INTRODUCTION TO MACHINE LEARNING WITH ML.NET

A MACHINE LEARNING FRAMEWORK FROM MICROSOFT

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AGENDA

- Machine Learning
- Types of ML
- ML Frameworks
- What is ML.Net?
- Enterprise applications
- Workflow
- Data Pipeline
- Code Demo : Sample + Tools

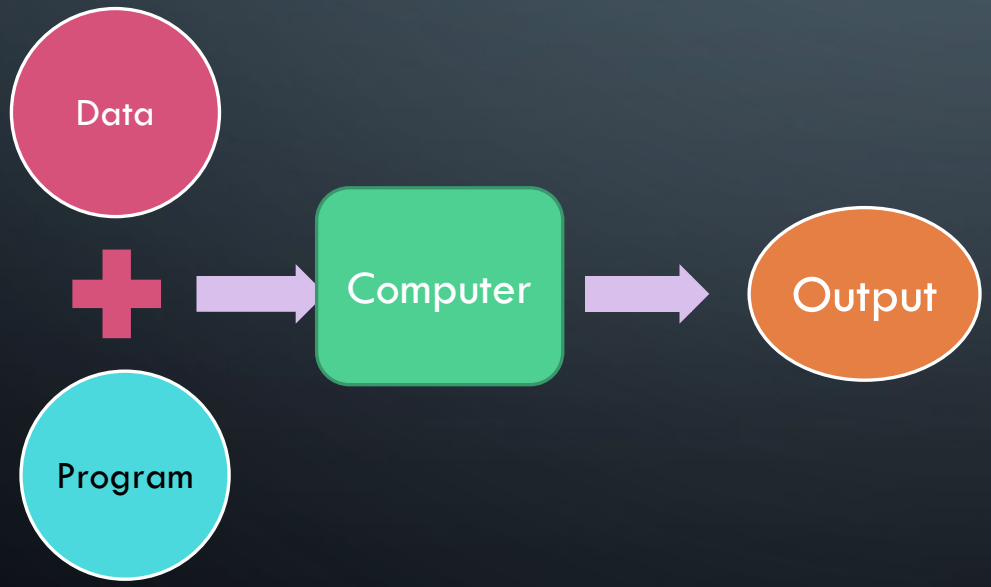
QUIZ

- Is this A or B?
- How much – or – How many?
- How is this organized?
- What should I do next?
- Is number a palindrome?

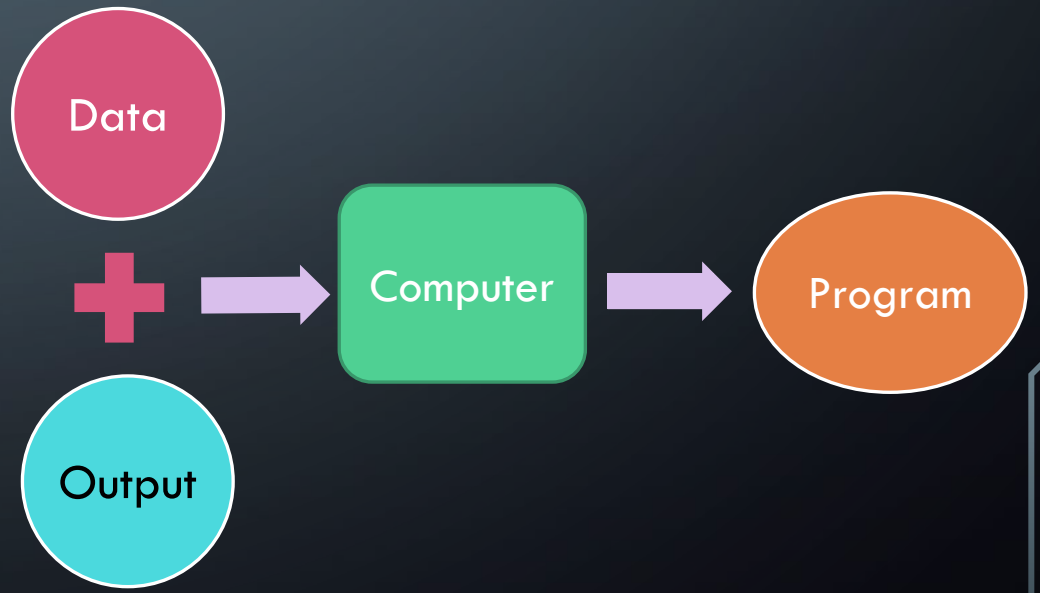
MACHINE LEARNING

- ML is a method of training algorithms such that they can learn how to make decisions.
- Machine learning is getting computers to program themselves.
- If programming is automation, then machine learning is automating the process of automation

TRADITIONAL PROGRAMMING



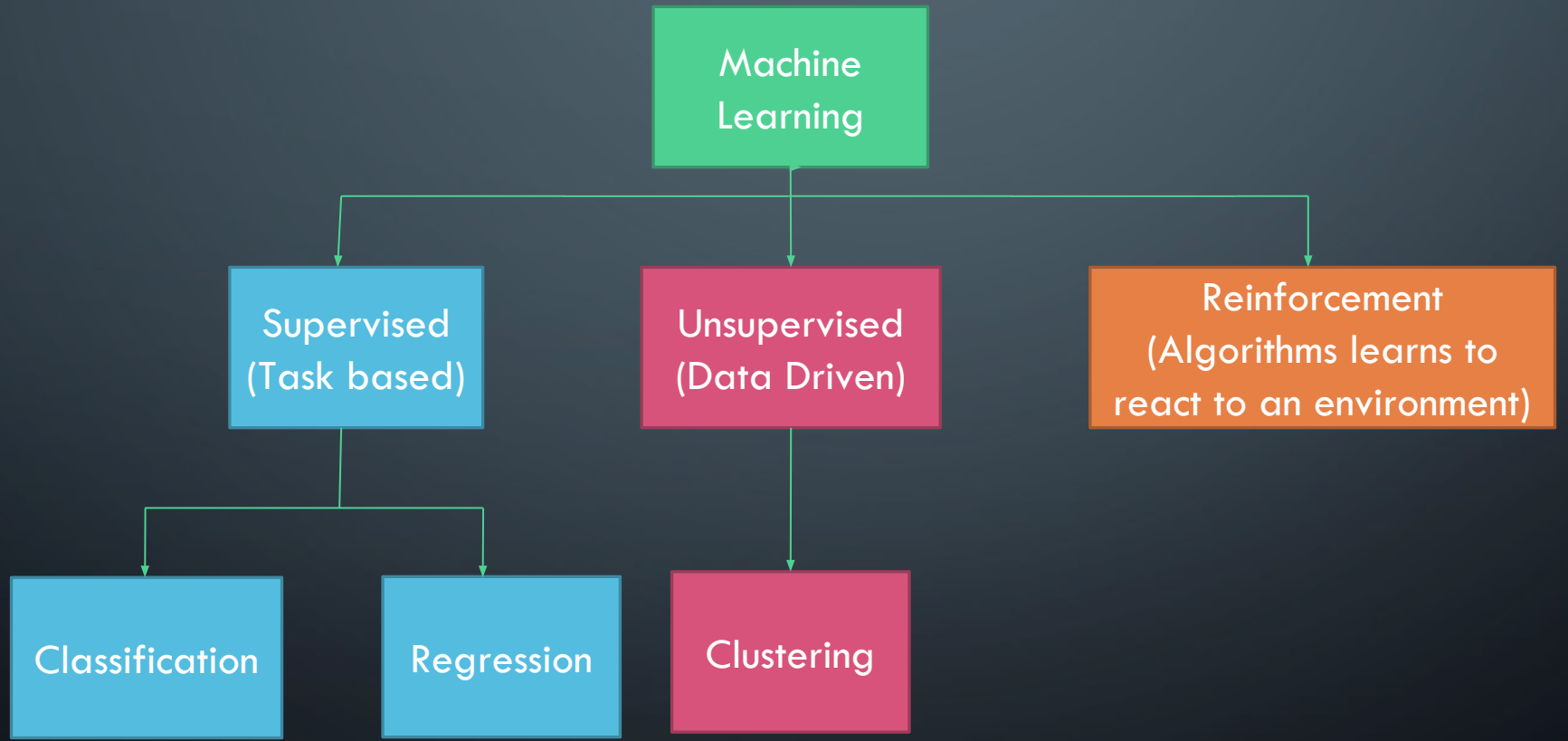
MACHINE LEARNING



PRE-REQUISITES OF ML

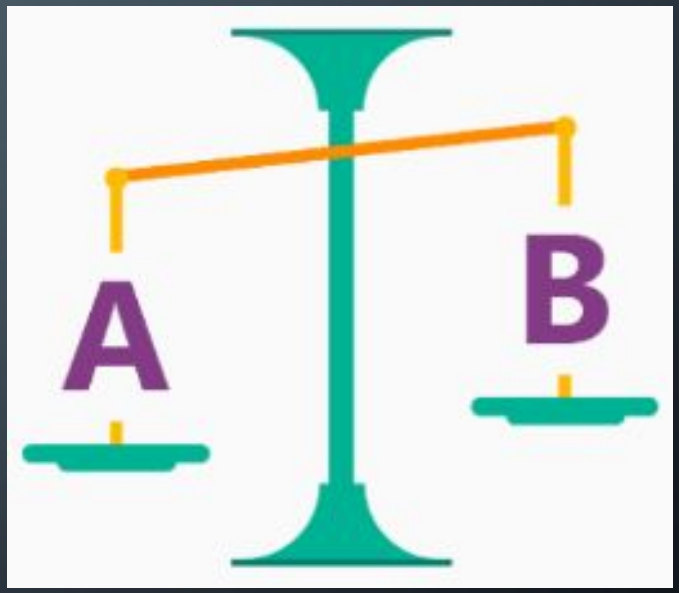
- A Pattern should exist
- Mathematical model / algorithm is unknown
- Lots of data

TYPES OF ML


Machine Learning
Supervised (Task based)
Unsupervised (Data Driven)
Reinforcement (Algorithms learns to react to an environment)
Classification
Regression
Clustering

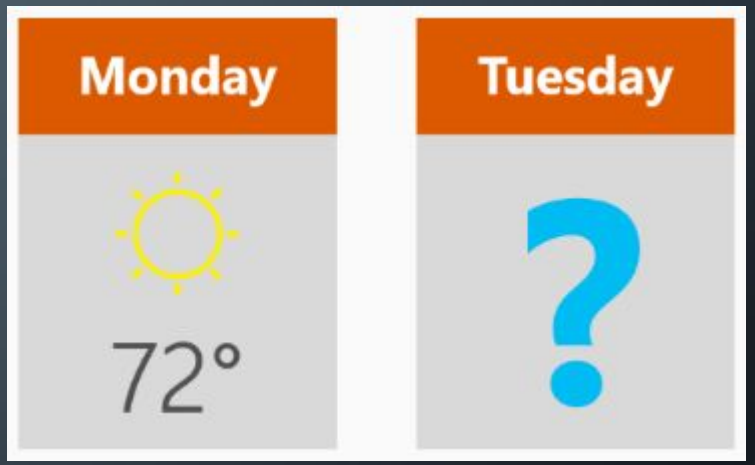
IS IT A OR B?

- Classification Algorithm
- Will this tire fail in the next 1,000 miles : Yes or No ?
- Which brings in more customers: a $5 coupon or a 25% discount ?



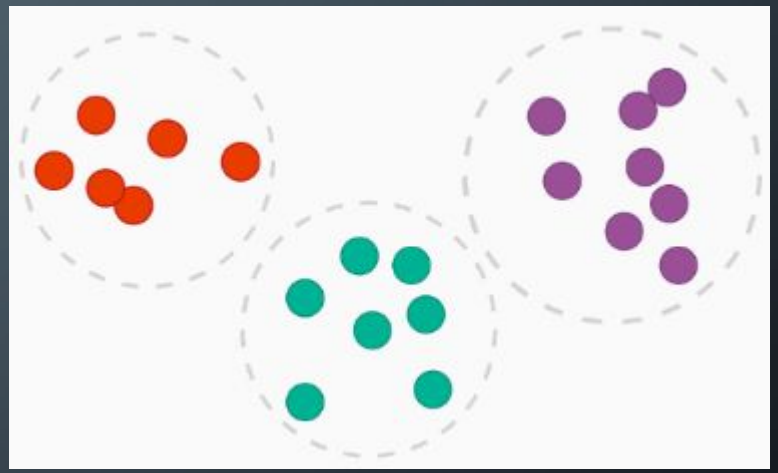
HOW MUCH? HOW MANY?

- Regression Algorithm
- What will the temperature be next Tuesday?
- What will my fourth quarter sales be?
- They help answer any questions that asks for a number



HOW IS THIS ORGANIZED?

- Clustering Algorithm
- Which viewers like the same type of movies?
- Which printer model fail the same way?



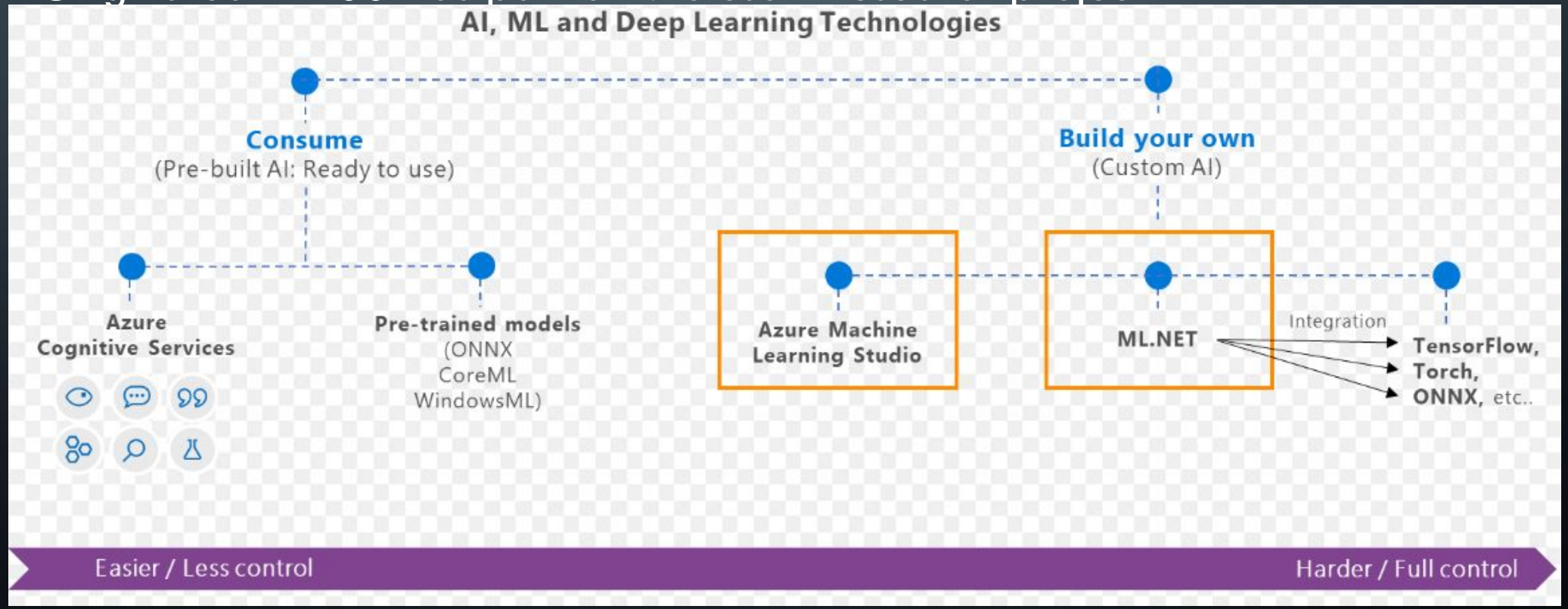
WHAT SHOULD I DO NOW?

- Reinforcement learning Algorithm
- If I'm a self-driving car: At a yellow light, brake or accelerate?
- For a robot vacuum: Keep vacuuming, or go back to the charging station?

ML FRAMEWORKS

WHAT IS ML.NET?

- ML framework from Microsoft for developing Custom AI/ML applications
- Originated in 2002 as part of Microsoft Research project



ML.NET

Machine Learning framework made for .NET developers

Build-your-own

Build your own custom models by writing C# or F# code

Developer focused

ML.NET provides just the right amount of productivity and control

Extensible

Tap into other machine learning toolkits with the rich extensibility model like TensorFlow

Proven

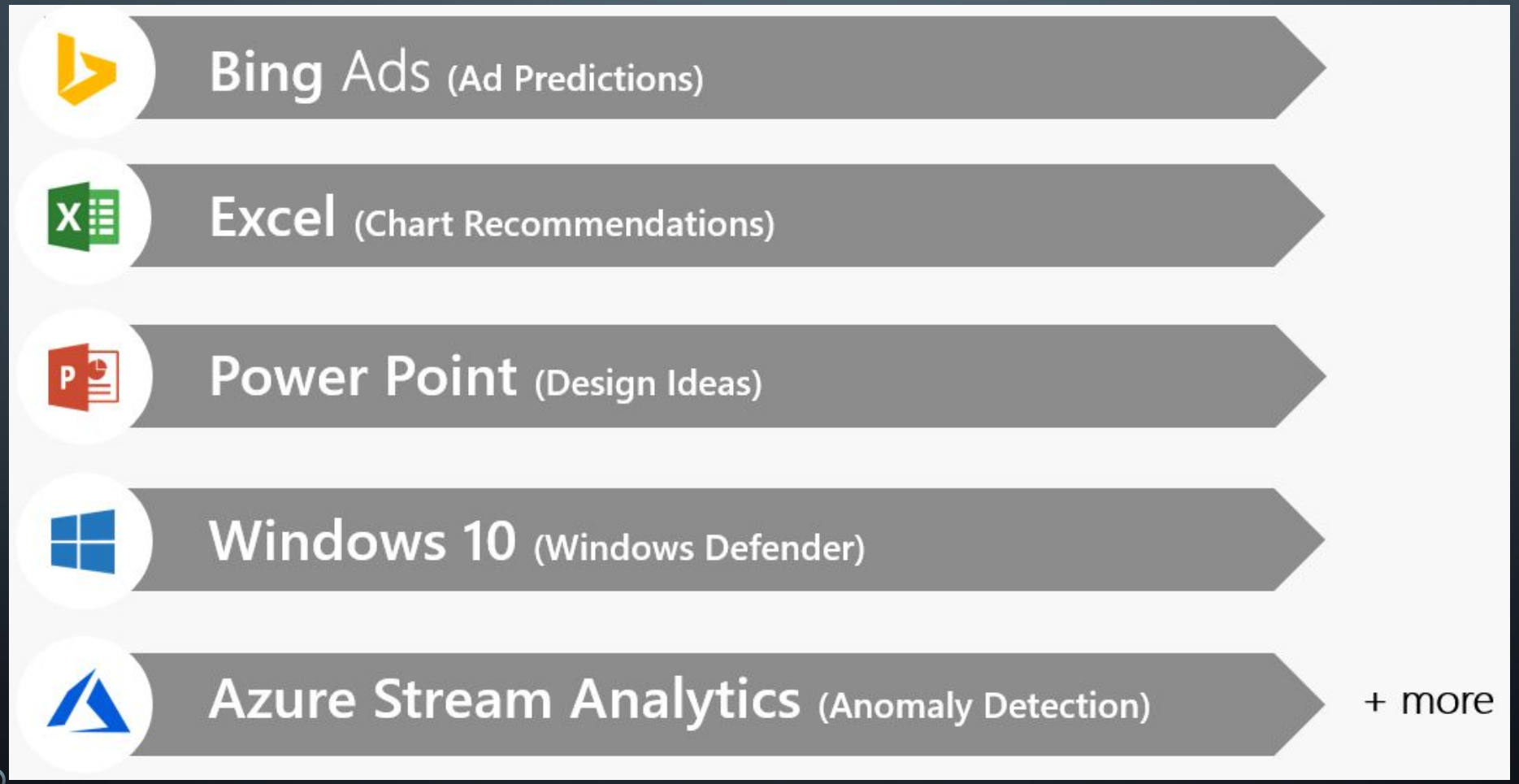
ML.NET has been used internally in products like Office and Bing for years

Open source and Cross-platform

Runs on Windows, macOS and Linux and developed in the open on GitHub

https://github.com/dotnet/machinelearning

PROVEN AT SCALE, ENTERPRISE READY



POSSIBILITIES


Sentiment Analysis


Forecasting


Issue Classification


Predictive maintenance


Image classification

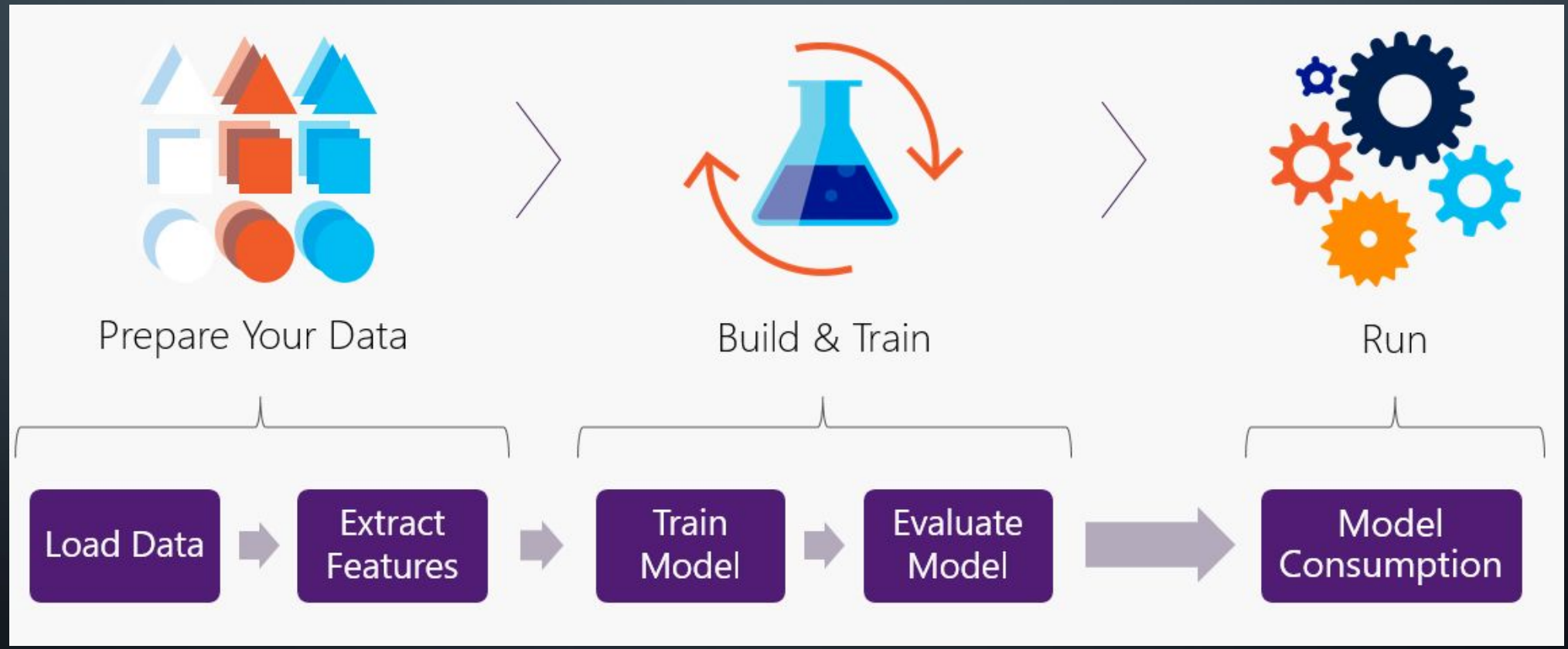

Recommendations


Object detection

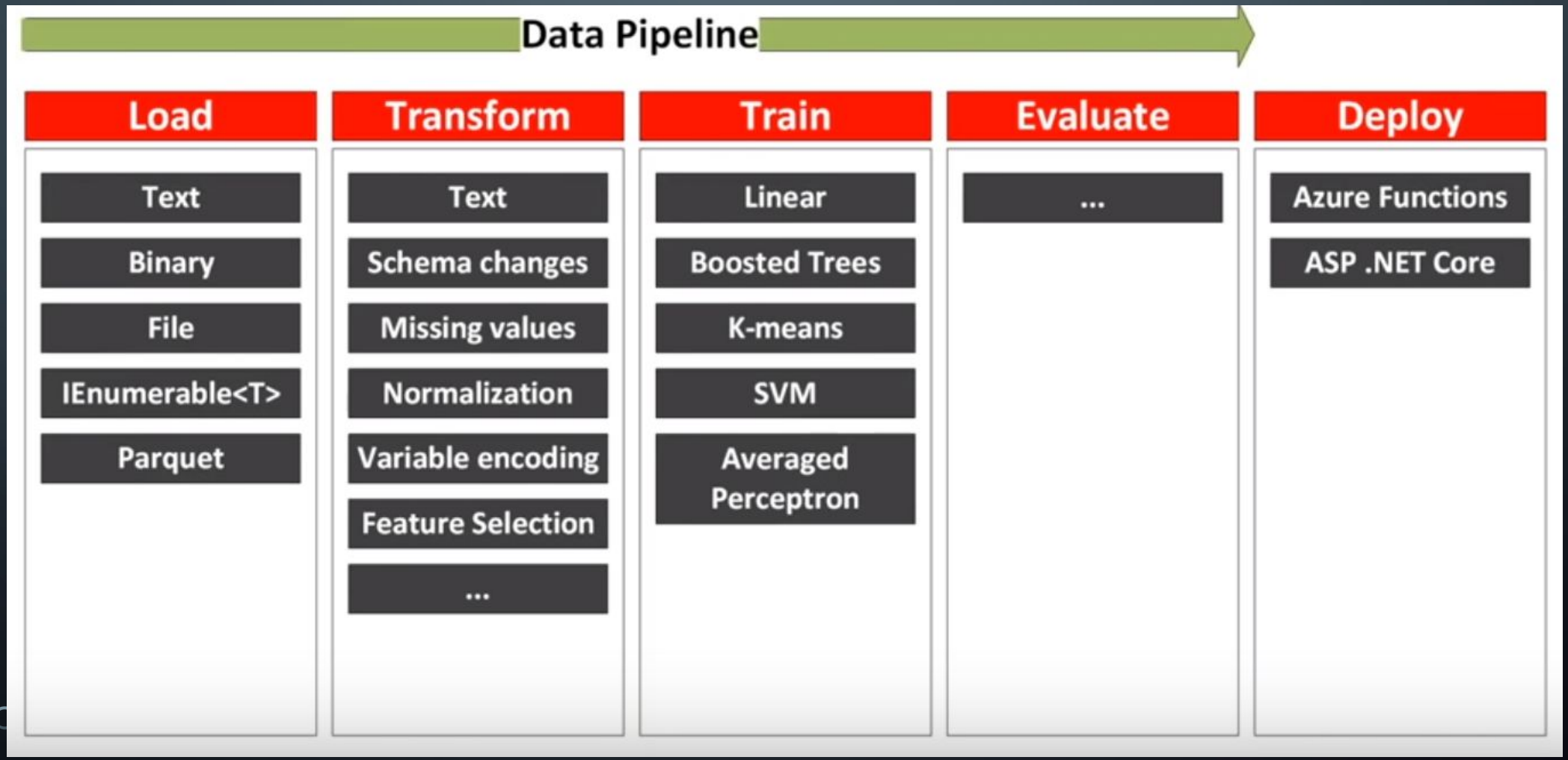

Customer segmentation


And more! Samples @ https://github.com/dotnet/machinelearning-samples

WORKFLOW

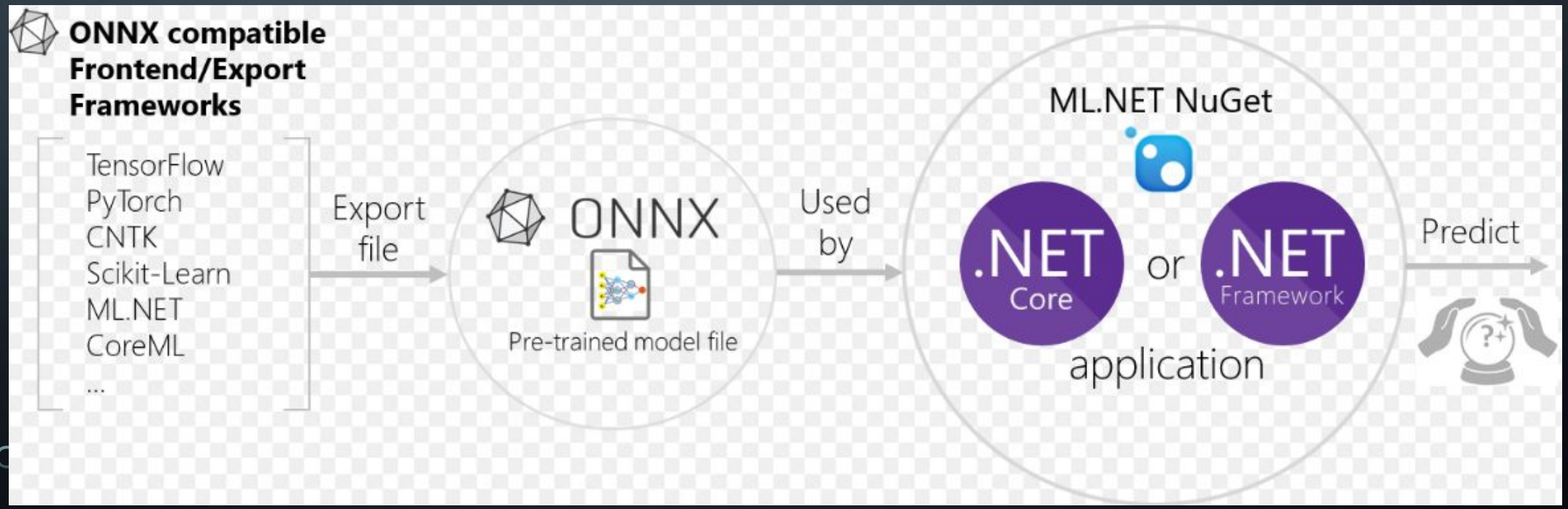

Prepare Your Data
Build & Train
Run
Load Data
Extract Features
Train Model
Evaluate Model
Model Consumption

DATA PIPELINE



INTEROPERABILITY: ONNX
OPEN NEURAL NETWORK EXCHANGE FORMAT

- ONNX is developed and maintained by a community of partners such as Microsoft, Facebook, AWS, Nvidia, Intel and AMD.
- ONNX files could be viewed using Netron



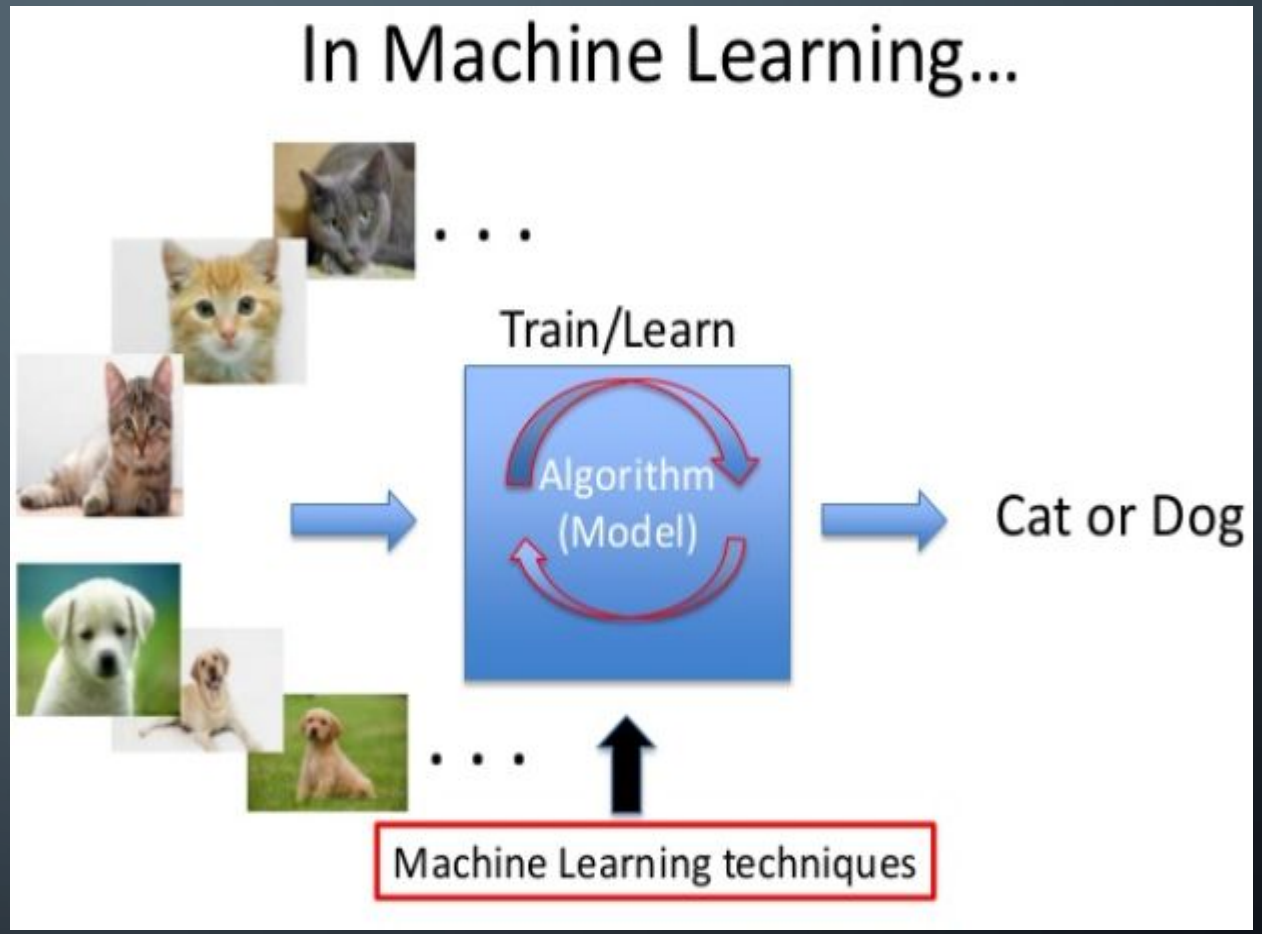
CODE DEMO(S)

BINARY CLASSIFICATION

- Titanic - Survival Prediction
- Train model using ML.Net
- Train using AutoML
- Code generation
- Accuracy improvement
- Data: https://web.stanford.edu/class/archive/cs/cs109/cs109.1166/problem12.html

INTEROPERABILITY

- Photo-Search
- ML.Net + ONNX
- Keras CNN Model
- No rewrite of algorithms/model
- Save effort and time



REFERENCES

- ML.Net : https://dotnet.microsoft.com/apps/machinelearning-ai/ml-dotnet
- ML.Net: https://devblogs.microsoft.com/cesardelatorre/what-is-ml-net-1-0-machine-learning-for-net/
- ONNX : https://onnx.ai/
- Photo-Search (ONNX) : https://github.com/Tak-Au/Photo-Search
- Music Repair : https://www.youtube.com/watch?v=nnV-1q-z9uE
- ML Cookbook : https://github.com/dotnet/machinelearning/blob/master/docs/code/MlNetCookBook.md
- Deploy to Azure functions : http://luisquintanilla.me/2018/08/21/serverless-machine-learning-mlnet-azure-functions/
- https://rubikscode.net/2019/02/18/ultimate-guide-to-machine-learning-with-ml-net/
- https://www.youtube.com/watch?v=dojO4zEL9sg

THANK YOU

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Source Code :

https://github.com/praveenraghuvanshi1512/AIML/tree/master/Meetup_29_June_2019

Feedback : https://www.surveymonkey.com/r/KKHZZS2