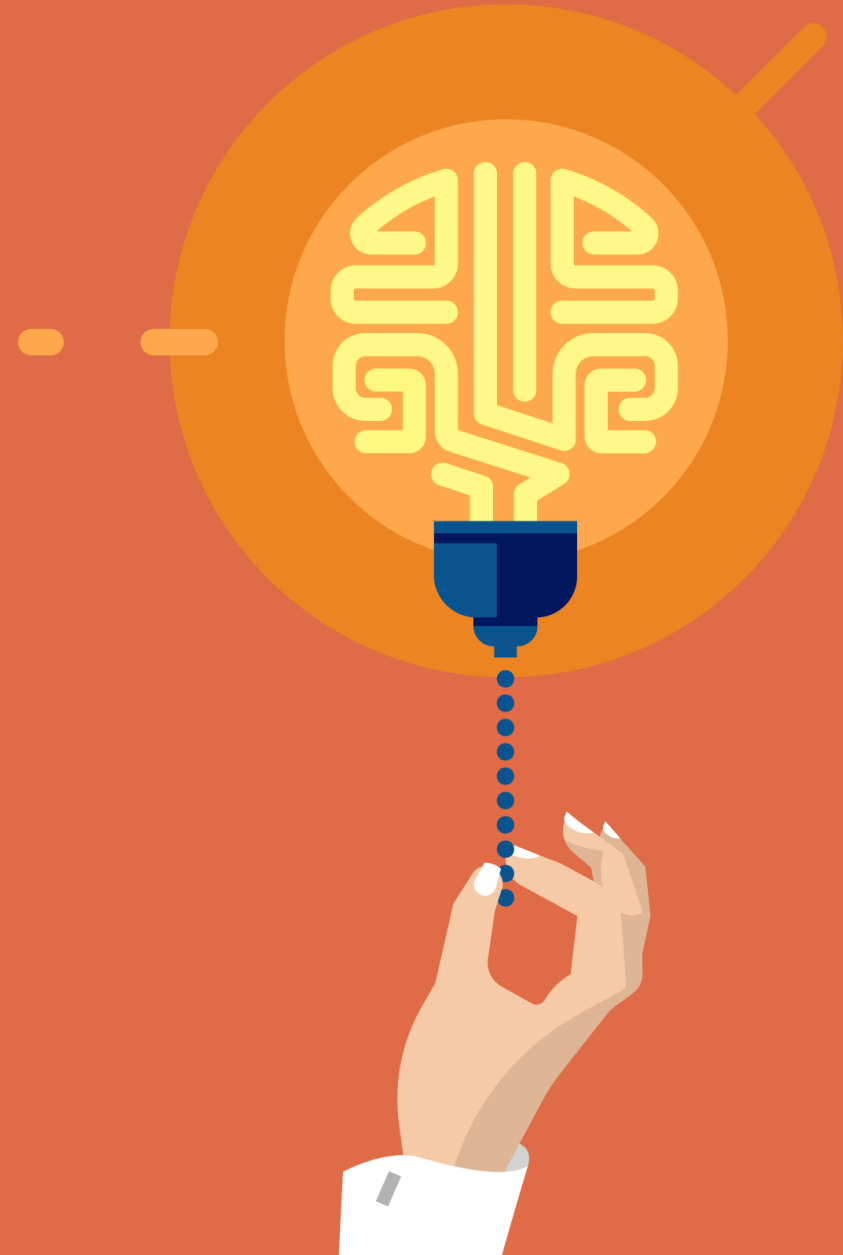


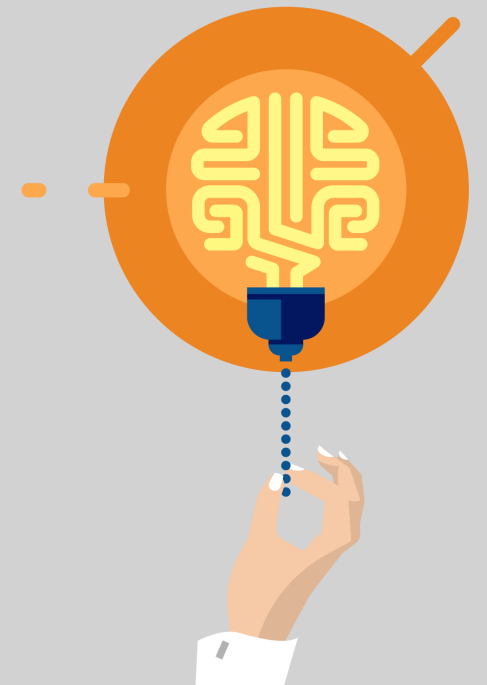


3+1 Things every Data Scientist must know!

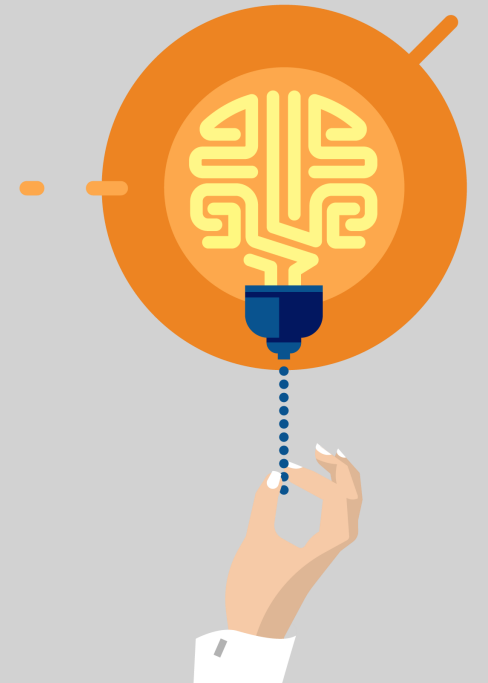
Mahesh Baliya
Cloud Solution Architect - IOT, Data & AI



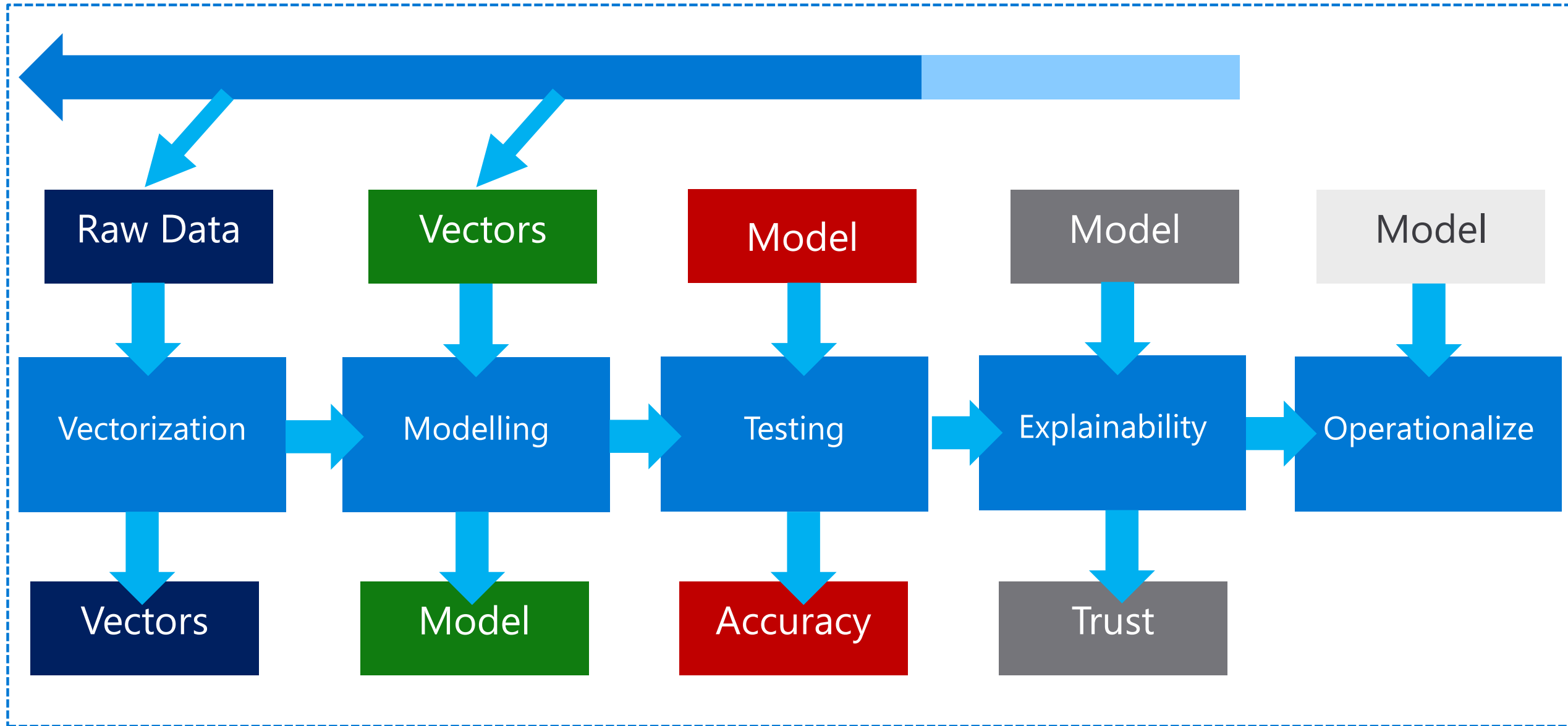
- Auto ML & UI ML
- Model Interpretability
- ML Ops
- $3+1 = ?$



Azure Machine Learning Introduction



Machine Learning Process



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



What is Azure Machine Learning service?

Set of Azure
Cloud Services



Python
SDK

That enables
you to:

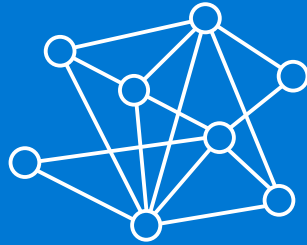
- ✓ Prepare Data
- ✓ Build Models
- ✓ Train Models

- ✓ Manage Models
- ✓ Track Experiments
- ✓ Deploy Models

Azure ML

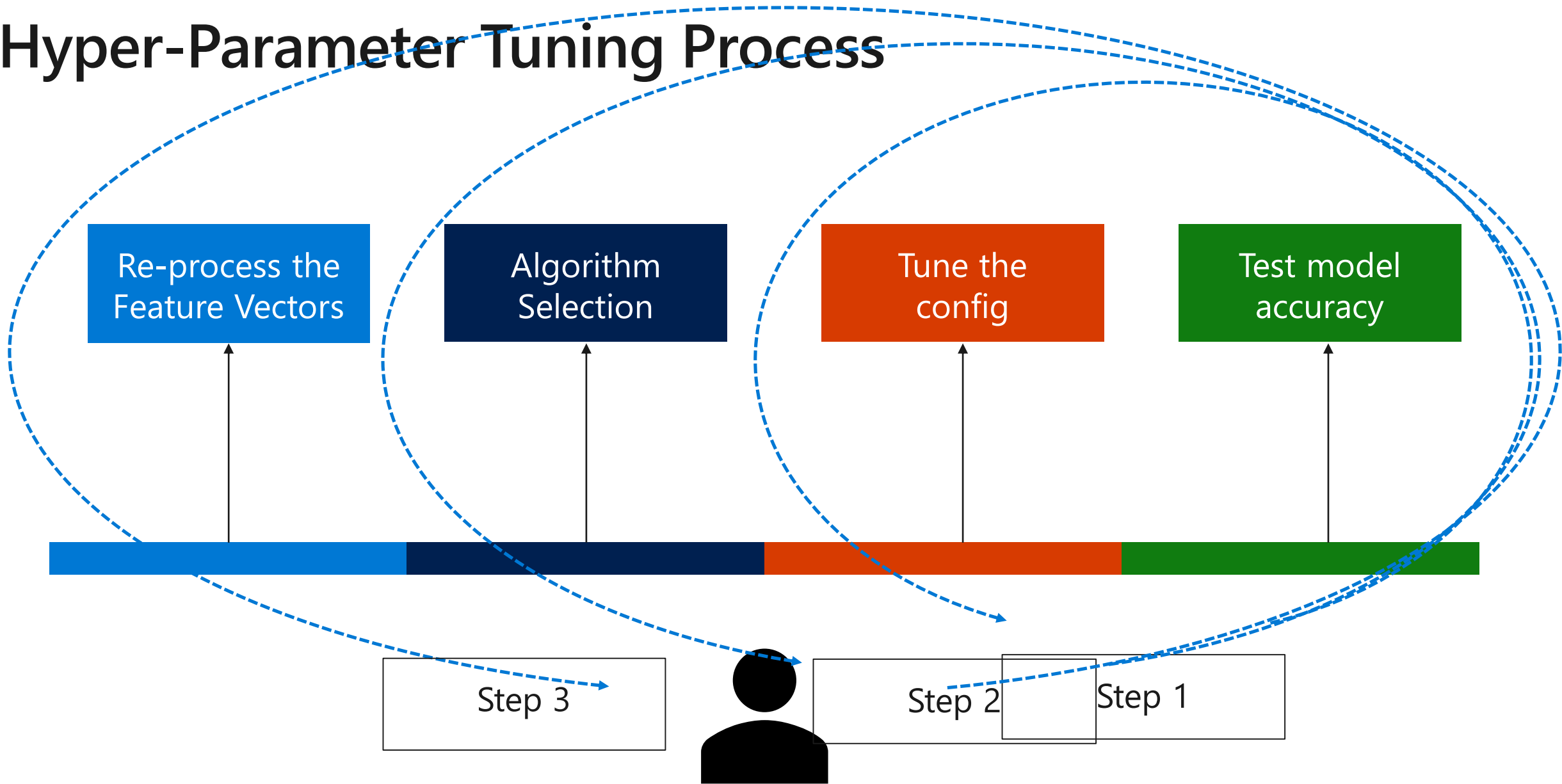
<https://azure.microsoft.com/en-us/services/machine-learning/>

<https://github.com/microsoft/recommenders>

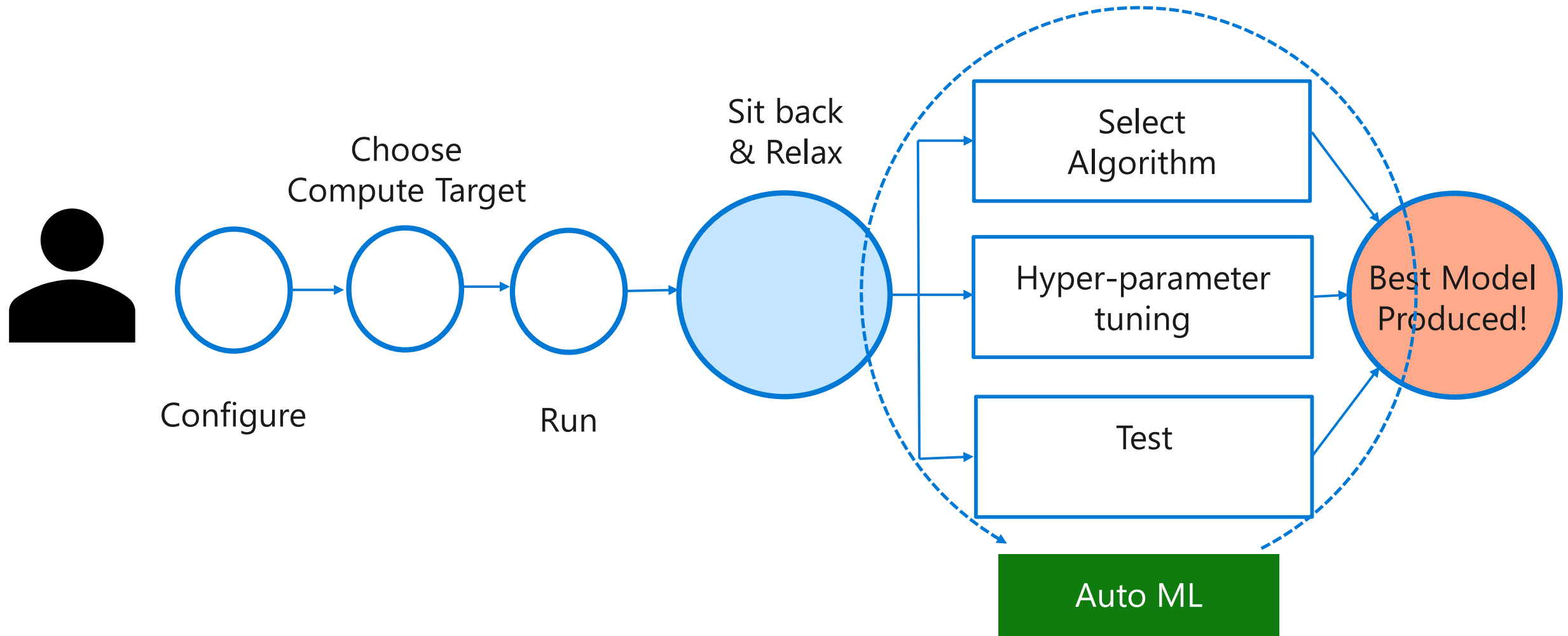


Automated machine learning

Hyper-Parameter Tuning Process

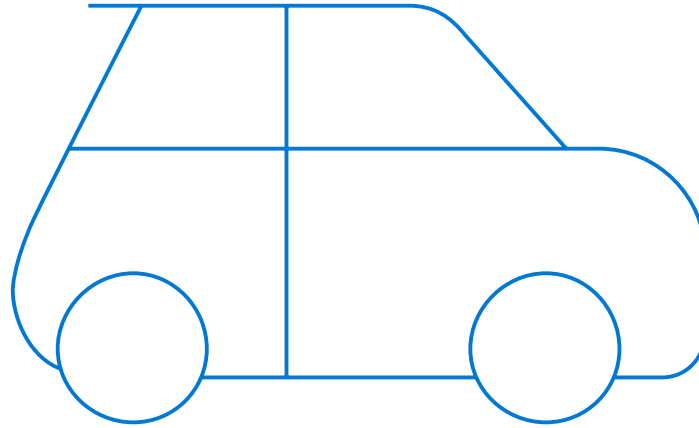


Auto ML



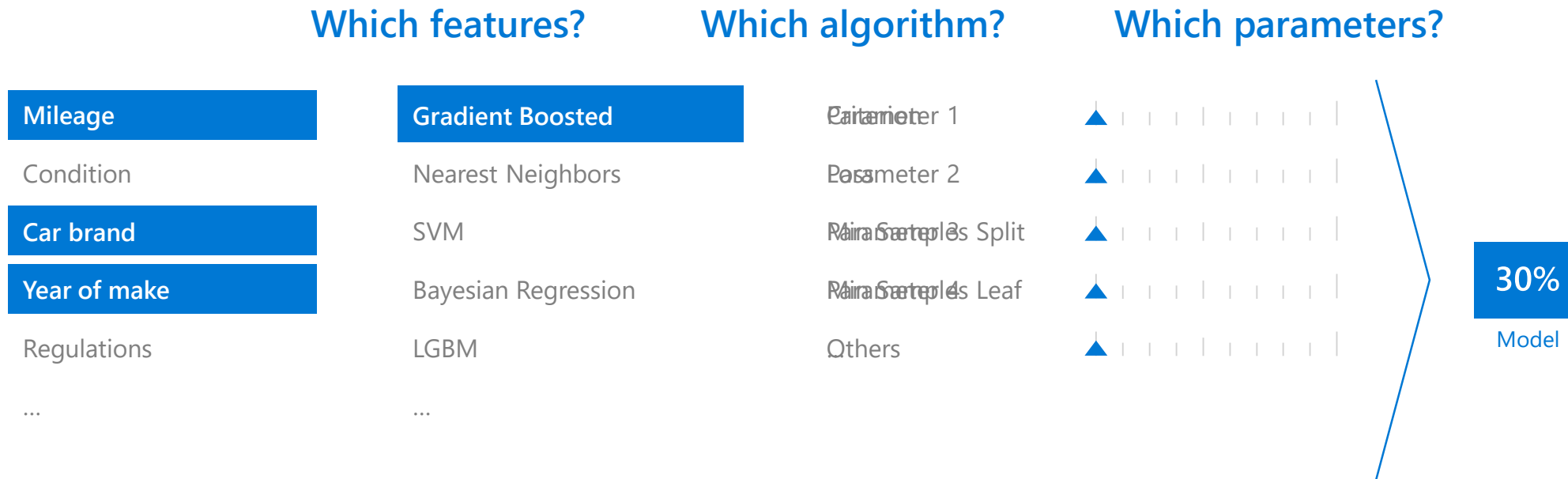
Azure Machine Learning

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?

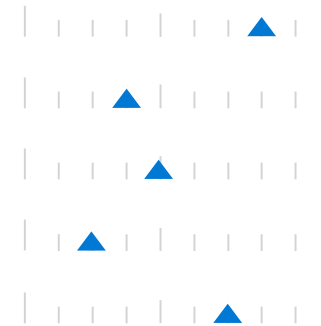
Neighbors

Weights

Min Samples Split

Min Samples Leaf

XYZ



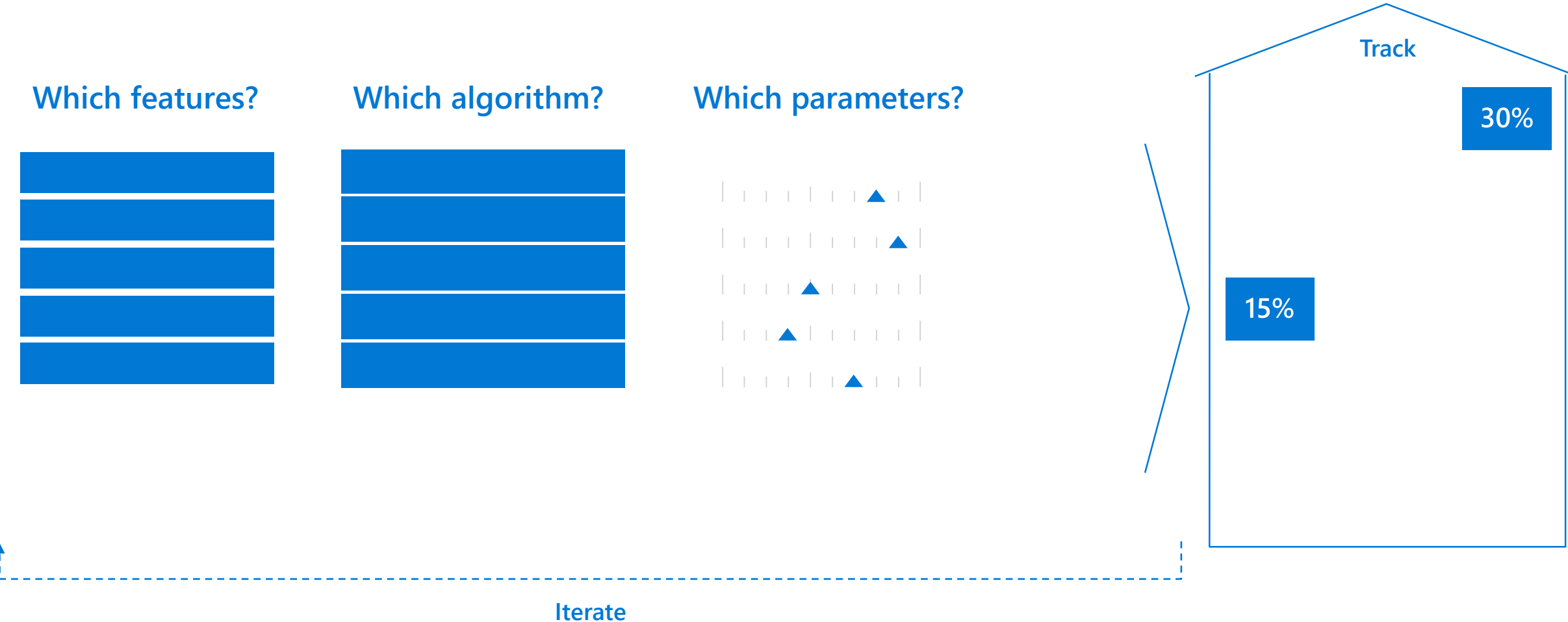
Track

30%

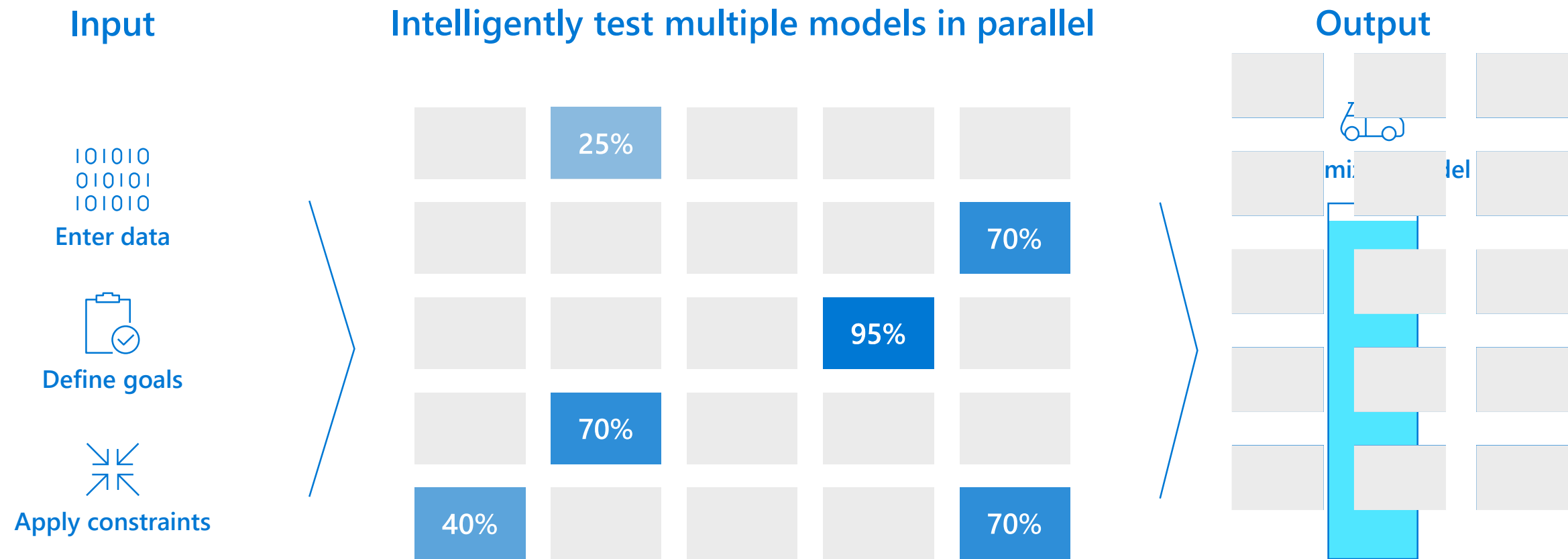
Model

Iterate

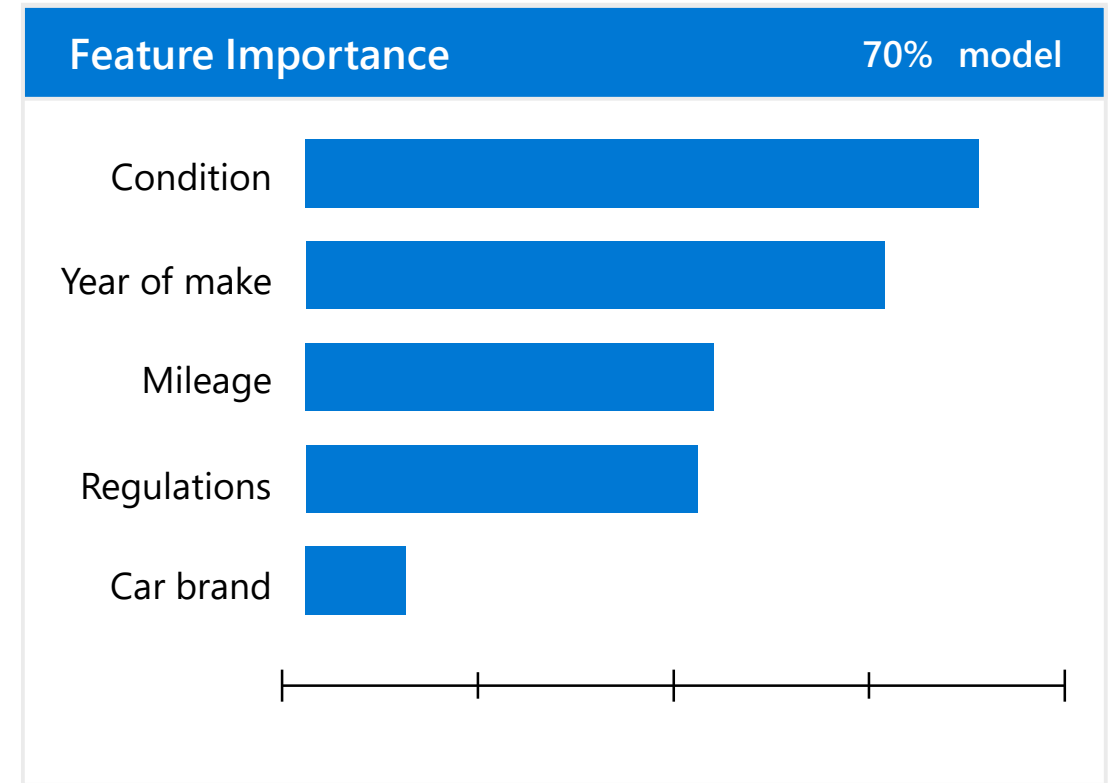
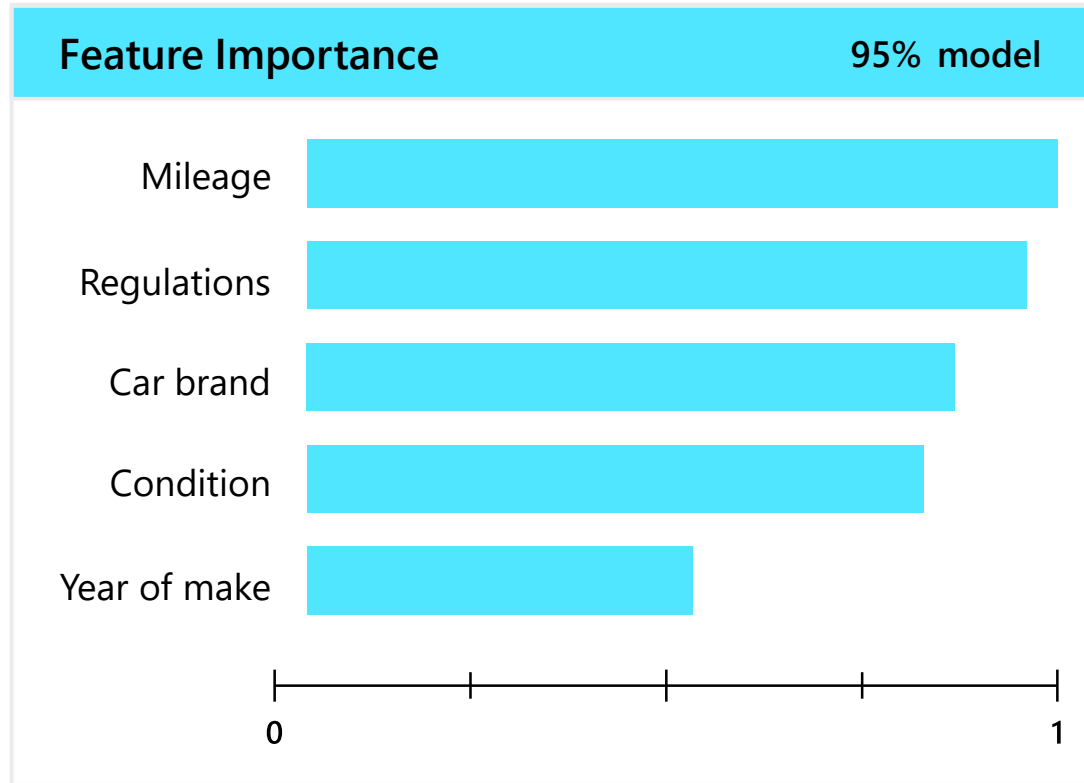
Model creation is typically a time consuming process



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

Auto ML

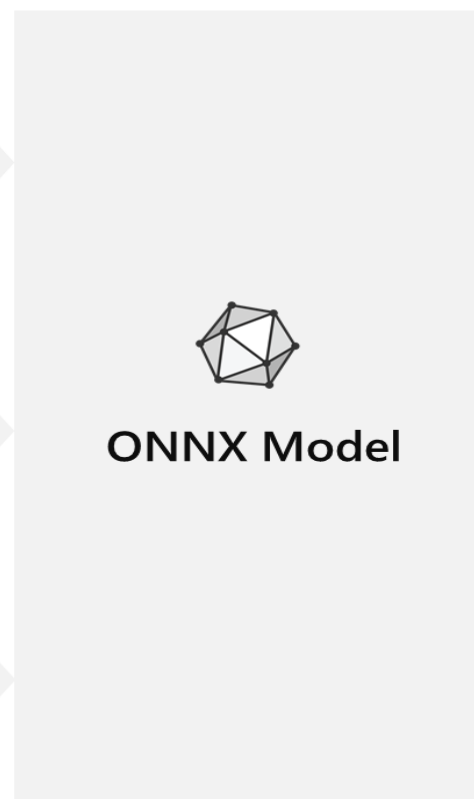
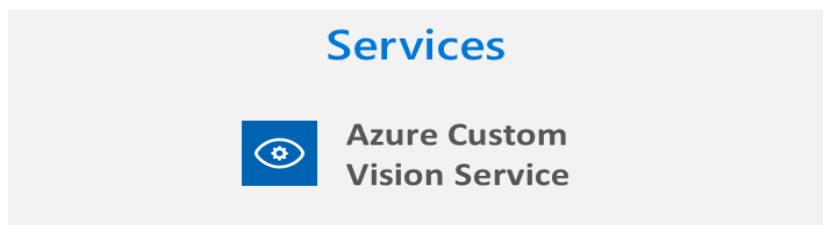
<https://github.com/Azure/MachineLearningNotebooks>

The image features the ONNX logo, which consists of the text "ONNX" in a bold, black, sans-serif font. The text is centered within a large white circle. This circle is set against a dark gray background, and the circle's edge is defined by a thin, light gray border.

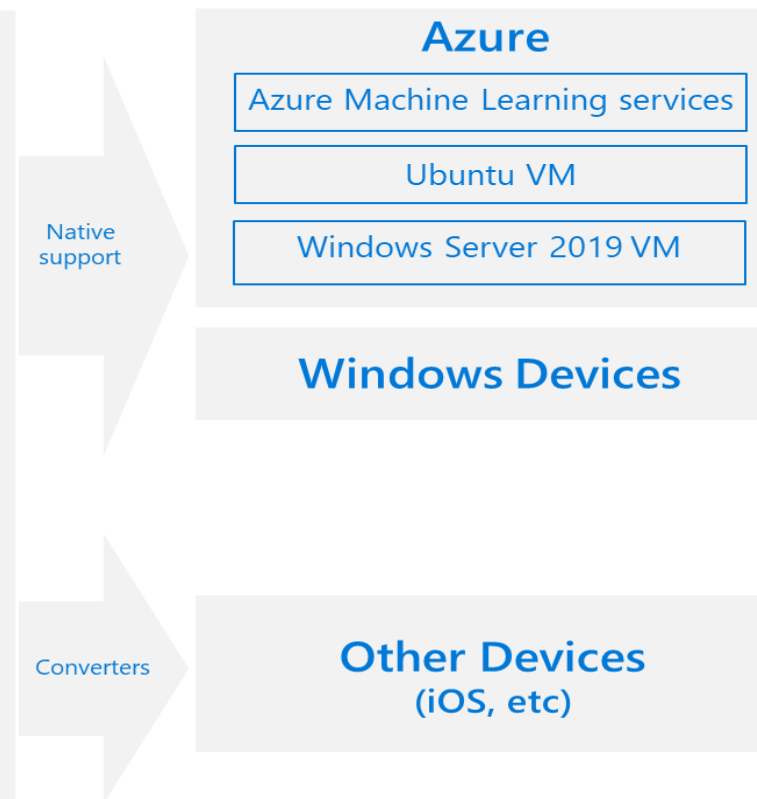
ONNX

Open Neural Network Exchange

Create



Deploy

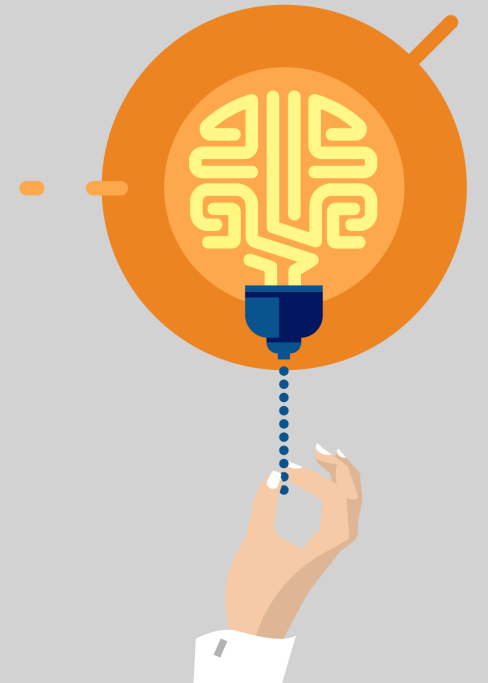


ONNX

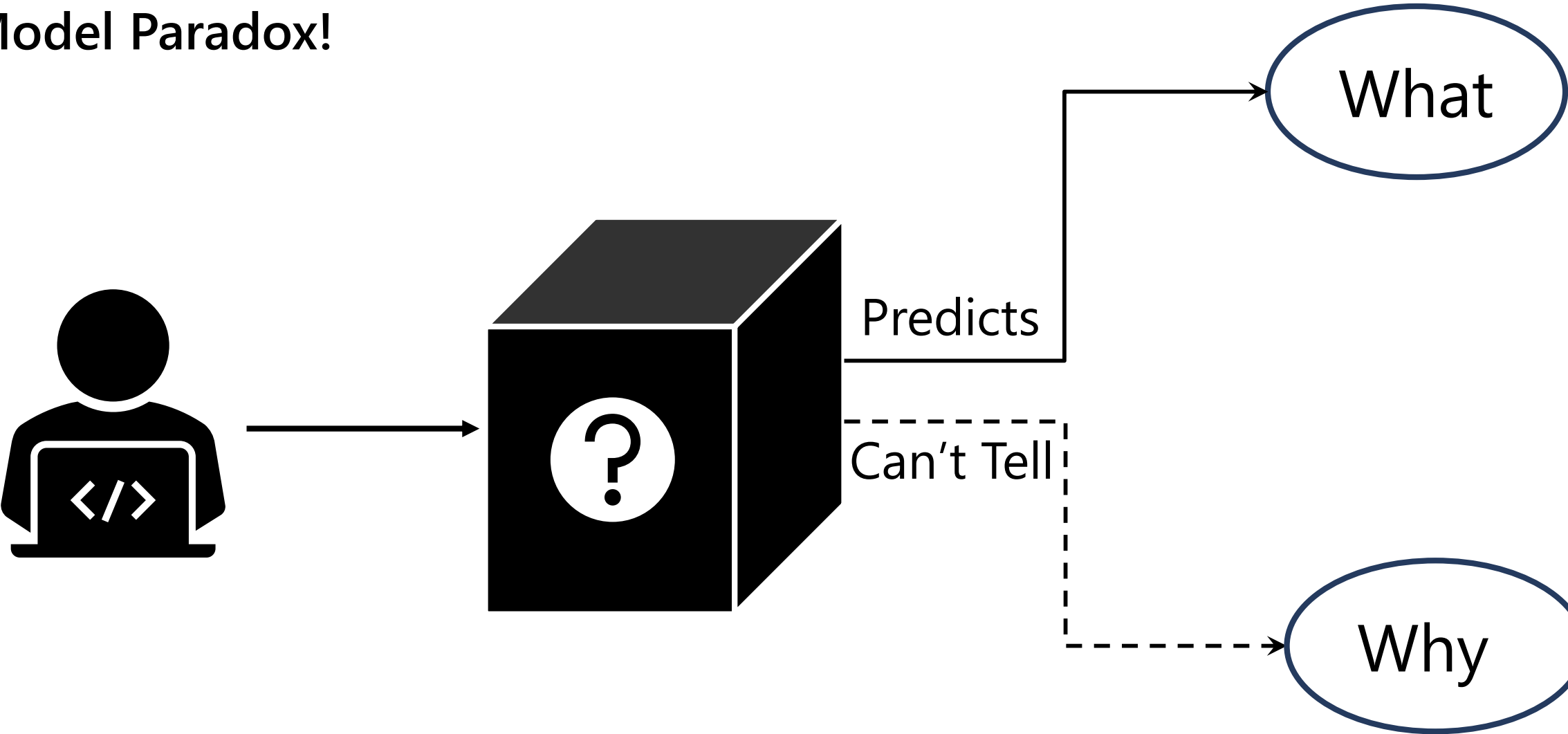
<https://onnx.ai/>

<https://github.com/microsoft/onnxruntime>

Model Interpretability



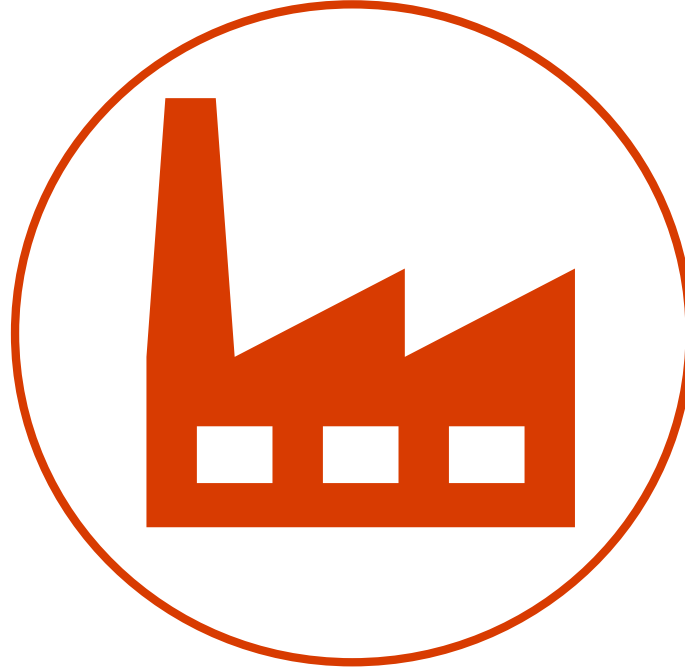
Model Paradox!



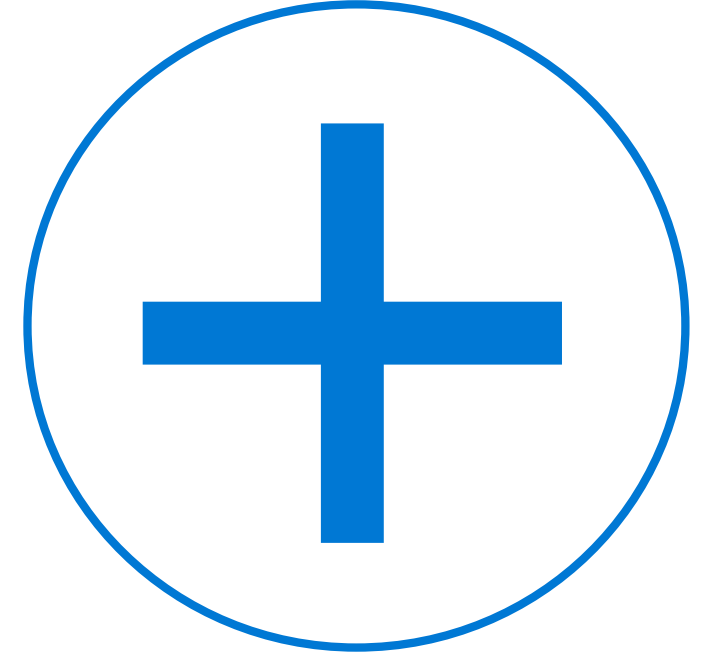
Model Interpretability - Scenarios



Financial Services



Manufacturing

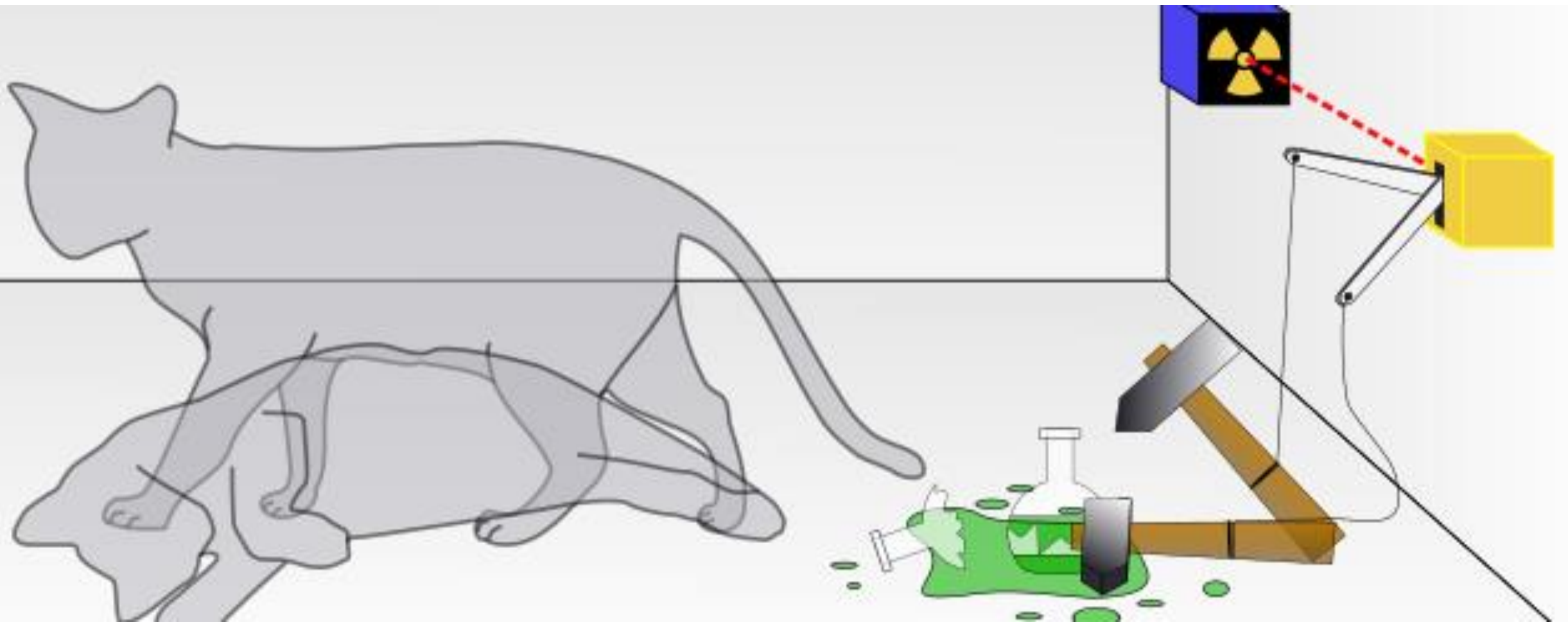


Healthcare

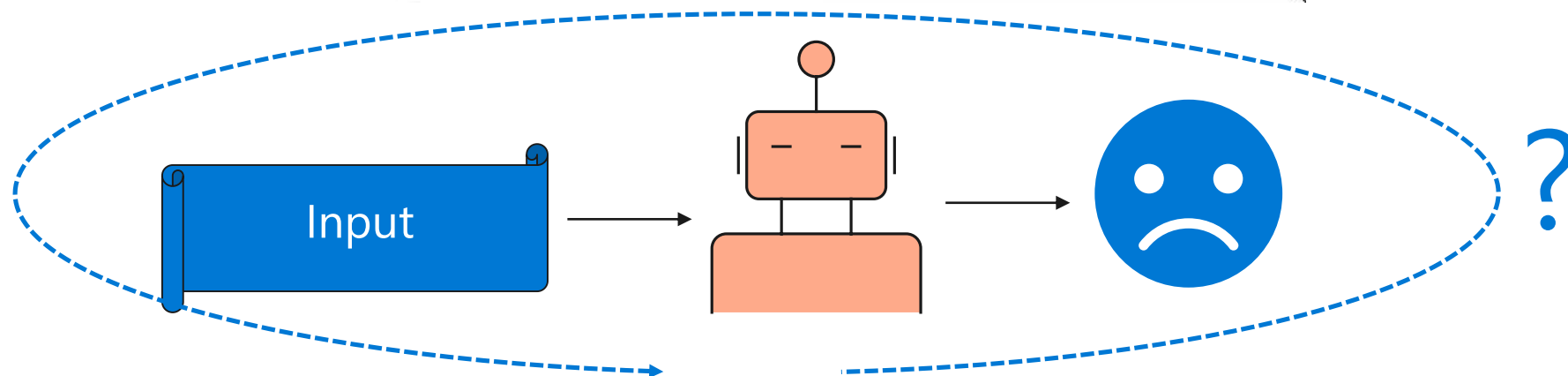
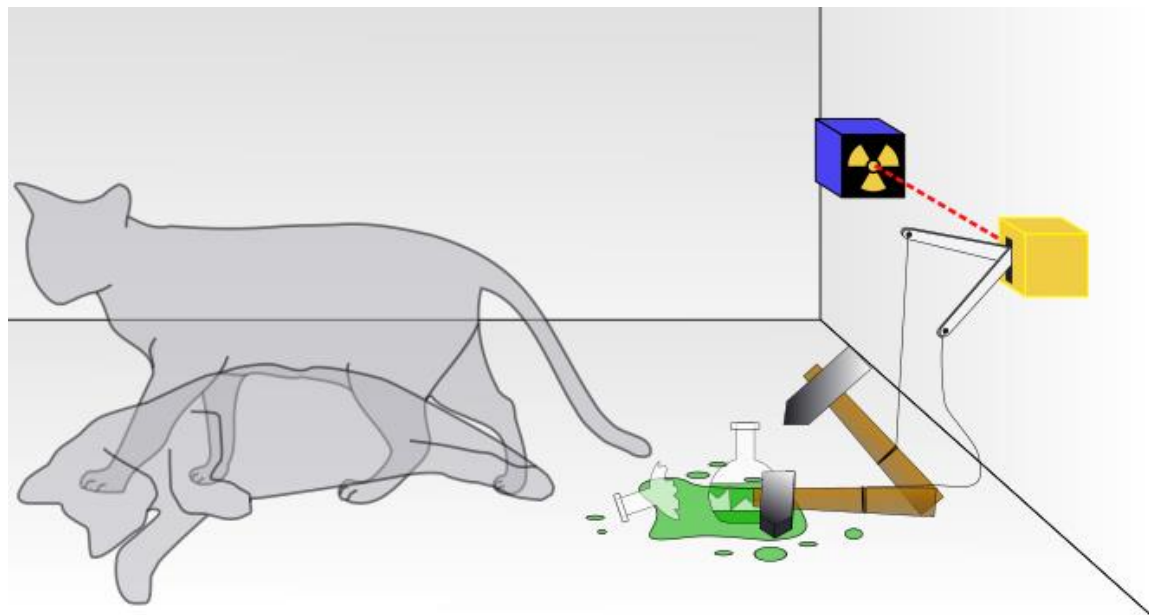
Model Trust!



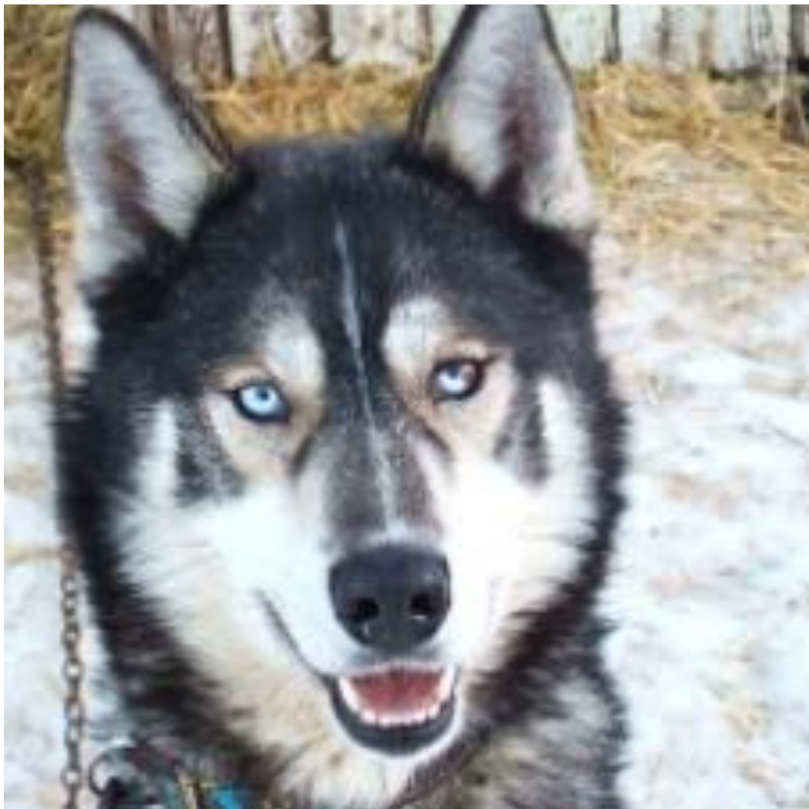
Why Trust Model?



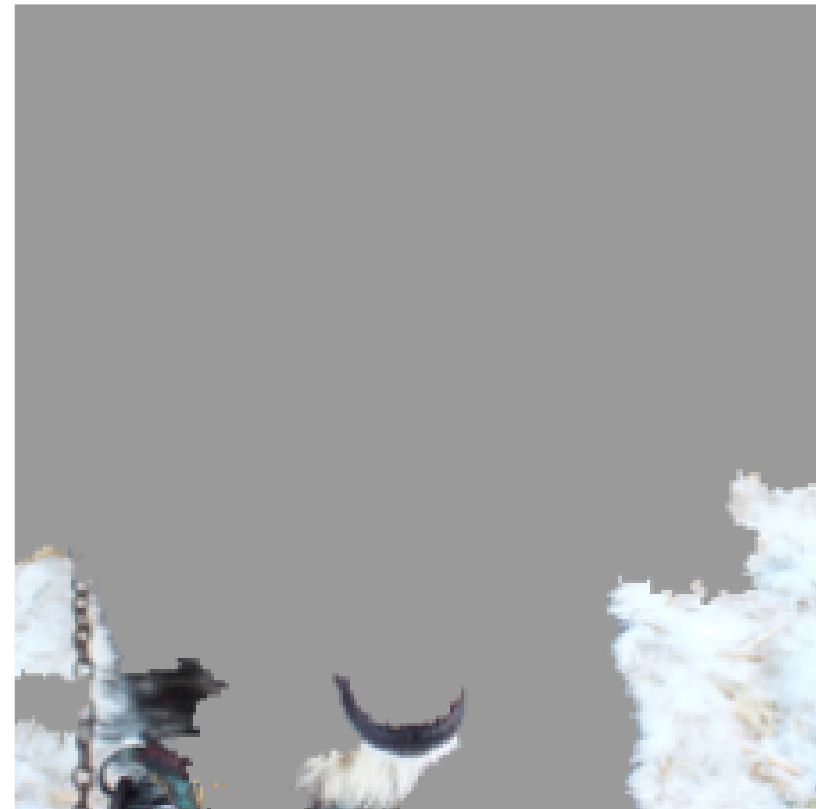
Why Trust Model?



(Husky Vs Wolf)

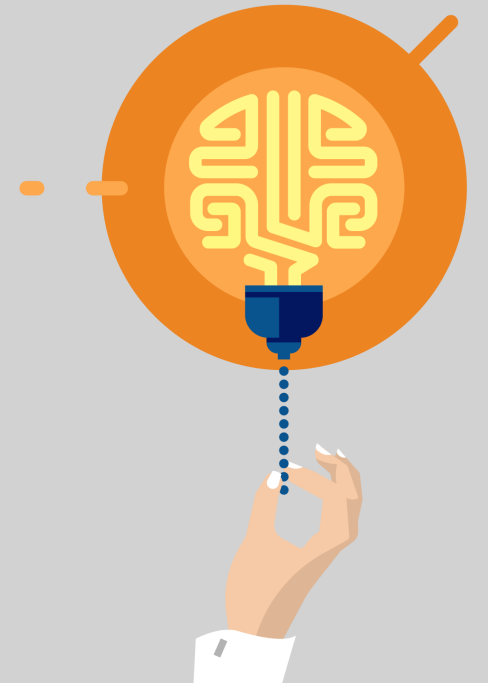


Model Predicts Husky as Wolf

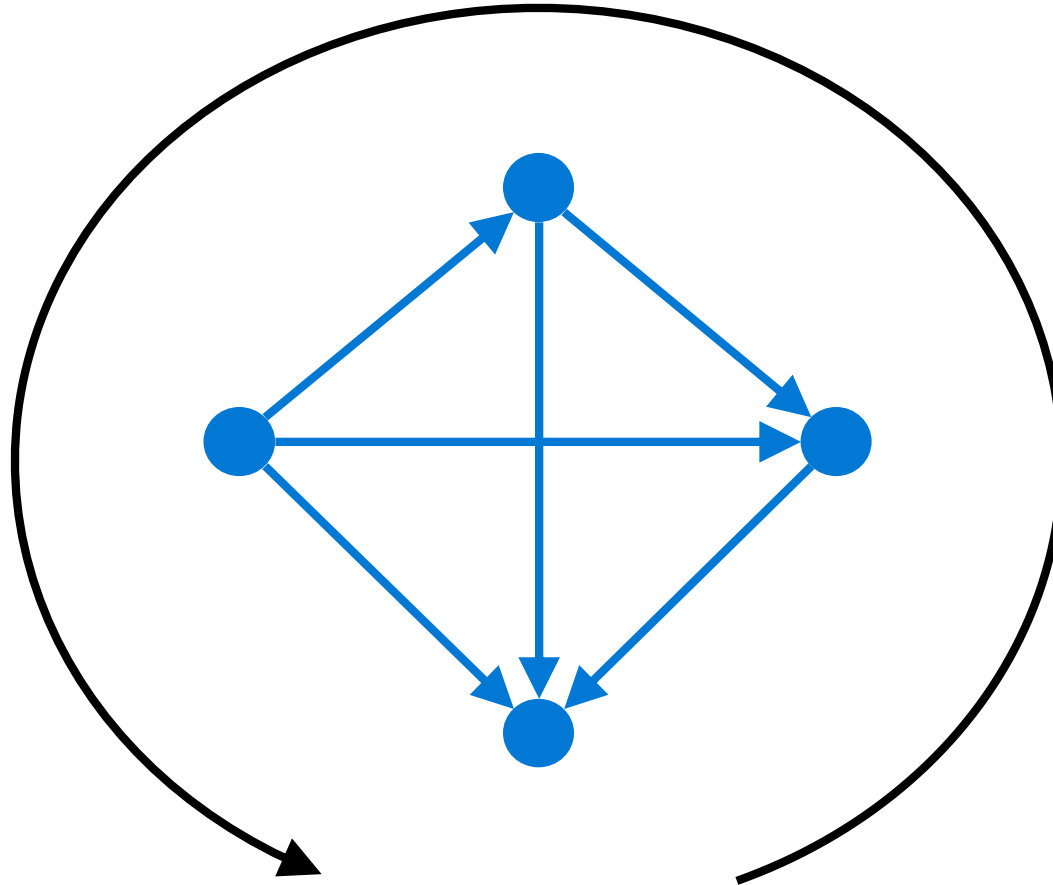


Because of above

Importance of Model Interpretability

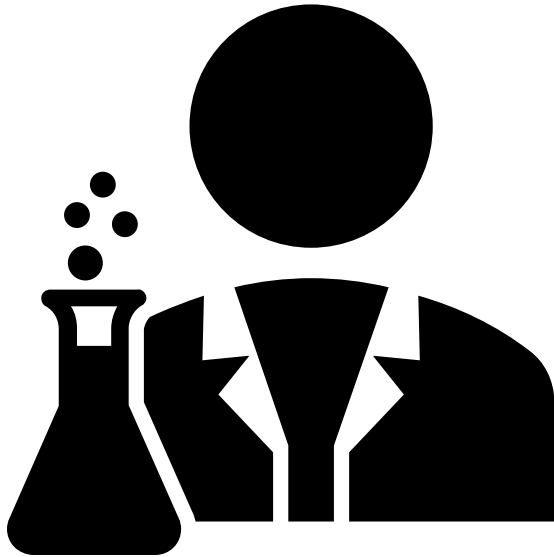


Model Debugging

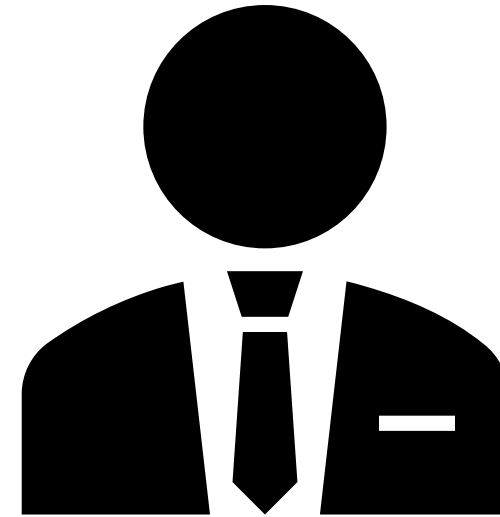


Debug Model and Test

Build Confidence



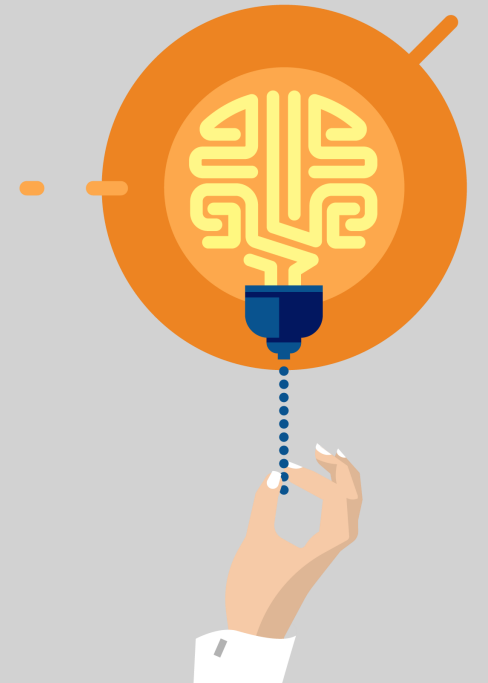
Build
Confidence



Data Scientist

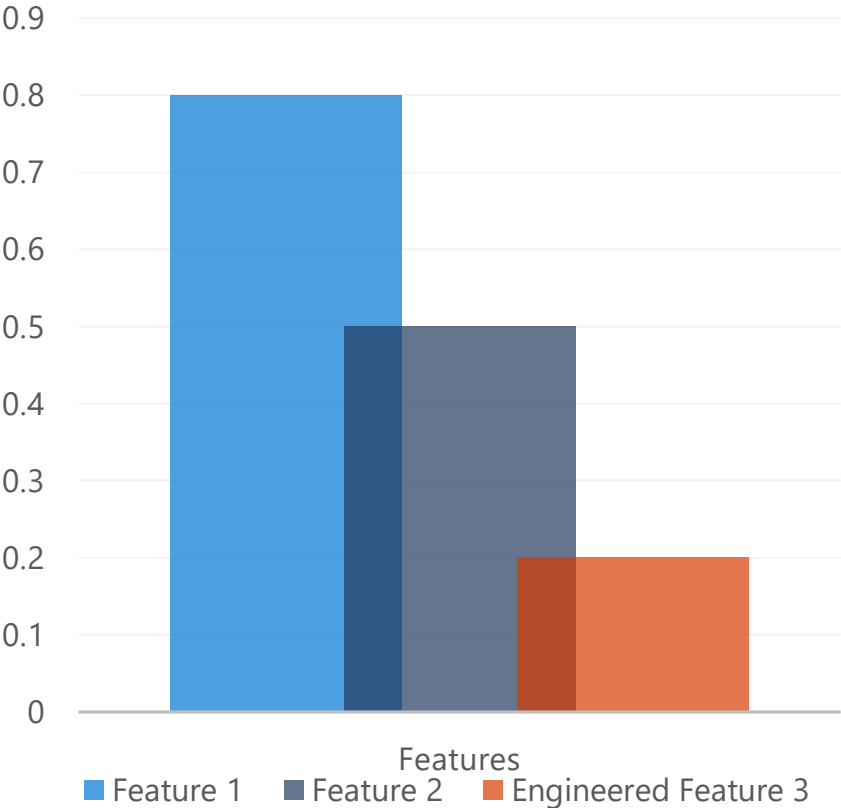
Business Stake Holder

Understanding Models

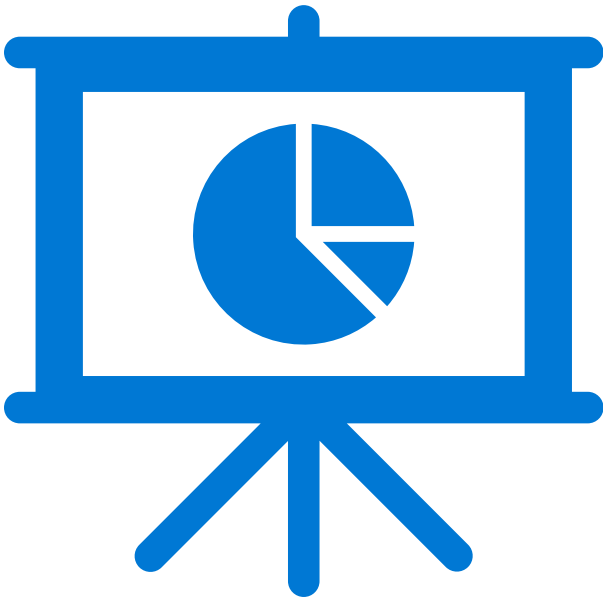


Azure ML – Model Interpretability

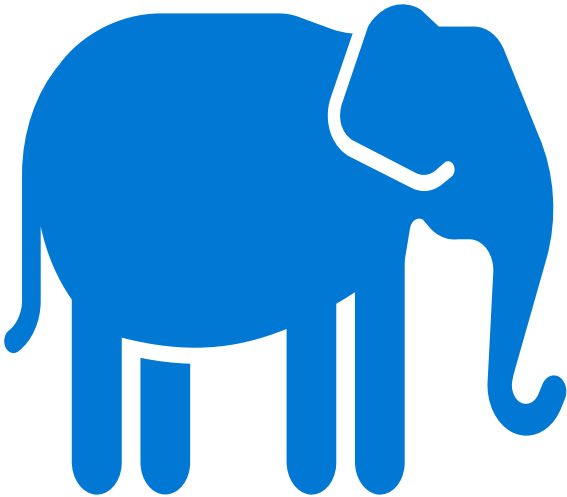
Feature Importance



Interactive Visualizations

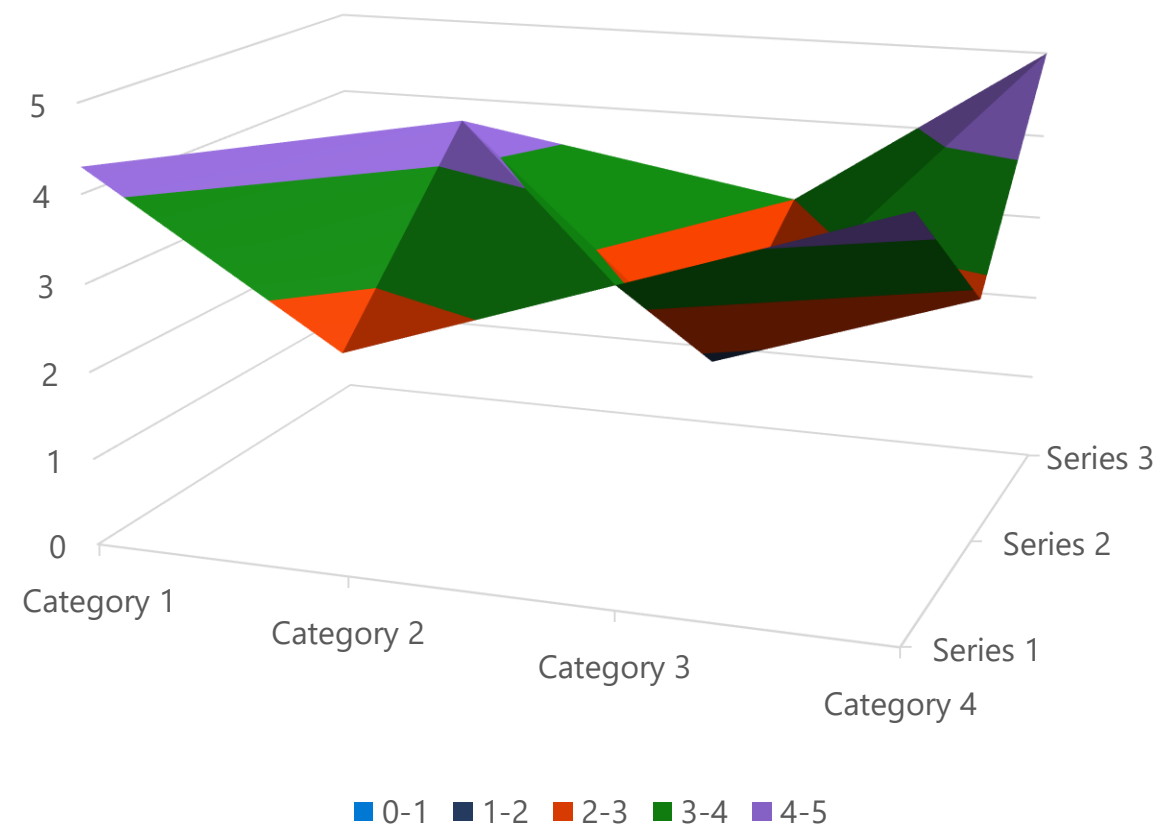


At Scale

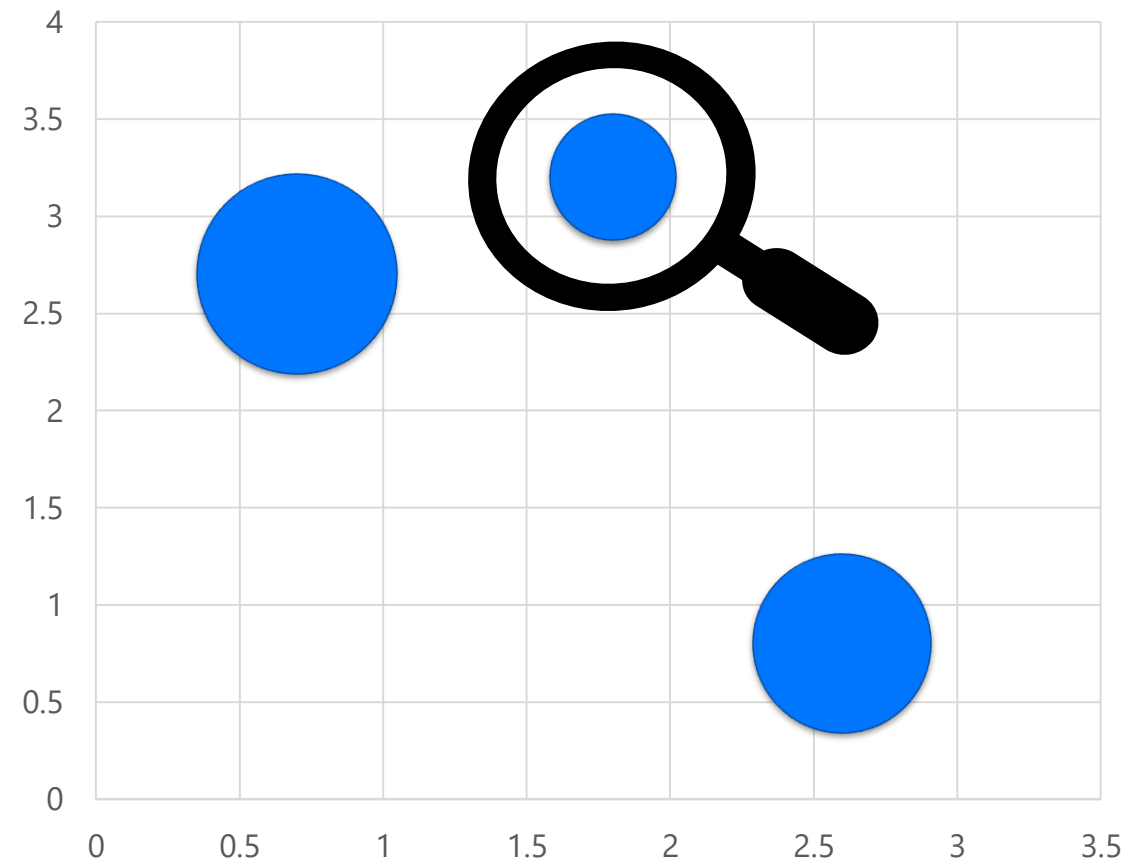


Global Vs Local Explanations

Global



Local



Packages

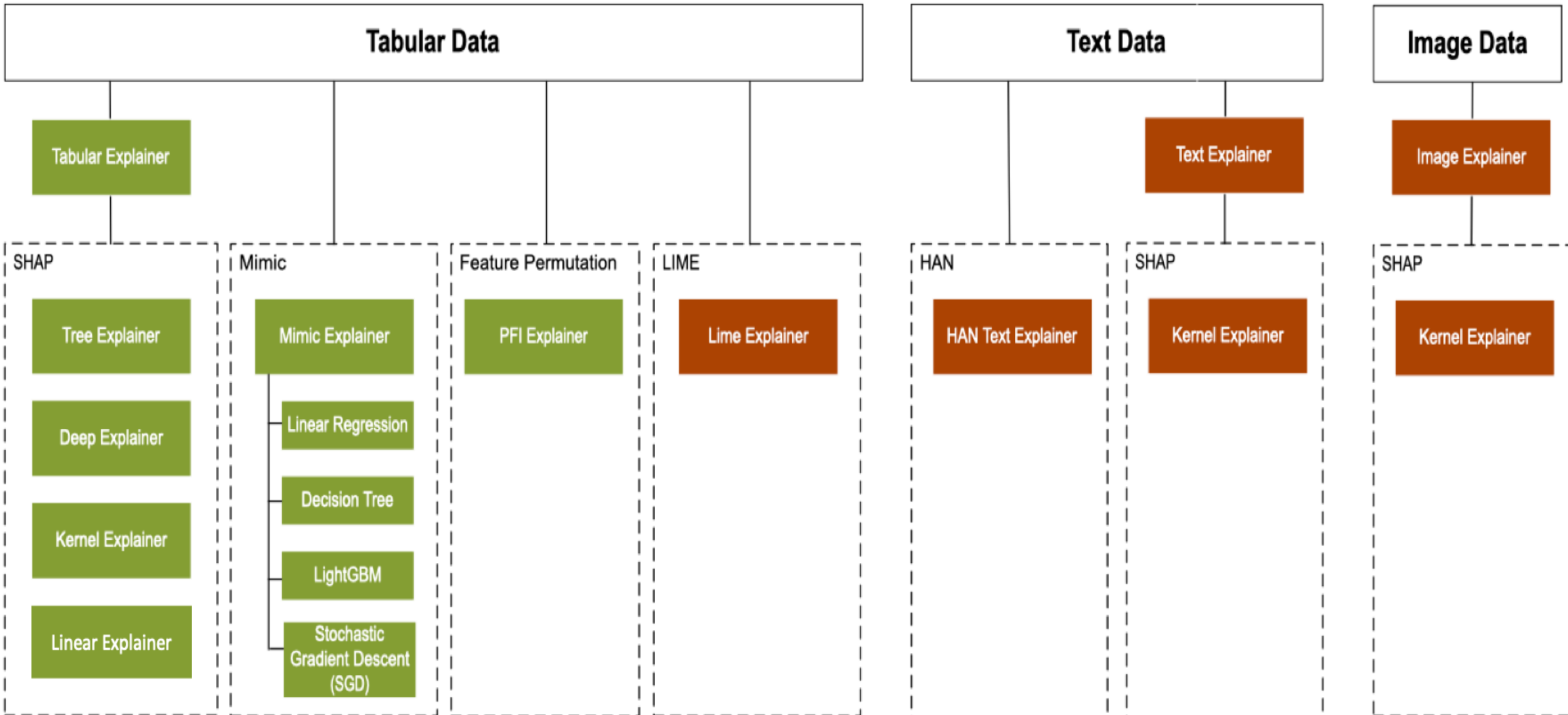


azureml.interpret

azureml.contrib.
interpret

azureml.train.
automl.
automlexplainer

Machine Learning Interpretability



ML Interpret Community

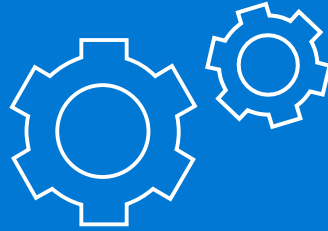
<https://github.com/interpretml/interpret-community>



Model Deployment

Choosing Model Deployment Modes

Deployment Mode	When to choose
ACI – Azure Container Instances	<ul style="list-style-type: none">• Faster Deployment• Mainly used in Development and Testing scenarios
AKS – Azure Kubernetes Service	<ul style="list-style-type: none">• Preferable for Production deployments• Autoscaling• Logging & Model Data collection• Best performance for web-service calls
Azure IoT Edge	<ul style="list-style-type: none">• Low latency decision making• Reduce network bandwidth by making predictions locally• Intermittent network connectivity• Highly sensitive IP
Batch Deployment mode	<ul style="list-style-type: none">• For making decisions on the groups of records offline• Large scale batch decisioning



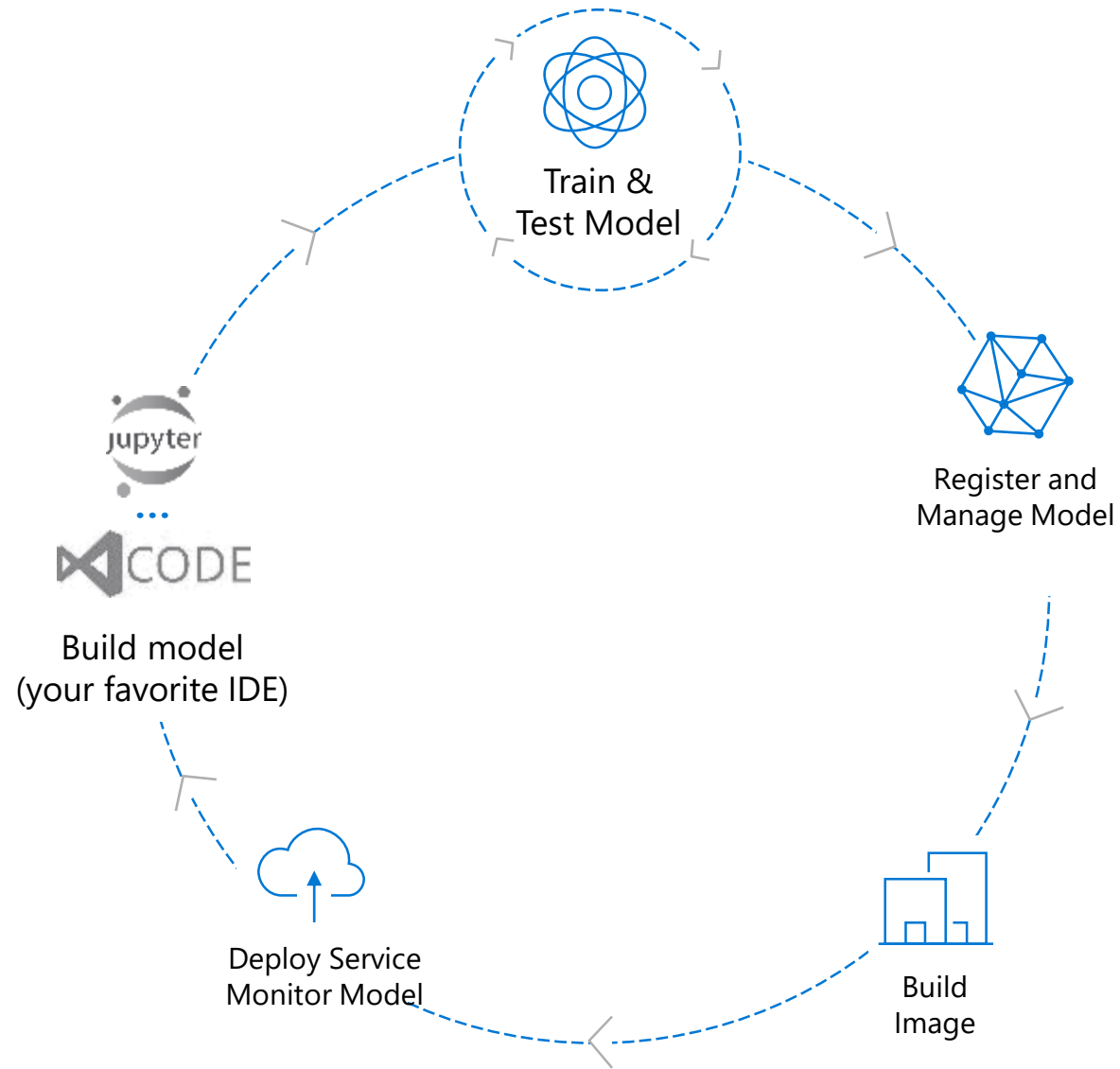
DevOps for machine learning

DevOps loop for data science

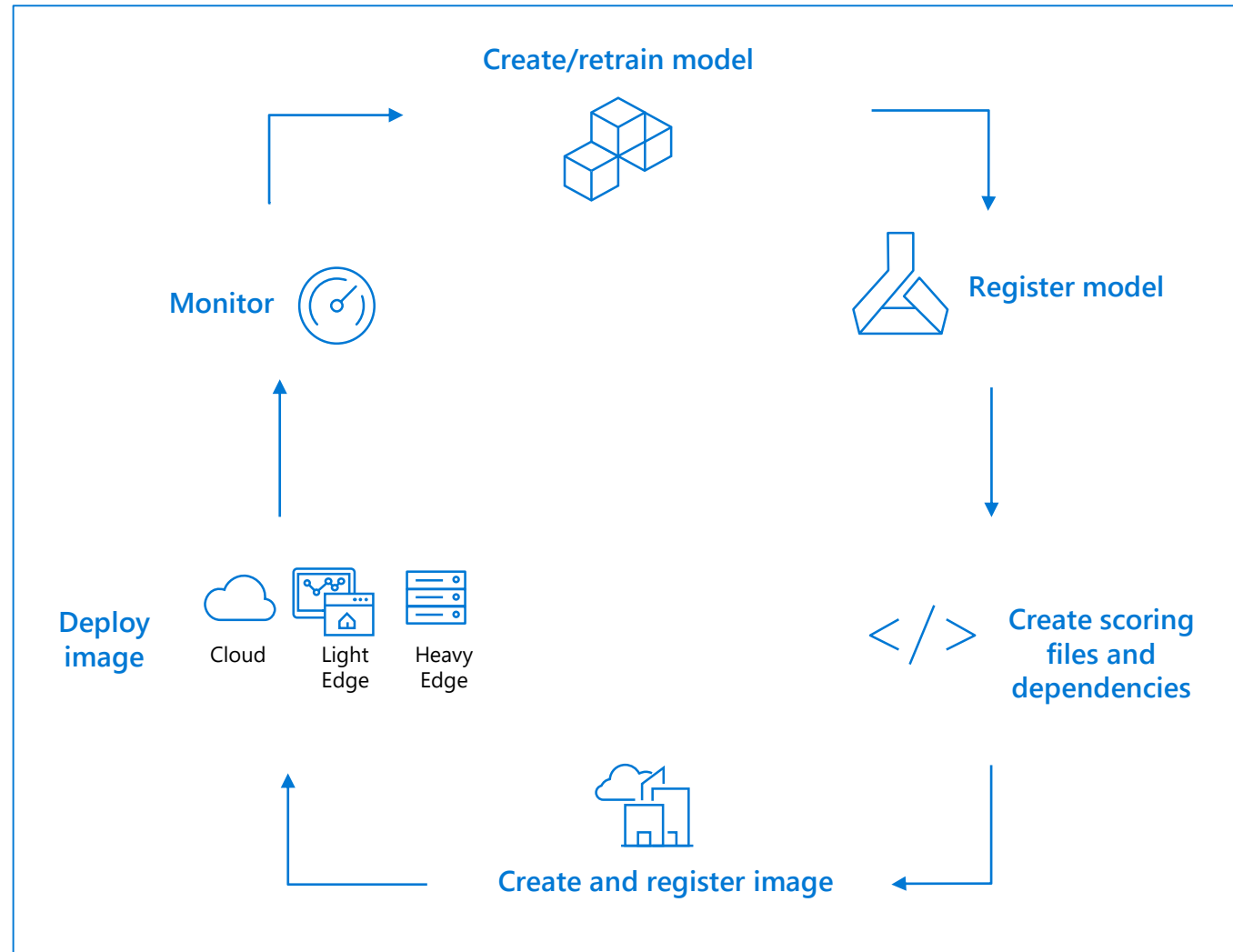
Prepare



Prepare
Data



Model management in Azure Machine Learning



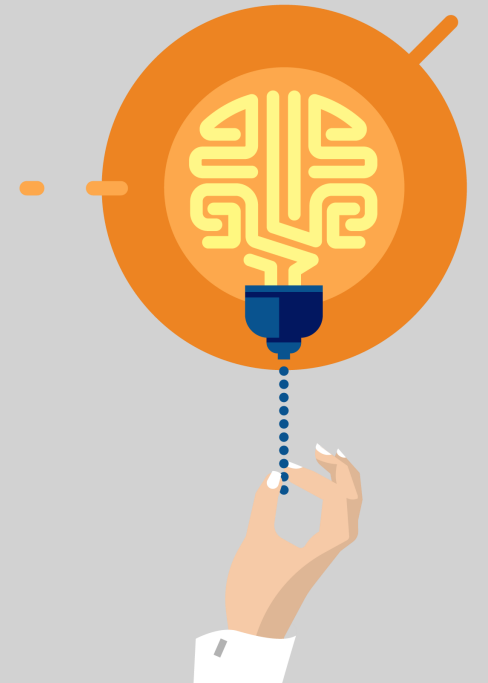
MLOps with Azure ML

Hands-on Labs:

<https://github.com/microsoft/MCW-ML-Ops>

<https://microsoftcloudworkshop.com/>

Machine Teaching!



Can you find
Jellyfish Mouth?



Image Source: <https://www.thoughtco.com/facts-about-jellyfish-4102061>

Millions of Training Samples

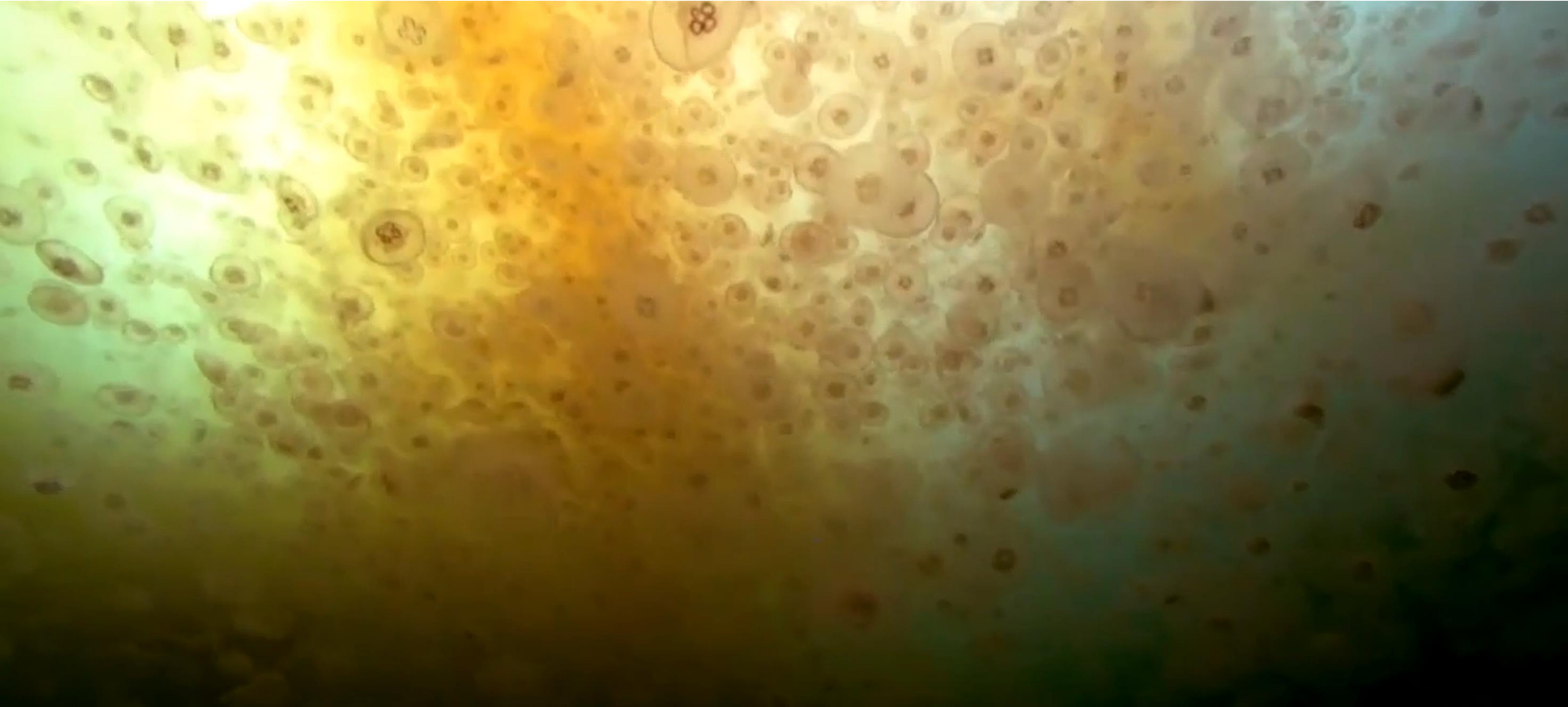


Image Source: <https://www.thoughtco.com/facts-about-jellyfish-4102061>

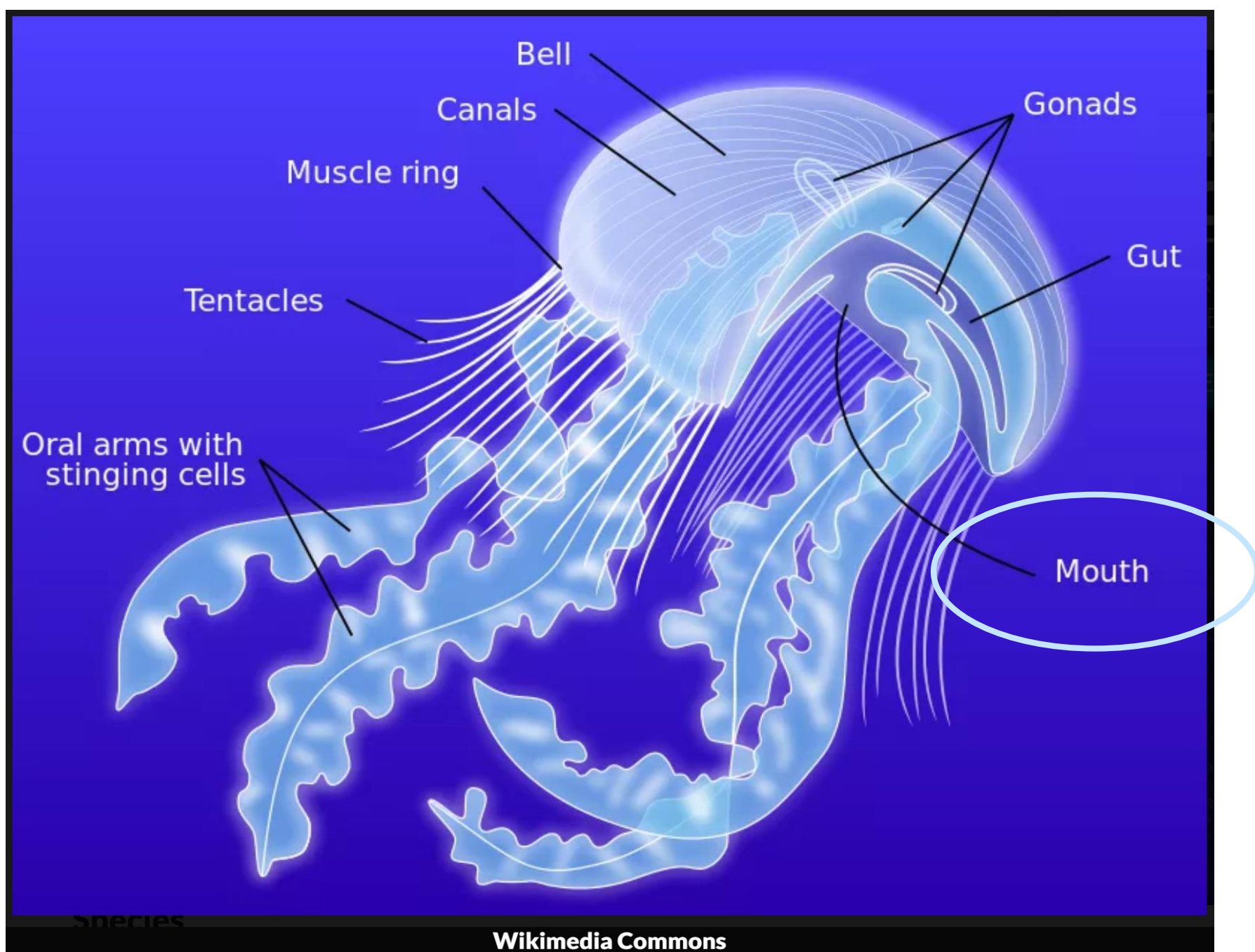


Image Source: <https://www.thoughtco.com/facts-about-jellyfish-4102061>

Benefits of Machine Teaching



Machine Teaching useful links

<https://blogs.microsoft.com/ai/machine-teaching/>

<https://docs.bons.ai/guides/inkling-guide.html>

<https://www.microsoft.com/en-us/research/group/machine-teaching-group/>

