Nash Tech.

Practicing ML.NET

Solving problems using machine learning in .NET

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Agenda

- What is machine learning?
- Getting started with .NET Interactive, Jupyter
- Solving a simple problem using ML.NET
- Transfer learning
- Onnx
- AutoML with ML.NET CLI

What's machine learning?

- **Artificial intelligence (AI)** is a technique that enables computers to mimic human intelligence. It includes machine learning.
  - **Machine learning (ML)** is a subset of artificial intelligence that includes techniques (such as deep learning) that enable machines to improve at tasks with experience.
    - **Deep learning (DL)** is a subset of machine learning based on artificial neural networks that permit a machine to train itself.

What's machine learning?

It's …. programing the unpgrogramable!

Machine learning algorithms

Supervised learning

- **Regression**: how much/how many (quantity)
- **Classification**: which standard label does it have? (quality)

Unsupervised learning

- **Clustering**: are there different groups? Which does it belong to?
- **Anomaly detection**: is this weird?
- **Recommendation**: which option should I choose?

ML Workflow

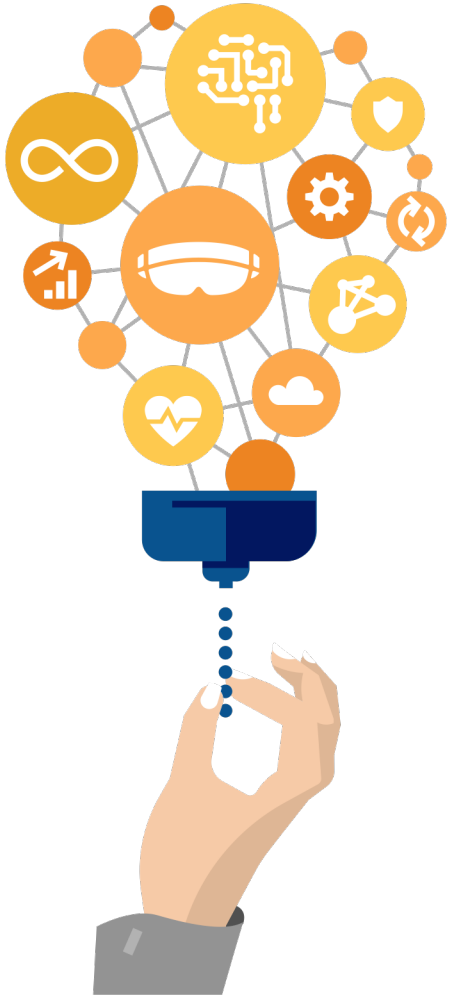
Data exploration › **Train model** › **Test model** › **Deploy & Run**

- Find, select, and/or create data
- Apply preprocessing
- Ethical considerations

- Apply algorithm
- Select candidate model

- Test with unseen data
- Select good enough model
- Explain ability

- Deploy chosen model
- Application posts to API
- Human oversight



Introduce ML.NET

Machine Learning framework for building custom ML Models

Custom ML made easy
Automated ML and Tools (Model Builder and CLI)

Proven at scale
Azure, Office, Windows

Extensible
TensorFlow, ONNX and Infer.NET

Cross-platform and open-source
Runs everywhere

Problems ML.NET can solve

Sentiment analysis

Analyze the sentiment of customer reviews using a binary classification algorithm.

Product recommendation

Recommend products based on purchase history using a matrix factorization algorithm.

Price prediction

Predict taxi fares based on parameters such as distance traveled using a regression algorithm.

Customer segmentation

Identify groups of customers with similar profiles using a clustering algorithm.

Object detection

Recognize objects in an image using an ONNX deep learning model.

Fraud detection

Detect fraudulent credit card transactions using a binary classification algorithm.

Sales spike detection

Detect spikes and changes in product sales using an anomaly detection model.

Image classification

Classify images (for example, broccoli vs. pizza) using a TensorFlow deep learning model.

Sales forecasting

Forecast future sales for products using a regression algorithm.

ML.NET Components

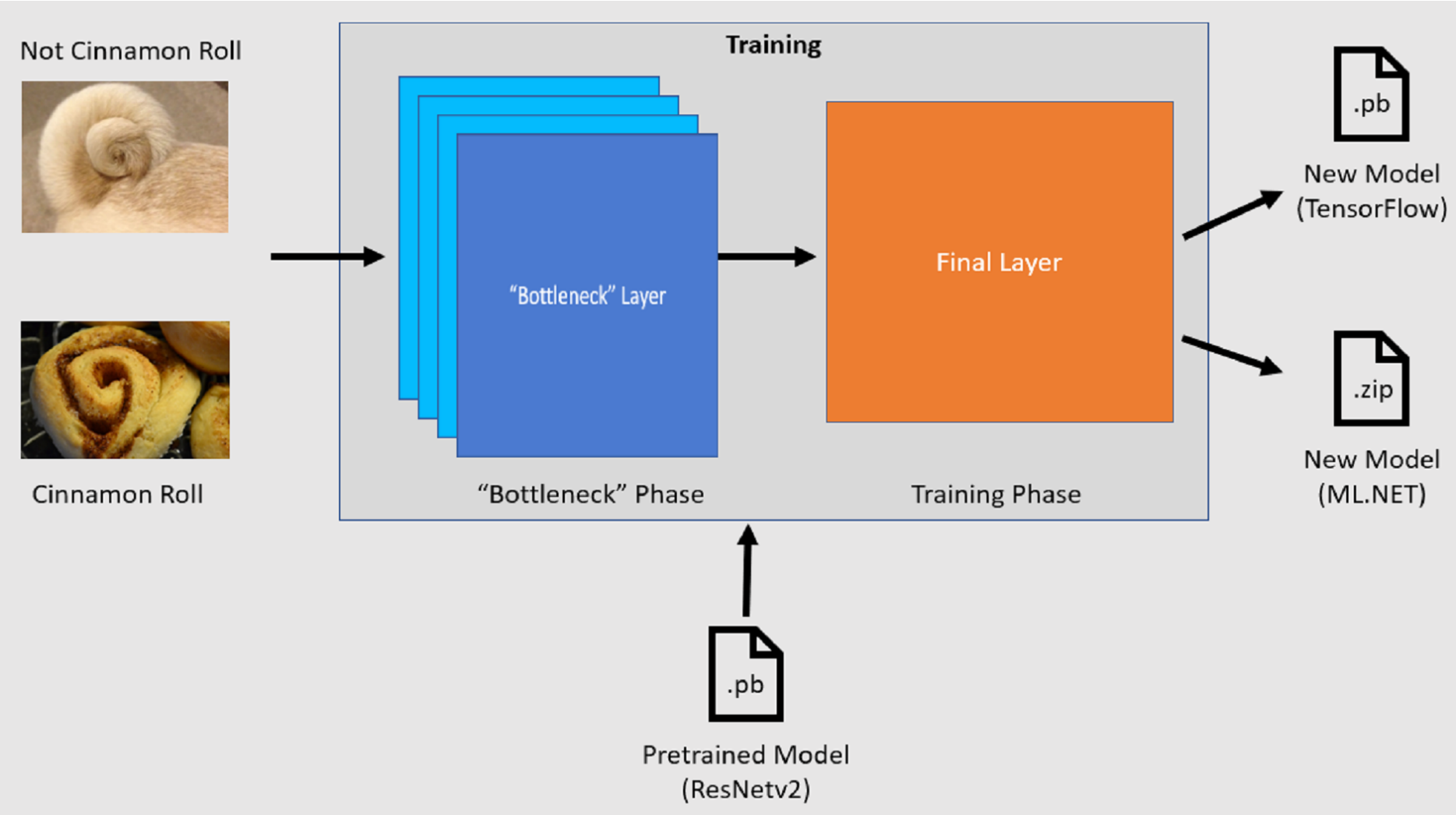
Training & Consumption

Data	Transforms	Trainers	Others
IDataView	Text	Binary Classification	Train/Test/Validate
Text Readers	Feature Engineering	Multi-class clasification	Cross-Validation
IEnumarable Reader	Normalization	Regression	Quality Metrics
Image Reader	Missing Values	Abnormaly Detection	Calibrators
Schema	User custom transforms	Ranking	Tensorflow
Vector Column		Clustering	Onnx
			Extension for .NET Core

Let’s try to solve a simple problem…

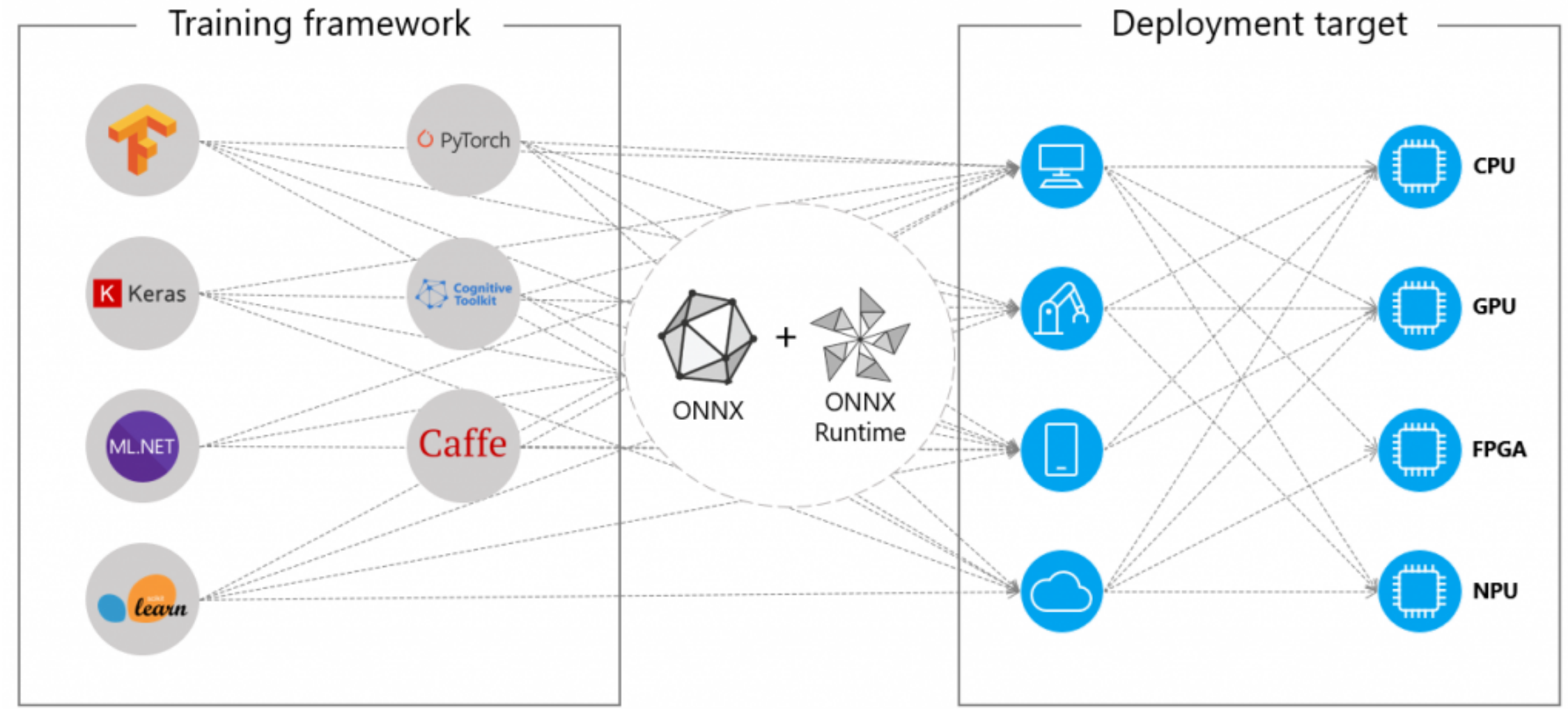
Source: internet

Transfer learning



Source: Microsoft

Onnx



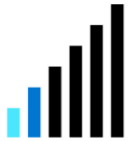
Source: Microsoft

AutoML

1. 

Data Preprocessing

Automated ML currently supports automated data cleaning

2. 

Feature Engineering

Most time-consuming part when done manually can now be done within minutes.

3. 

Algorithm Selection

Testing many different algorithms at once.

4. 

Hyper-parameter Tuning

Hyperparameter tuning what to include what to leave out

5. 

Model Recommendation

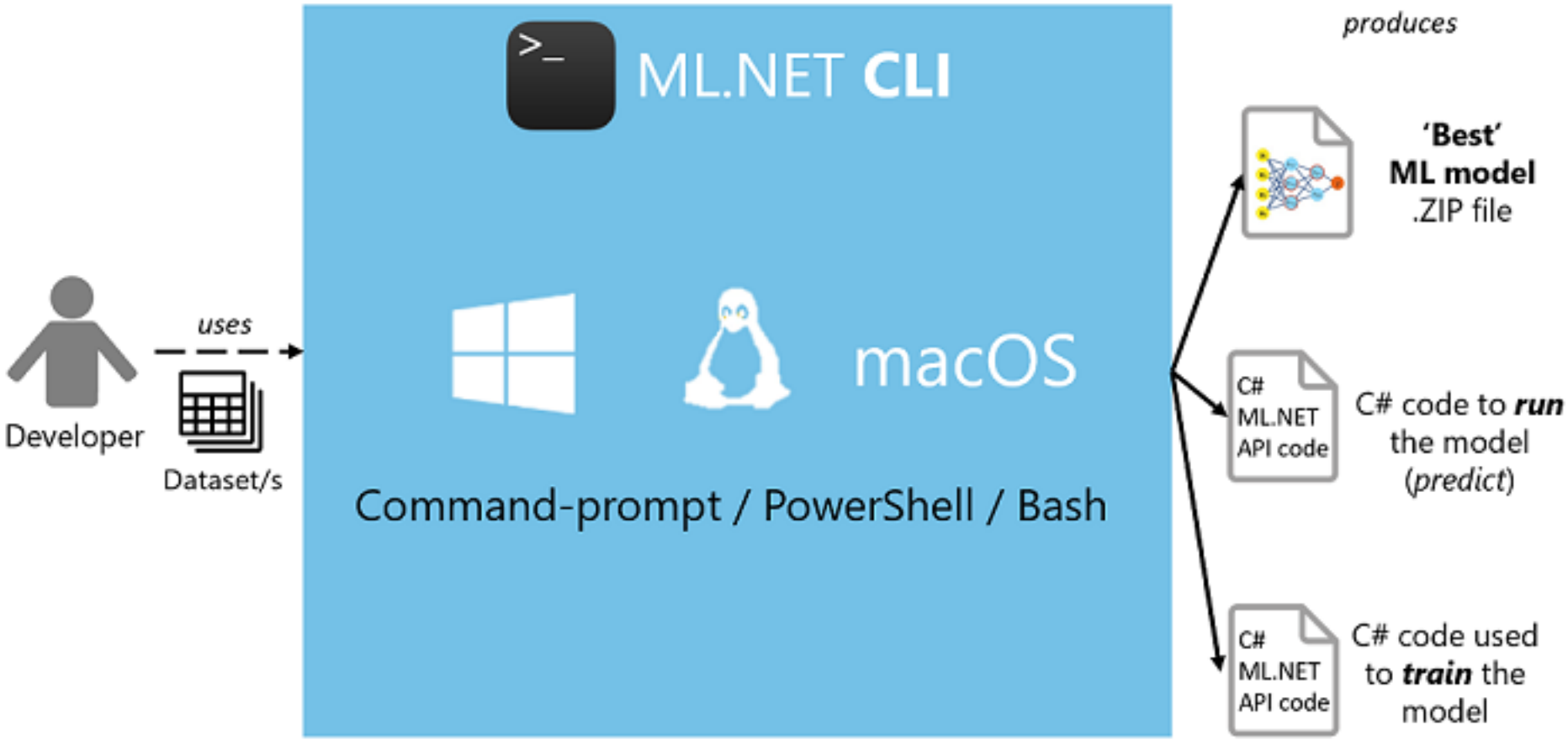
Having an overview of the best performing models based on accuracy & speed.

6. 

Interpretability & Explaining

Being able to explain what created an outcome and what features had the most significant impact

AutoML demo using ML.NET CLI



Source: Microsoft

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Q&A

Thank you!