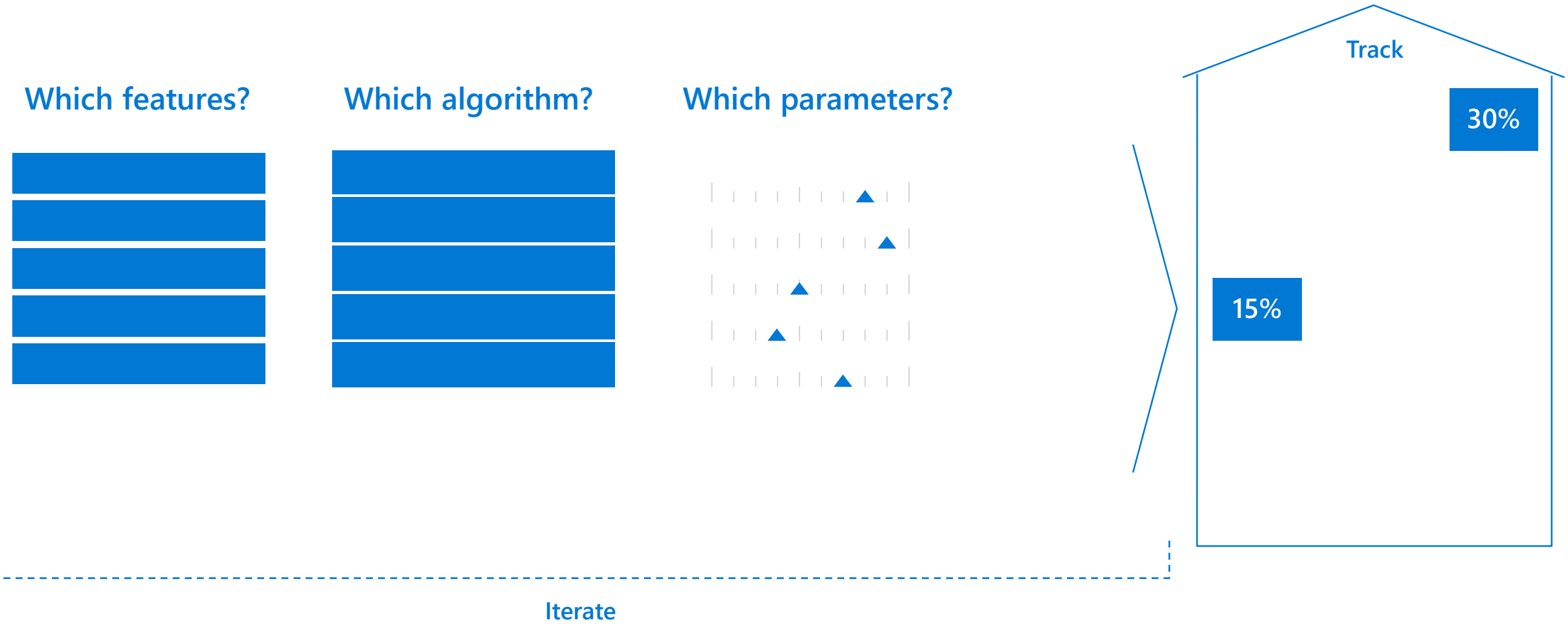
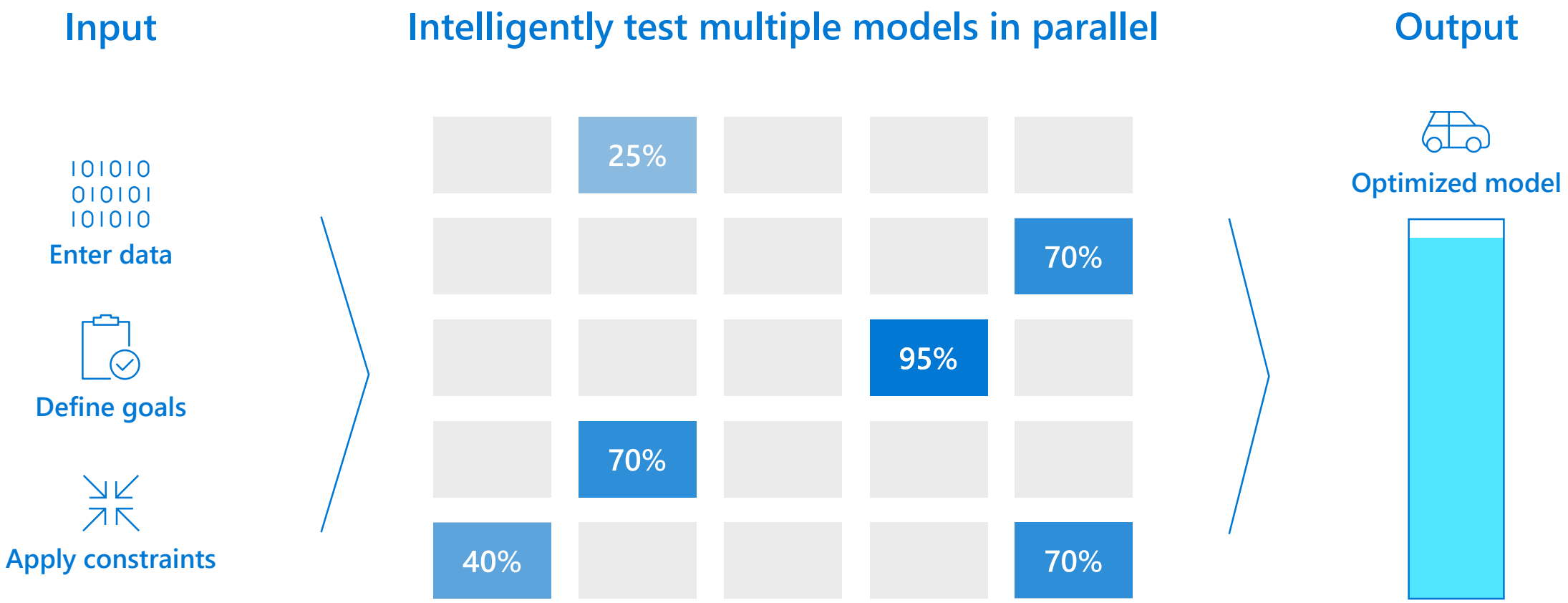
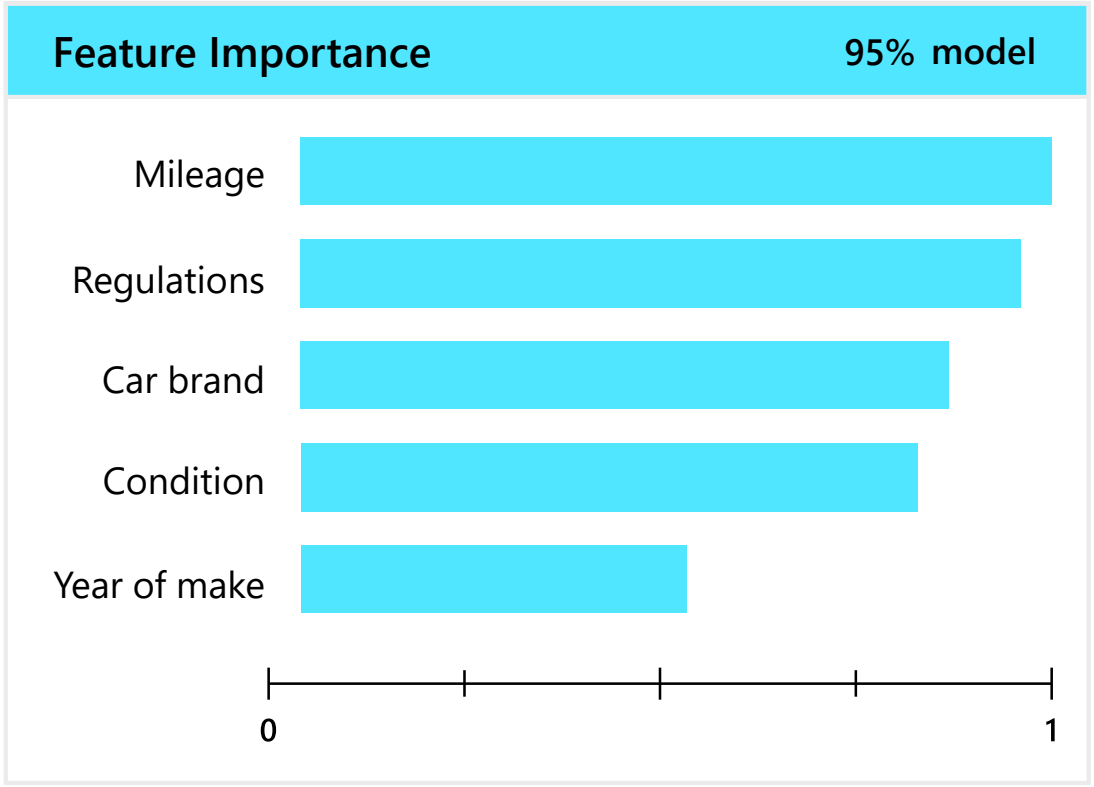
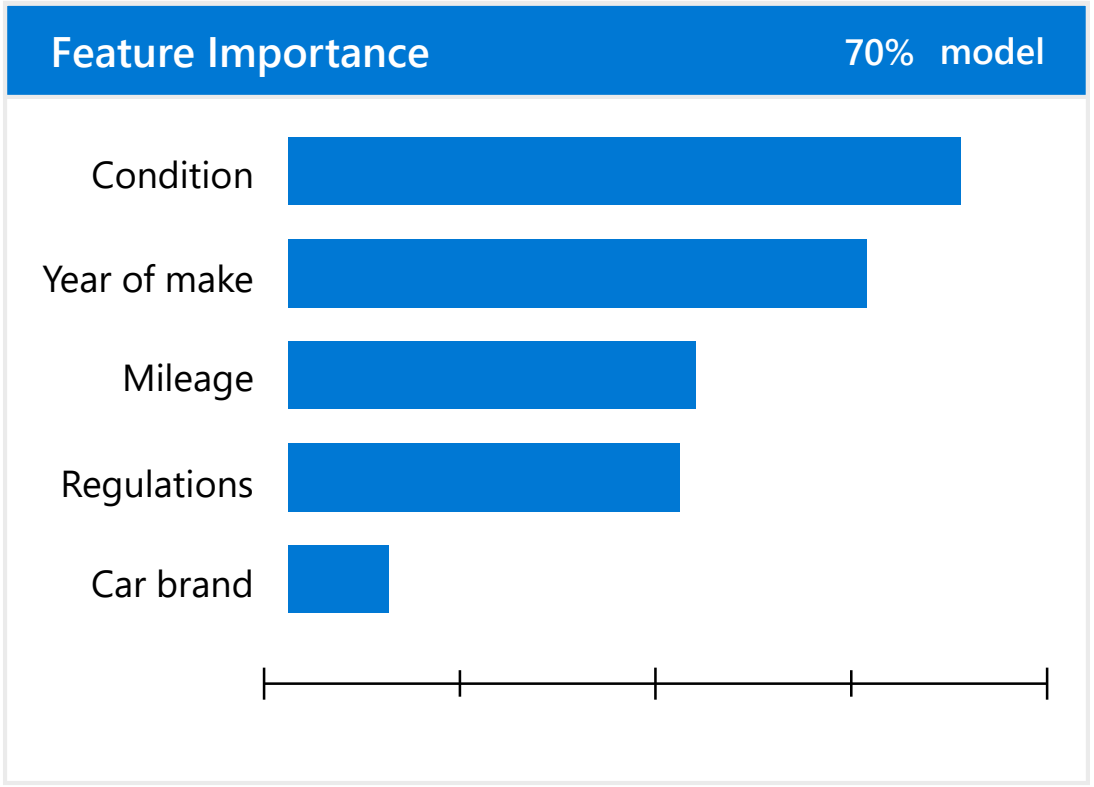


Automated Machine Learning accelerates model development

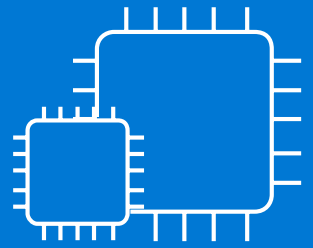


Understand the inner workings of ML by analyzing feature importance





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

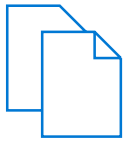


Managed compute

Training infrastructure

Dependencies and Containers

Leverage system-managed AML compute or bring your own compute



Distribute data

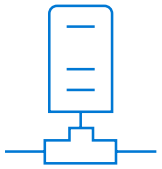
Manage and share resources across a workspace

Schedule jobs

Train at cloud scale using a framework of choice

Scale resources

Autoscale resources to only pay while running a job



Provision clusters

Use the latest NDv2 series VMs with the NVIDIA V100 GPUs

Powerful infrastructure

Accelerate deep learning

CPUs

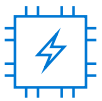
General purpose machine learning

D, F, L, M, H Series

GPUs

Deep learning

N Series



FPGAs

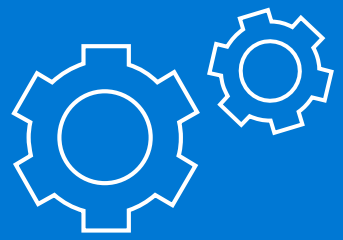
Specialized hardware accelerated deep learning

Project Brainwave

FPGA NEW UPDATES:

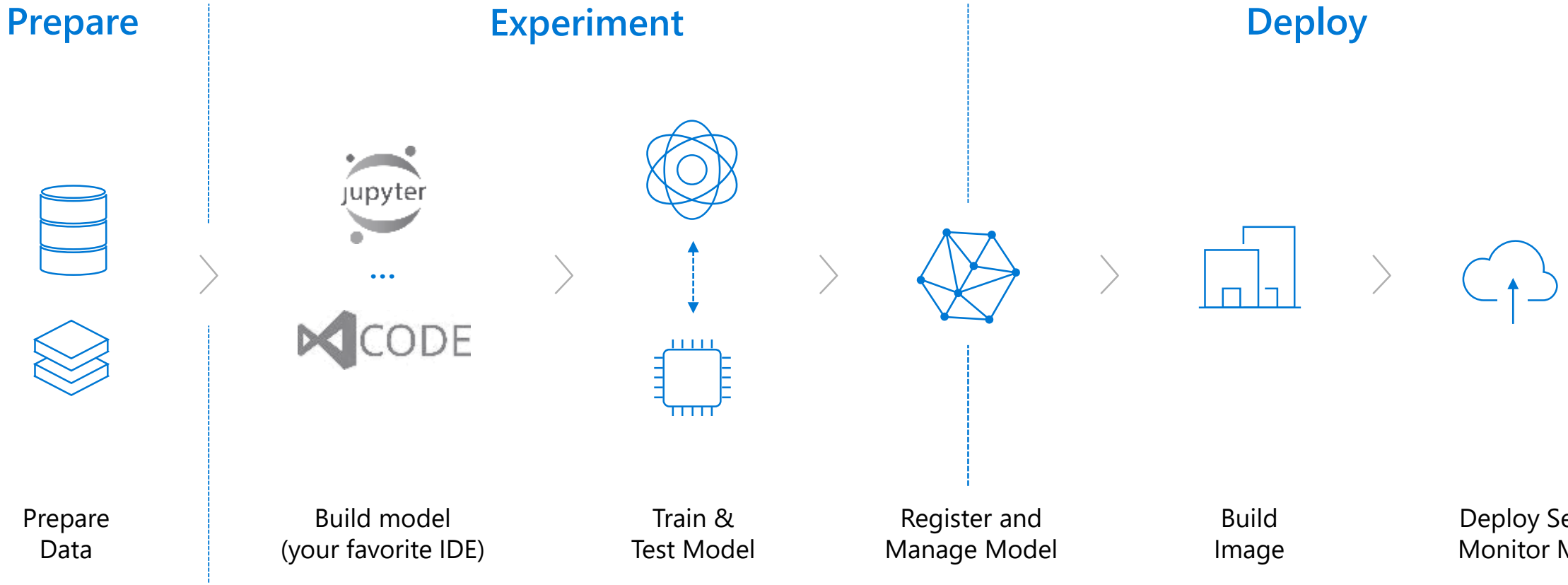
Support for image classification and recognition scenarios

ResNet 50, ResNet 152, VGG-16, SSD-VGG, DenseNet-121

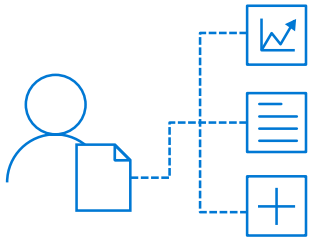


Azure Machine Learning experiments

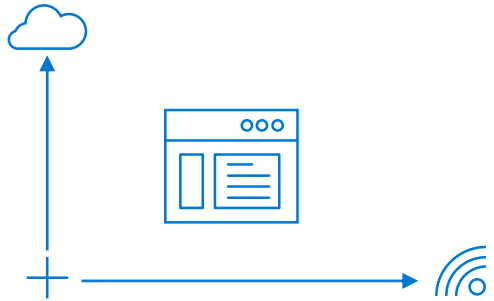
DevOps loop for data science



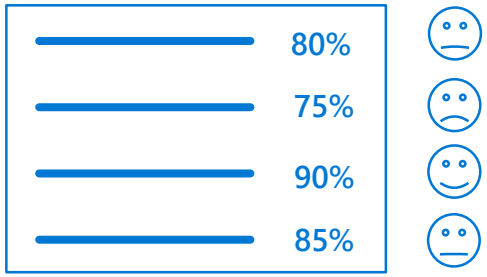
Experimentation



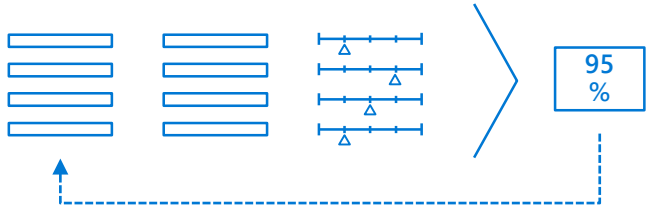
Leverage service-side capture of run metrics, output logs and models



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

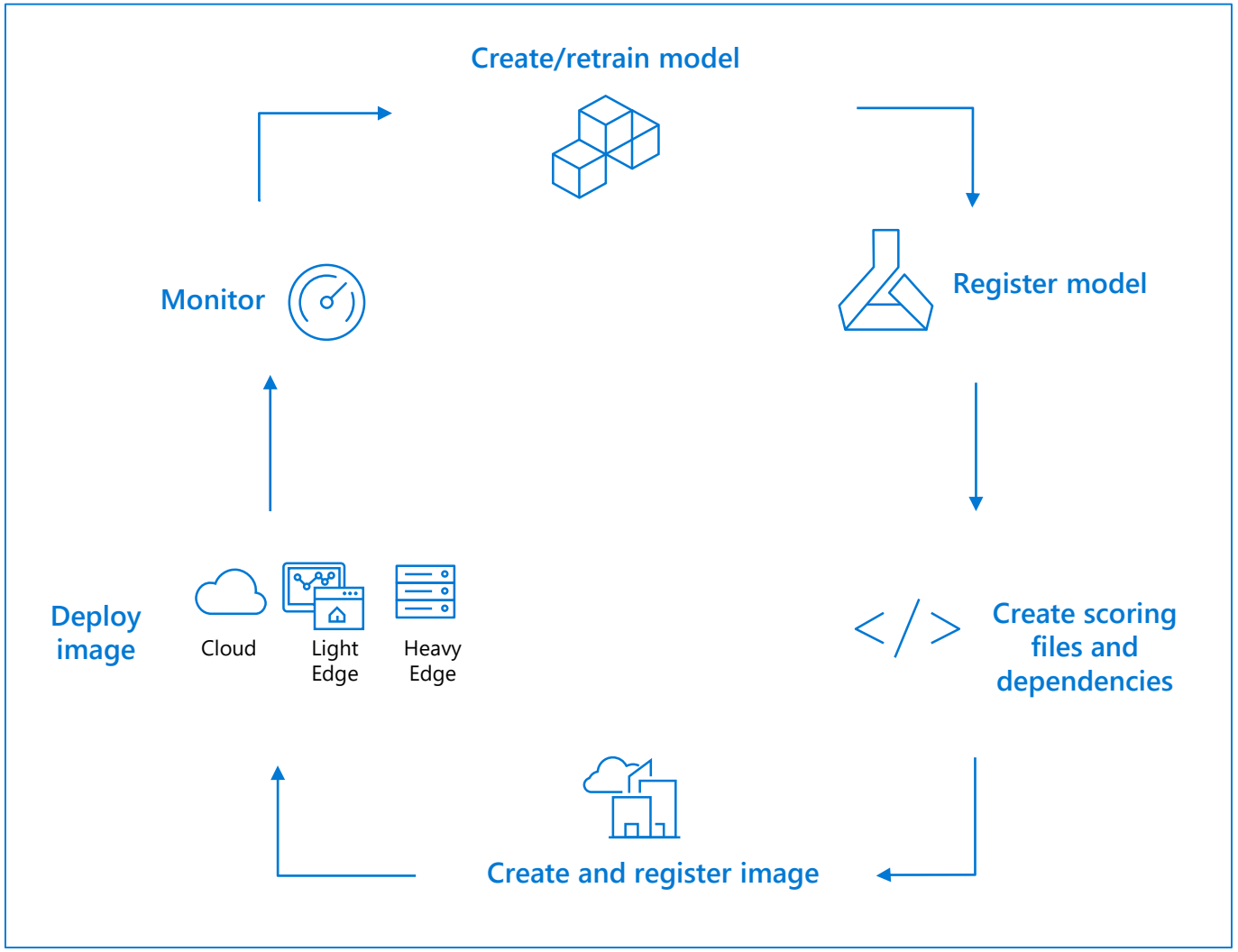


Use leaderboards, side by side run comparison and model selection



Conduct a hyperparameter search on traditional ML or DNN

Model management in Azure Machine Learning



Model management in detail

Create/Retrain Model

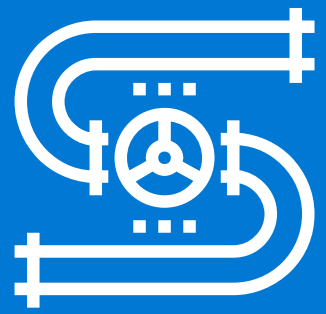
Enable DevOps with full CI/CD integration with VSTS

Register Model

Track model versions with a central model registry

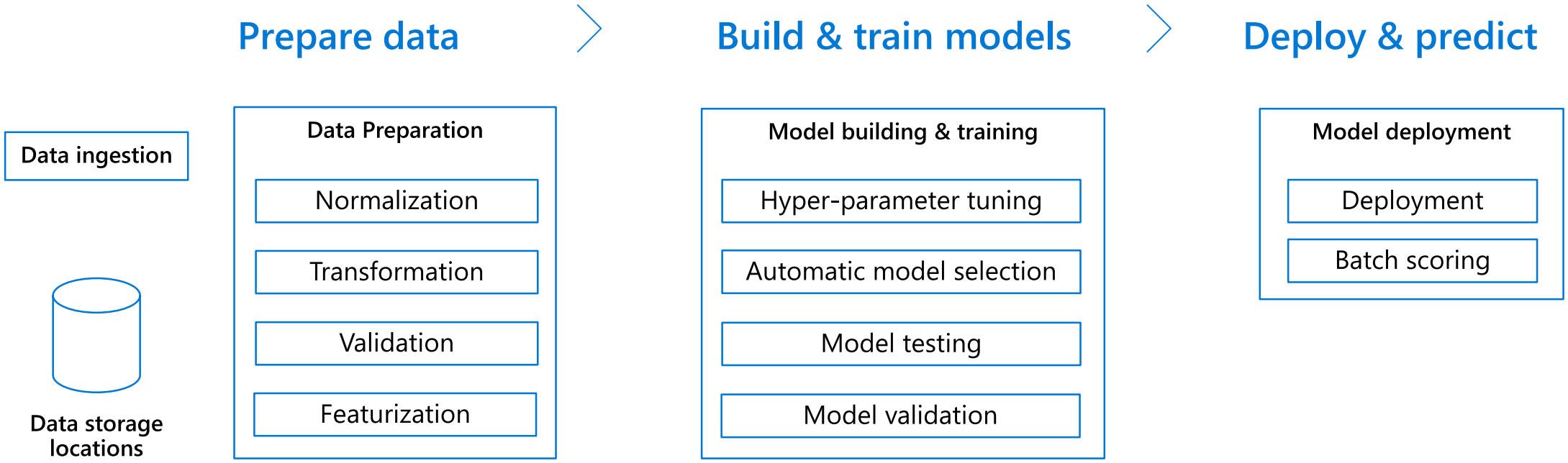
Monitor

Oversea deployments through Azure AppInsights

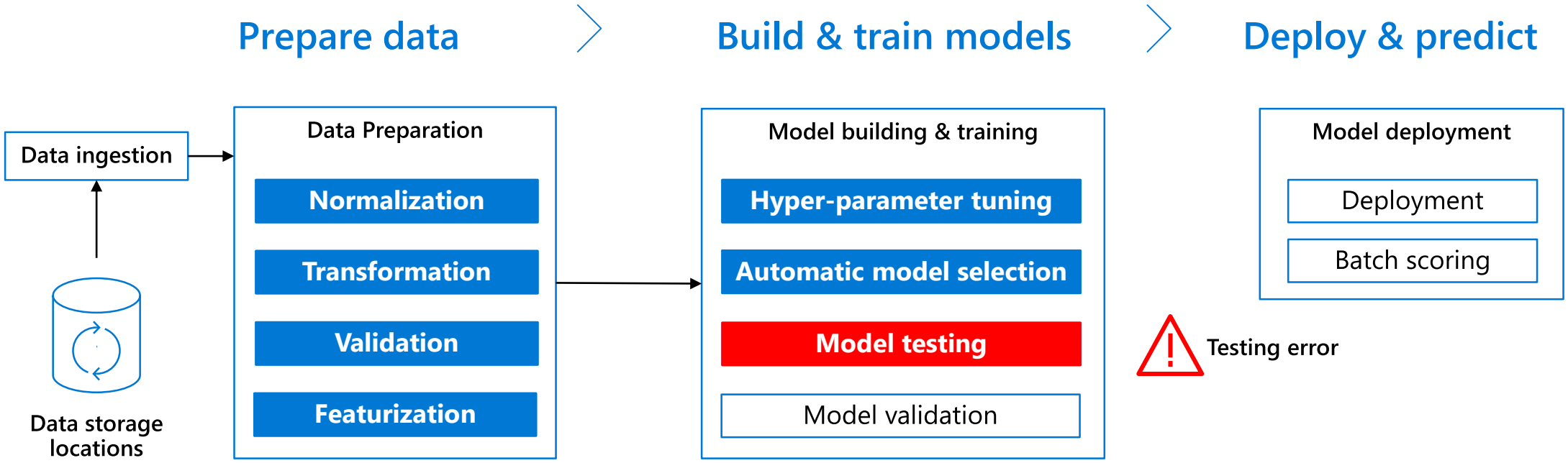


Azure Machine Learning pipelines

Azure Machine Learning pipelines



Azure Machine Learning pipelines



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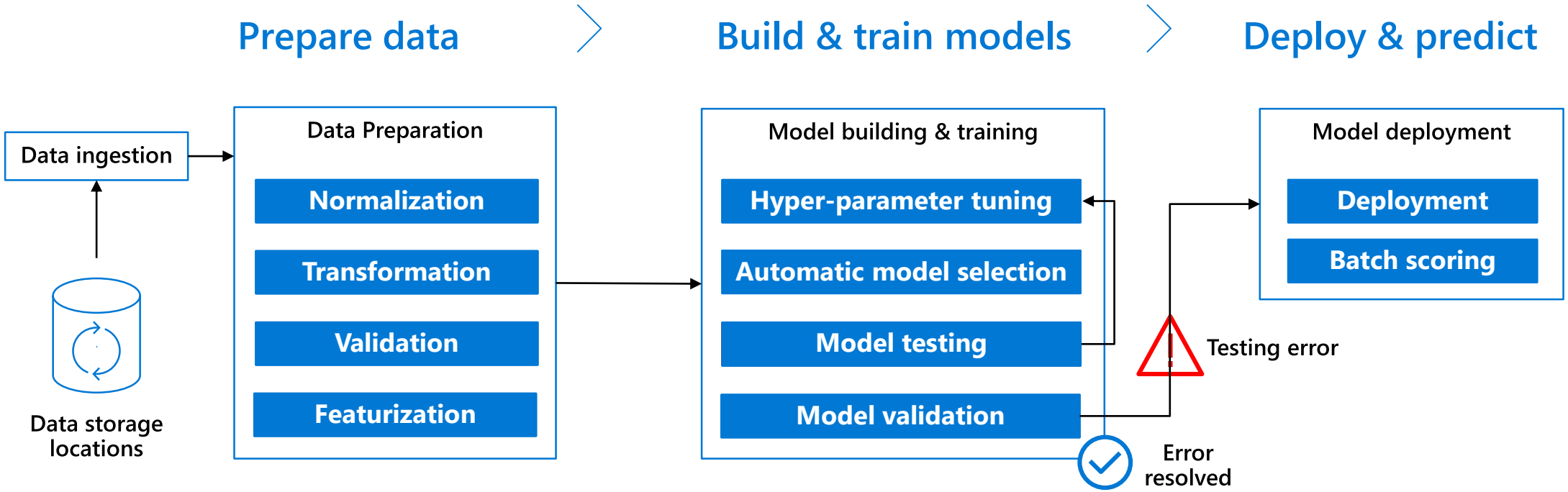
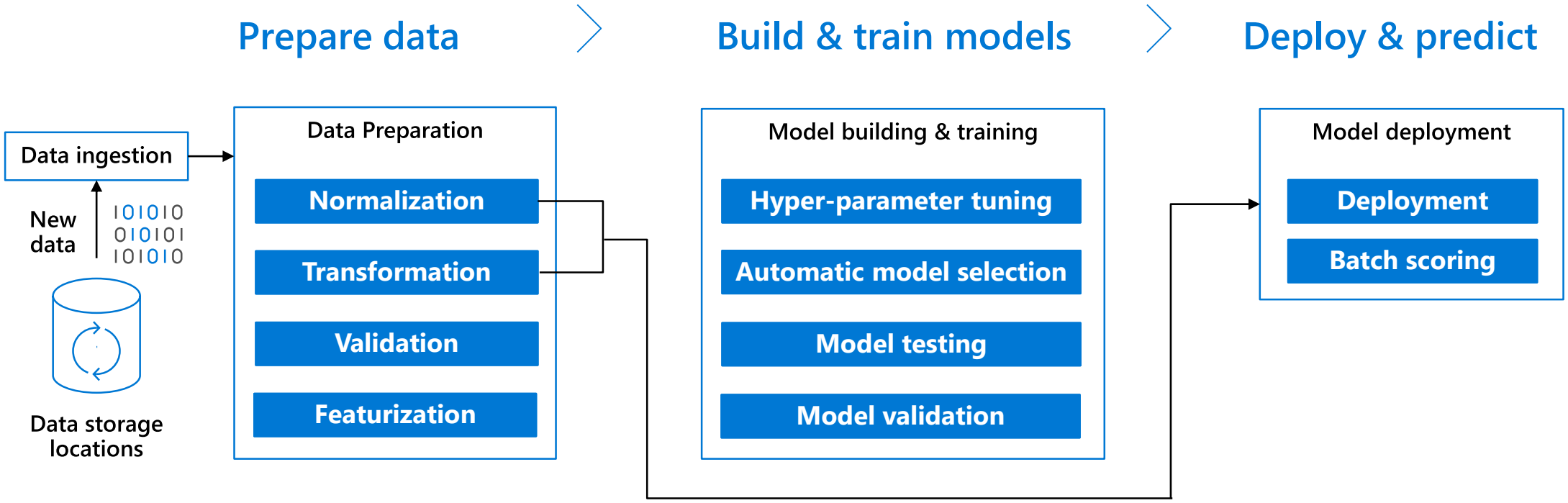


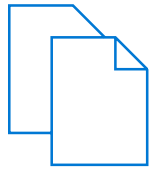
Azure Machine Learning pipelines with new data



Advantages of Azure ML Pipelines

Unattended runs

Schedule a few steps to run in parallel or in sequence to focus on other tasks while your pipeline runs

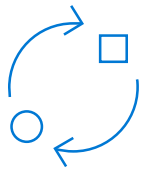


Tracking and versioning

Name and version your data sources, inputs and outputs with the pipelines SDK

Reusability

Create templates of pipelines for specific scenarios such as retraining and batch scoring



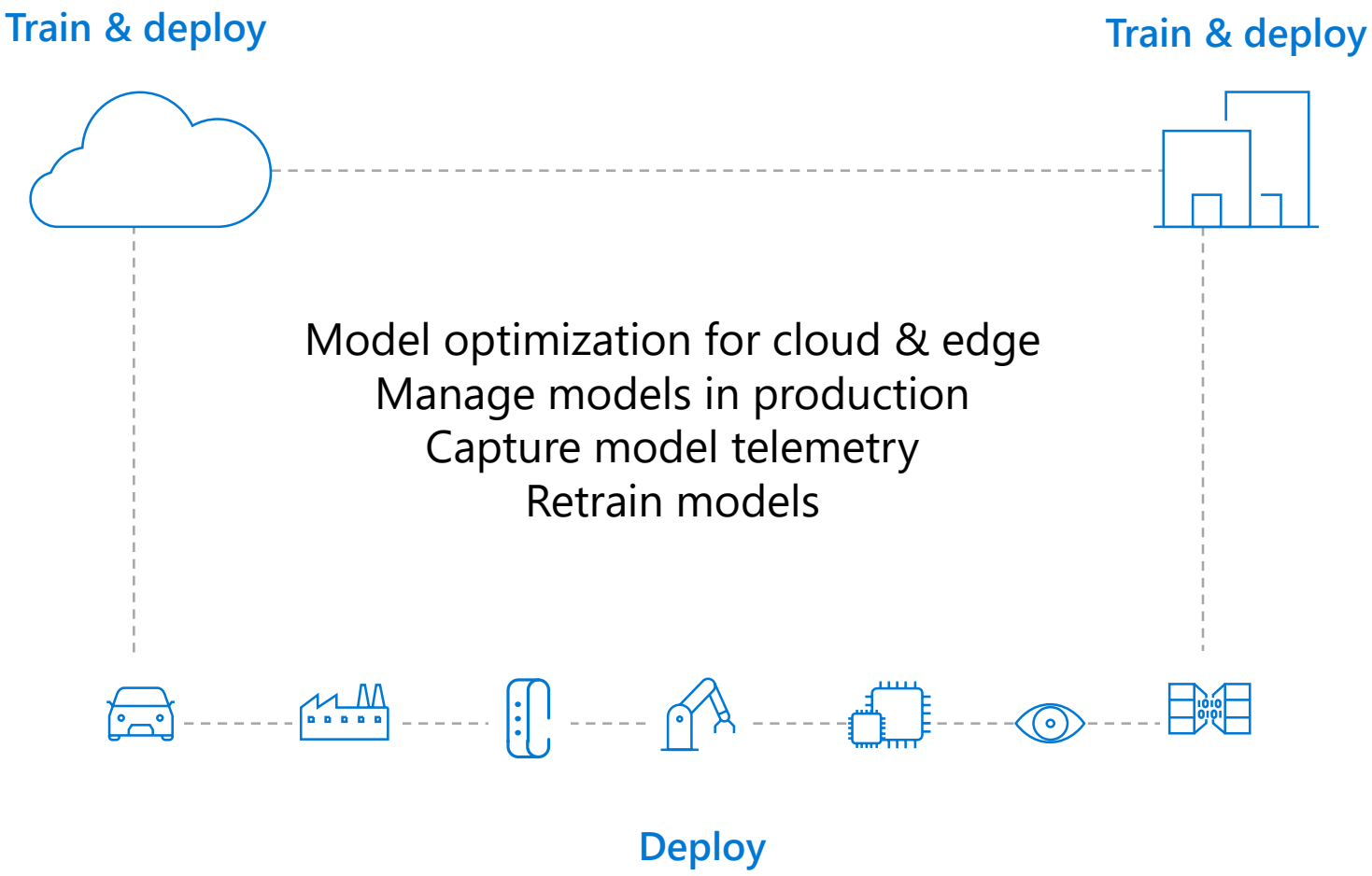
Mixed and diverse compute

Use multiple pipelines that are reliably coordinated across heterogeneous and scalable computes and storages

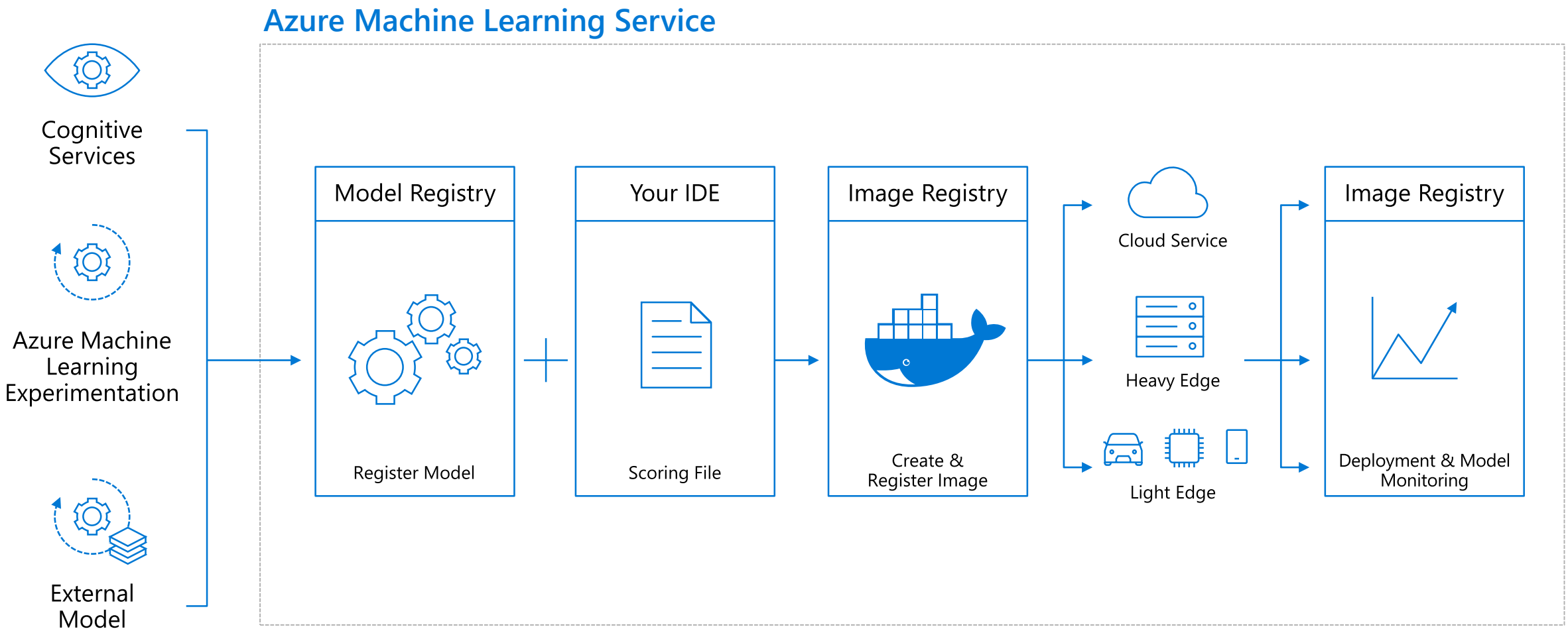
Simple deployment

Flexible deployment

Deploy and manage models on intelligent cloud and edge



Deploy Azure ML models at scale



Support for open source frameworks

Popular frameworks

Use your favorite deep learning frameworks

TensorFlow

PyTorch

Scikit-Learn

MXNet

Chainer

Keras

without getting locked into one framework

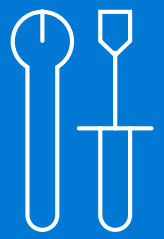
ONNX

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

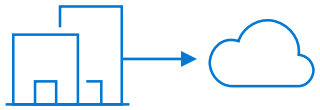
intel skymizer MathWorks NETRON Visual DL



Tool agnostic Python SDK

Tool Agnostic Python SDK

Use your favorite IDEs, editors, notebooks, and frameworks



Flexibility of your local environment or curated cloud environment

Integrate with other services like Azure Databricks

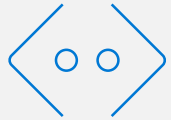
Get started quickly without any complex pre-requisites

Azure ML service also includes DataPrep SDK

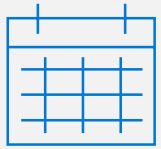
Customer challenges and pain points

- Understanding the semantics of data is difficult and time-consuming
- Merging data from different sources is a manual process
- Detecting, troubleshooting and fixing errors is a high tax
- Custom code is always required
- Operationalization is challenging

Examples of manual, non-scalable work



Data formatting



Dealing with dates

'Rectangualizing' data

Data Prep SDK

SDK

- Familiar pattern for complex transforms
- Responsive, lazy evaluations
- Share pipelines via serialization
- Support for execution

Core Engine

Scale through streaming

Multiple runtimes (Scale Up/Scale Out) single artifact

Intelligent transforms (by example, autoSplit, autojoin, fuzzy grouping, …)

Smart file reading

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

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