End-to-End Machine Learning with ML.NET and Azure

CodeCampNYC 2018
Luis Quintanilla

@ljquintanilla

Marquee Sponsor

toptal

cloudbees

Platinum Sponsors

smartsheet

twilio

Gold Sponsors

JetBRAINS

elastic

Seq
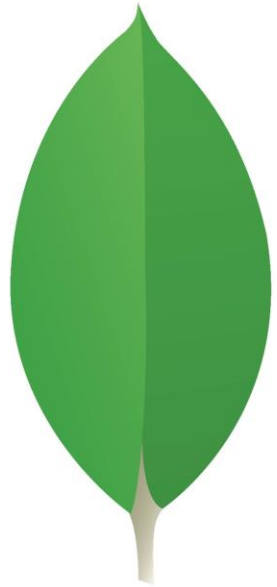
ASPOSE
File Format APIs

Silver Sponsors

Hello 🙂

💼 Artificial Intelligence Consultant

✉ lqdev@outlook.com

💻 http://luisquintanilla.me

🐦 @ljquintanilla

🐙 https://github.com/lqdev

Code & Slides

http://bit.ly/codecampnyc2018

@ljquintanilla

Agenda

@ljquintanilla

What is
Machine Learning?

@ljquintanilla

AI vs ML

Artificial Intelligence

Machine Learning

@ljquintanilla

Machine Learning Tasks

Supervised Learning   **Unsupervised Learning**

Regression

What is
the price
of a home
in NYC?

Classification

Is this a
dog or
cat?

Clustering

Customer
segments
in a
database

Classification Example

Training Data

Species	Is Independent	Class
Canine	False	Dog
Feline	True	Cat
Feline	True	Cat
Canine	False	Dog
Canine	True	Dog

Features (input)   Label (output)

New Data

Species	Is Independent
Canine	False

Prediction

Class
Dog

From Data to Machine Learning

The Continuous Machine Learning Process

@ljquintanilla
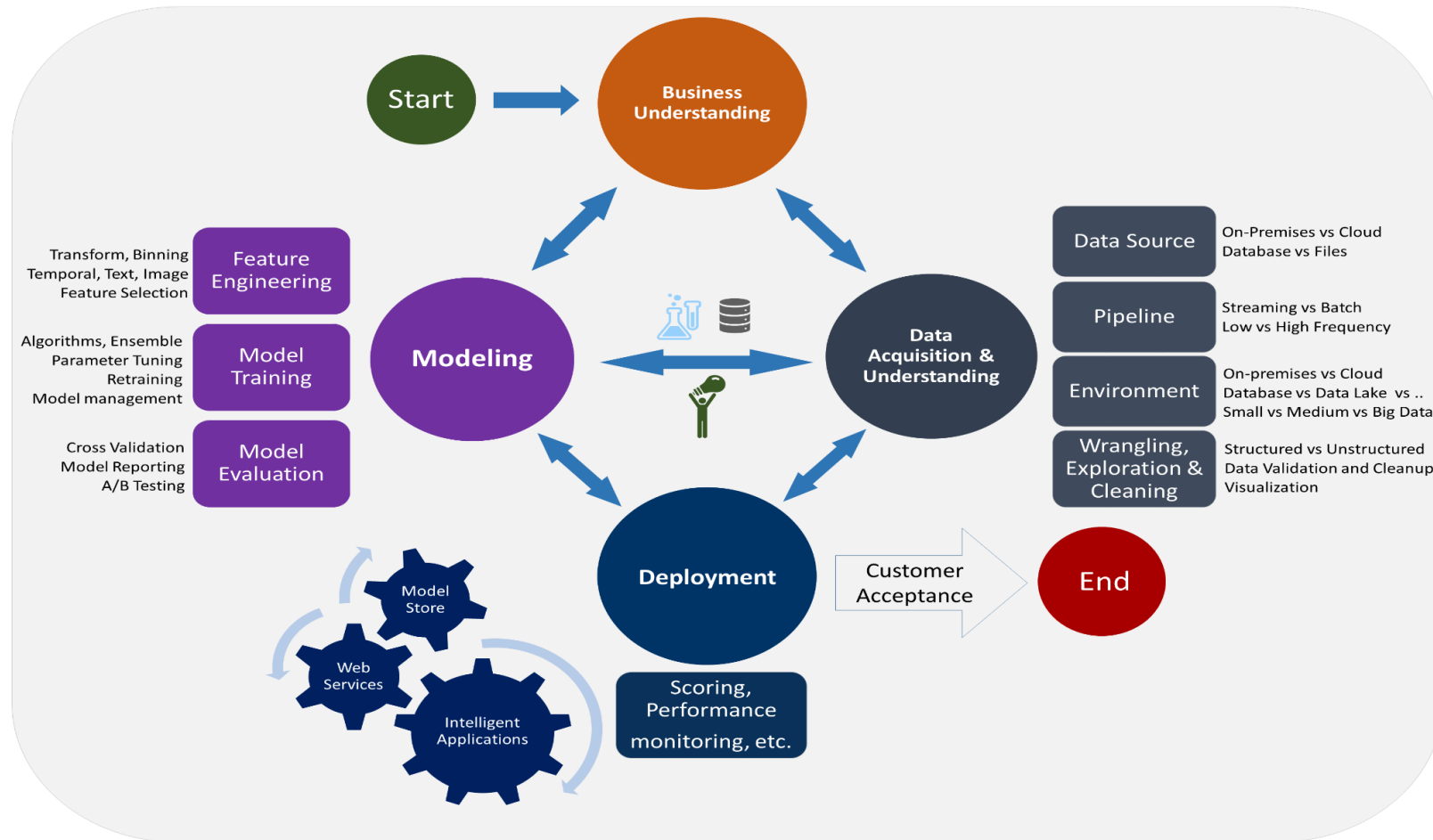
What is a model?

Input $f(x)$ { True / False }

Model

Output

@ljquintanilla

Building a Machine Learning Model

Machine Learning Tools

@ljquintanilla
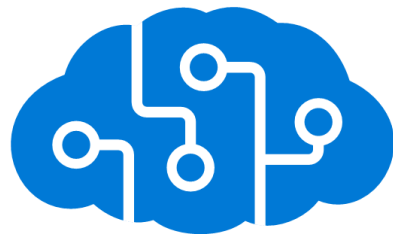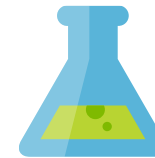
Automated vs. Custom

Automated ←——————————————————————————→ Custom
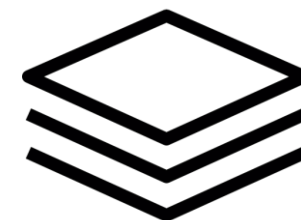
@ljquintanilla

.NET Tools
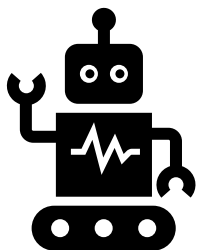
ML.NET

Framework for
Machine Learning

.NET Standard

Proven &
Extensible

Open
Source

Cross
Platform

@ljquintanilla

ML.NET - Framework

Transformations	Learners	Misc	Extensions
• Missing Values • Feature Selection • Normalization	• SVM • K-Means • Boosted Trees	• Data Loaders • Evaluators	• TensorFlow • CNTK • ONNX • Accord.NET

A few things you can do with ML.NET …

Sentiment Analysis

Issue Classification

Image classification

Object detection

Forecasting

Predictive maintenance

Recommendations

Customer segmentation

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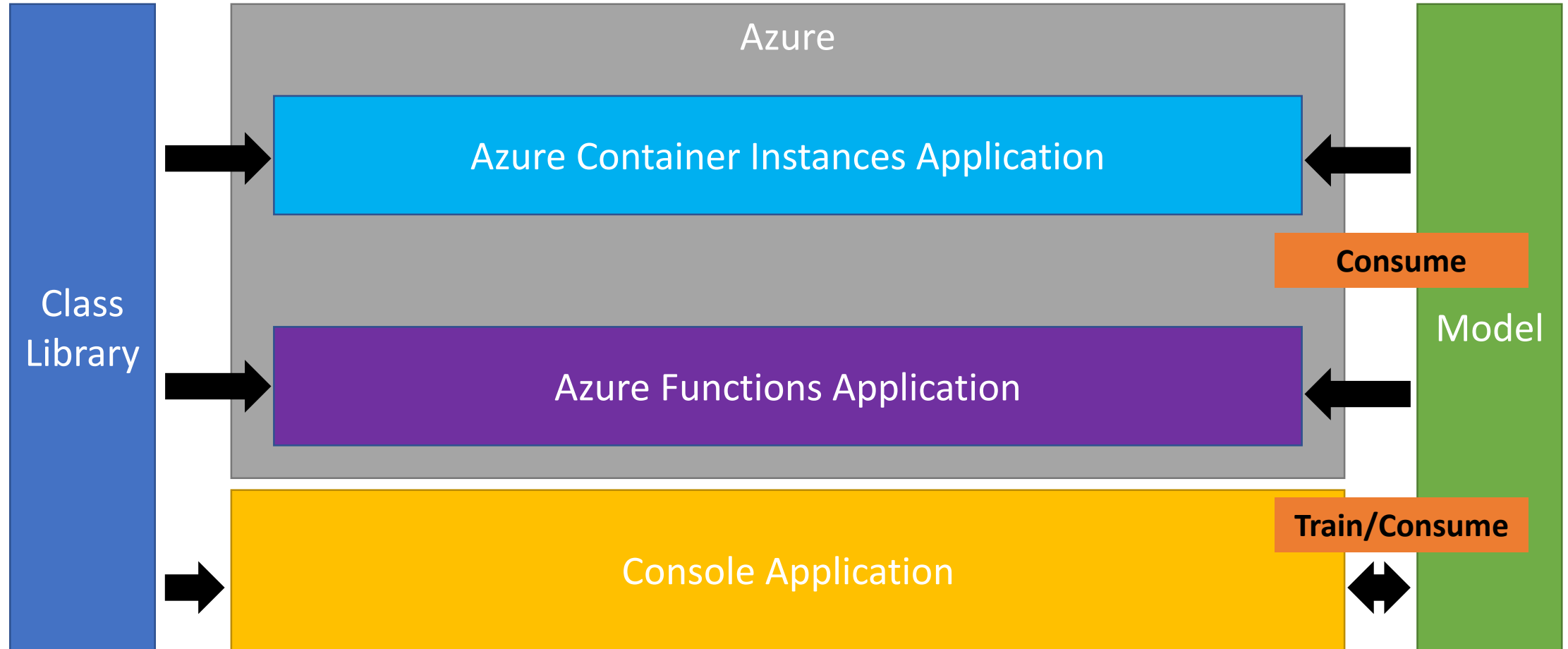
Iris Classification Model

Demo: Training a Model

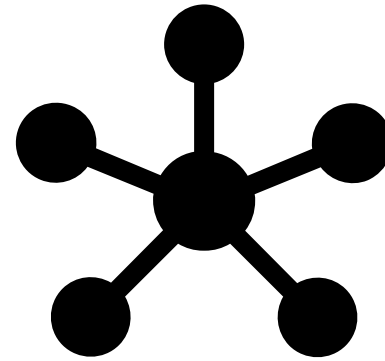# Consuming a Machine Learning Model

Model Consumption Methods
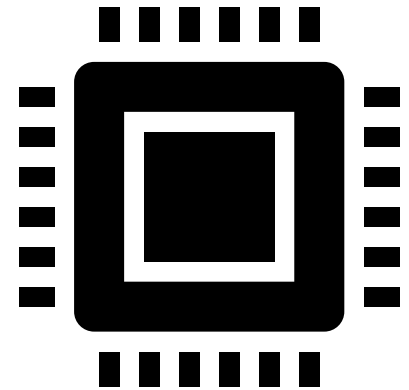

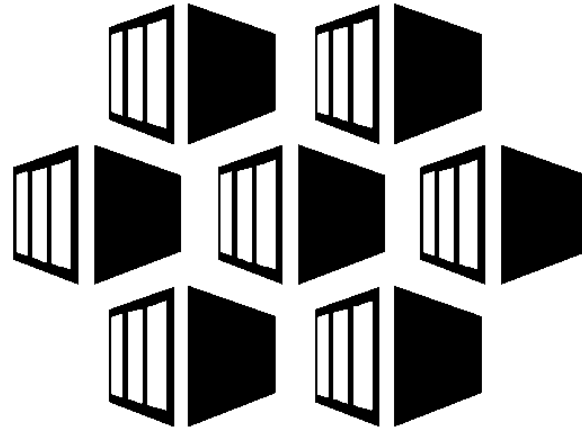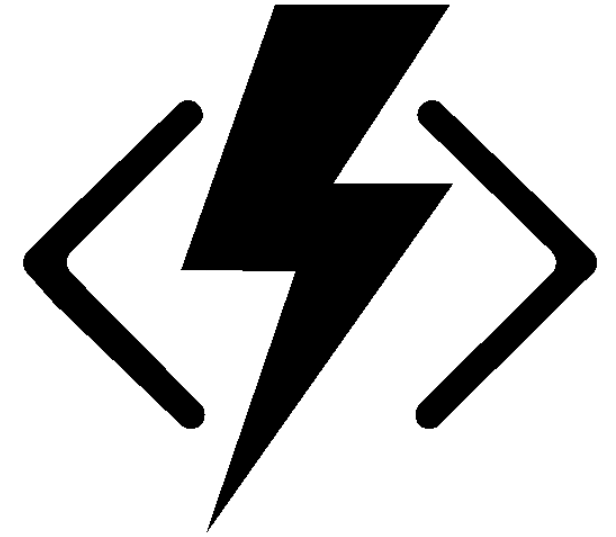Desktop   Mobile   Web   IoT

Deploying to the Web

Virtual Machines   Containers   Serverless

Demo: Deploying a Model to Azure Container Instances

Demo: Deploying a Model to Azure Functions

Takeaways

- ML.NET is a proven, open-source, cross-platform machine learning framework for building custom models in the .NET ecosystem.

- ML.NET is still in its early stages but is quickly maturing with strong support from open source community and Microsoft.

- Model persistence provides great flexibility in model deployment phase.

- Azure (Container Instances and Functions) reduces friction and management overhead associated with deployment of ML.NET models to the web.

Questions?

Resources

- https://docs.microsoft.com/en-us/azure/container-instances/
- https://docs.microsoft.com/en-us/azure/azure-functions/functions-run-local
- https://blogs.msdn.microsoft.com/dotnet/2018/10/08/announcing-ml-net-0-6-machine-learning-net/
- https://docs.microsoft.com/en-us/dotnet/machine-learning/resources/glossary
- https://docs.microsoft.com/en-us/dotnet/machine-learning/tutorials/
- http://luisquintanilla.me/2018/08/21/serverless-machine-learning-mlnet-azure-functions/
- http://luisquintanilla.me/2018/05/11/deploy-netml-docker-aci/