Getting Started with Machine Learning .Net

Bruno Capuano

Innovation Lead @Avanade

@elbruno | http://elbruno.com

As a developer,
why should I care about AI and ML?

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Some problems are difficult to solve using traditional algorithms and procedural programming.

IBM slaps patent on coffee-delivering drones that can read your MIND (link)

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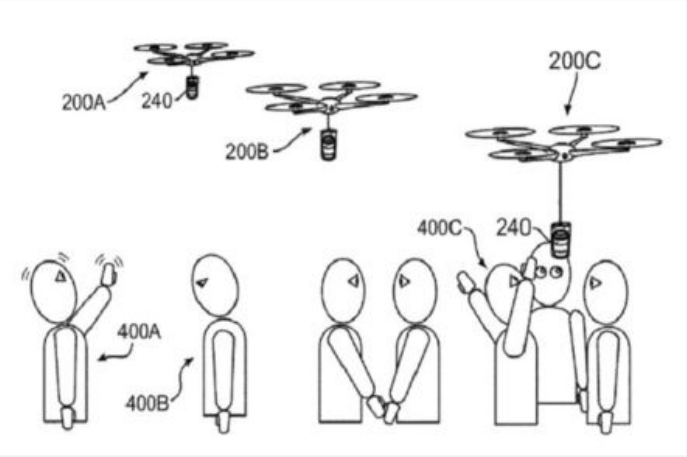
DATA CENTRE SOFTWARE SECURITY DEVOPS BUSINESS PERSONAL TECH SCIENCE

Emergent Tech

IBM slaps patent on coffee-delivering drones that can read your MIND

Facial recog, psychological profiling – and scalding liquid flying through the air

By Gareth Corfield 23 Aug 2018 at 11:30 71 SHARE ▼



IBM has filed a patent for mood-sensing coffee delivery drones, because what the world really needs is piping hot liquids flying around over

dronelife

News Products Industries Enthusiasts Regulations Business Video

IBM Patents Coffee-Delivering Drone

Posted By: Malek Murison on: August 24, 2018

There are two universal truths in the drone industry. The first is that technology companies will file rafts of drone-related patents in an attempt to score easy PR and cover even the most obscure bases for the future. The second is that tech workers need the occasional caffeine hit from time to time.

Combining those two trends this week is IBM. The tech giant has patented a drone system that can identify the "cognitive state" of office workers and lower cups of coffee on demand, with a little help from an "unspooling string".

Quite how the drone will be able to detect the cognitive state of office workers remains to be seen. Perhaps the system could harness some of IBM's AI tech to read into body language to see who would benefit most from an expresso. IBM's patent suggests the drone could detect blood pressure, pupil dilation and facial expressions to decide whether workers are feeling drowsy.

IBM slaps patent on coffee-delivering drones that can read your MIND (link)

pdfpiw.uspto.gov/.piw?docid=10040551&SectionNum=1&IDKey=61C703B14D4D&HomeUrl=http://patft.u

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Sections:
- Front Page
- Drawings
- Specifications
- Claims

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Full Pages

US010040551B2

(12) **United States Patent**
Erickson et al.

(10) **Patent No.: US 10,040,551 B2**
(45) **Date of Patent: Aug. 7, 2018**

(54) **DRONE DELIVERY OF COFFEE BASED ON A COGNITIVE STATE OF AN INDIVIDUAL**

(71) Applicant: **International Business Machines Corporation**, Armonk, NY (US)

(72) Inventors: **Thomas David Erickson**, Minneapolis, MN (US); **Rogerio S. Feris**, Hartford, CT (US); **Clifford A. Pickover**, Yorktown Heights, NY (US); **Maja Vukovic**, New York, NY (US)

(73) Assignee: **International Business Machines Corporation**, Armonk, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 101 days.

(21) Appl. No.: **14/978,620**

(22) Filed: **Dec. 22, 2015**

(65) **Prior Publication Data**

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(51) **Int. Cl.**
E04H 3/04 (2006.01)
B64C 39/02 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***B64C 39/024*** (2013.01); ***A61B 5/01*** (2013.01); ***A61B 5/02055*** (2013.01); ***A61B 5/11*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC A61B 5/1176; A61B 2034/2057; A61B 2034/2065; A61B 5/165; A61B 5/02055;
(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,094,153 A 3/1992 Helbling
6,419,629 B1 7/2002 Balkin et al.
(Continued)

FOREIGN PATENT DOCUMENTS

WO 0117362 3/2001
WO 2005000385 1/2005

OTHER PUBLICATIONS

Disclosed Anonymously, "Use of Flavors with Modifying Properties (FMP) in Flavor Compositions and Applications of FMP in Food and Beverage Products", IP.com No. 000240463, Jan. 30, 2015, pp. 1-43.
(Continued)

Primary Examiner — Jeffrey A Shapiro
(74) *Attorney, Agent, or Firm* — Fleit Gibbons Gutman Bongini Bianco PL; Gary Winer

(57) **ABSTRACT**

Coffee or other drink, for example a caffeine containing drink, is delivered to individuals that would like the drink, or who have a predetermined cognitive state, using an unmanned aerial vehicle (UAV)/drone. The drink is connected to the UAV, and the UAV flies to an area including people, and uses sensors to scan the people for an individual who has gestured that they would like the drink, or for whom an electronic analysis of sensor data indicates to be in a predetermined cognitive state. The UAV then flies to the individual to deliver the drink. The analysis can include profile data of people, including electronic calendar data, which can be used to determine a potentially predetermined cognitive state.

17 Claims, 4 Drawing Sheets

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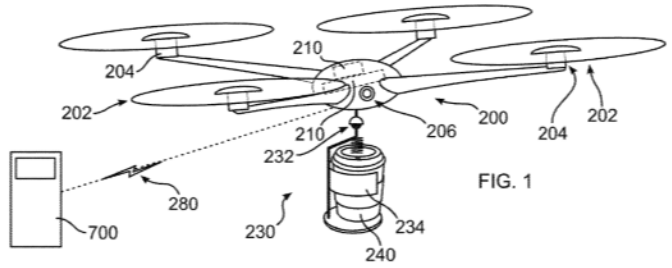


FIG. 1

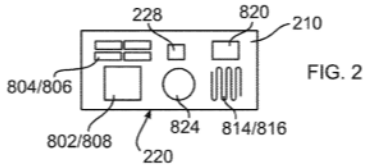
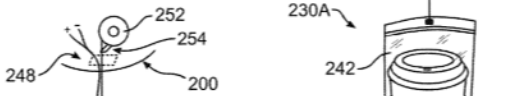
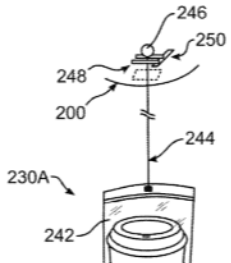


FIG. 2






PROPERTY OF IBM
09-13-2018 00:10:42:05
tbs

Machine Learning: “Programming the Unprogrammable”

$f(x)$ { Is this a face?

$f(x)$ { Price of Shirt?

“It has **exquisite** buttons … with **long sleeves** …works for casual as well as **business settings**”

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Machine Learning: “Programming the UnProgrammable”

Machine Learning creates a

$f(x)$

Model

Using this data

Face

Face

Not a face

Not a face

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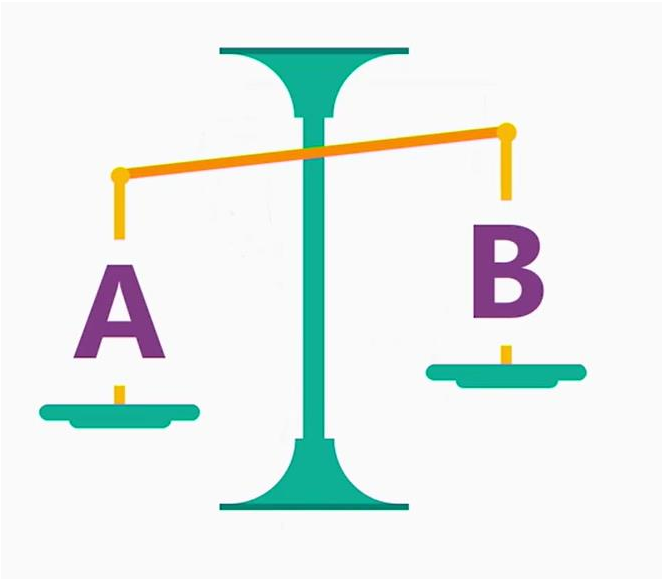
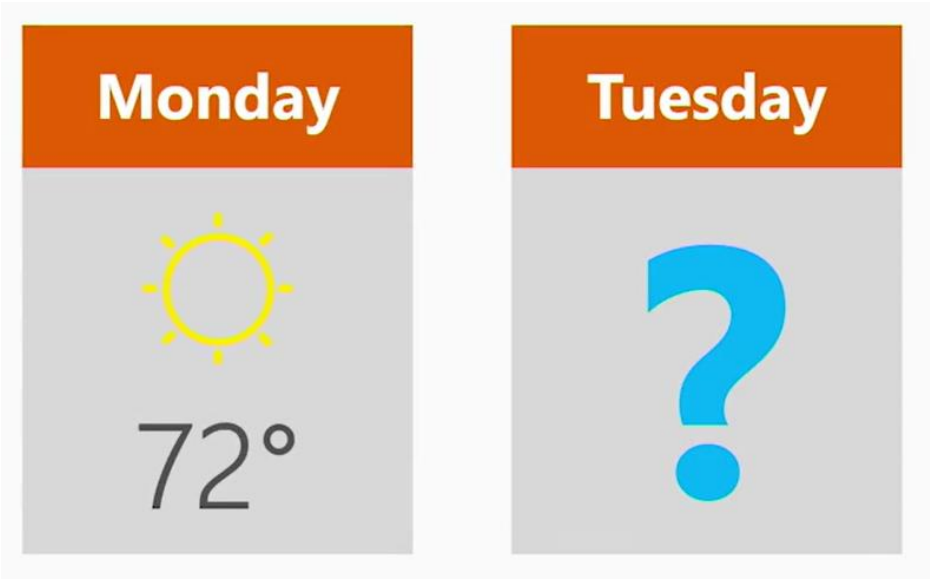
Machine Learning Tasks

Is this A or B?



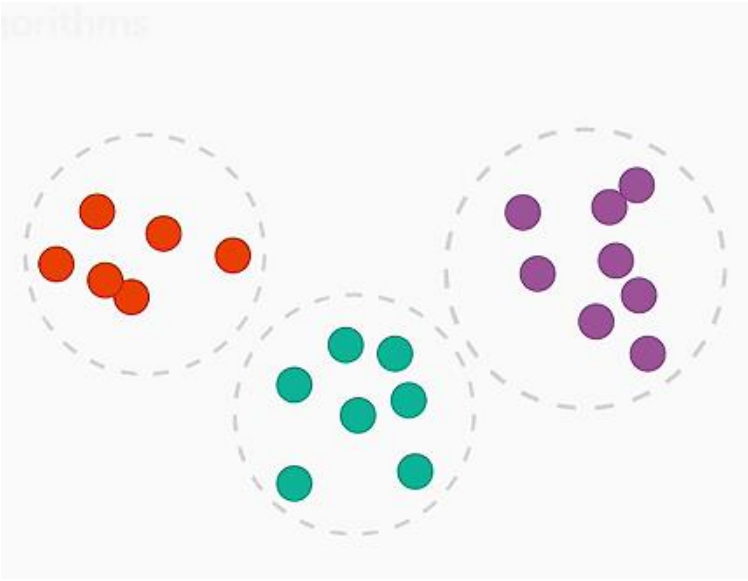
Classification

How much? How many?



Regression

How is this organized?



Clustering

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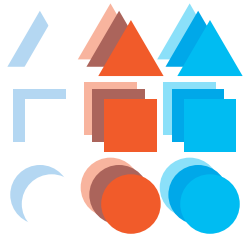
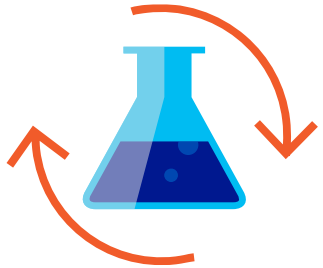
Get started with Machine Learning



Prepare Data

Azure Databricks

Quickly launch and scale Spark on demand
Rich interactive workspace and notebooks
Seamless integration with all Azure data services



Build & Train

Azure Machine Learning

Broad frameworks and tools support:
TensorFlow, Cognitive Toolkit, Caffe2, Keras, MxNET, PyTorch

Evaluate

In the cloud – on the edge

Docker containers
Windows Machine Learning

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Machine Learning.Net

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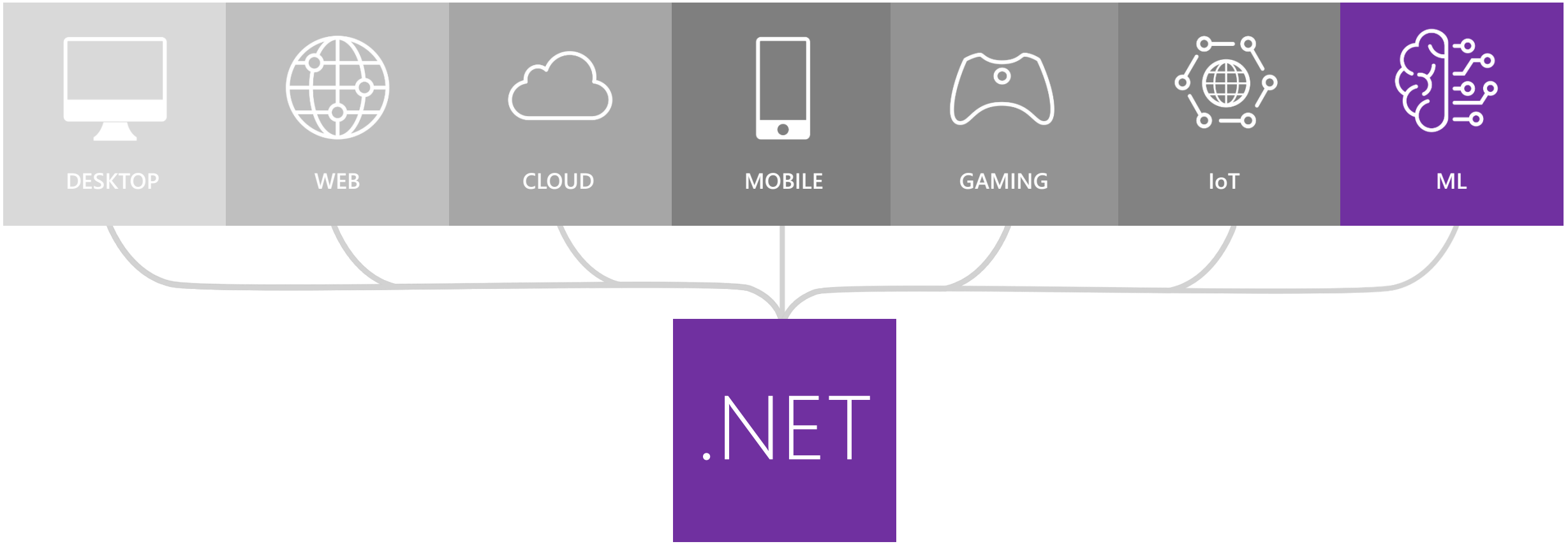
Your platform for building **anything**



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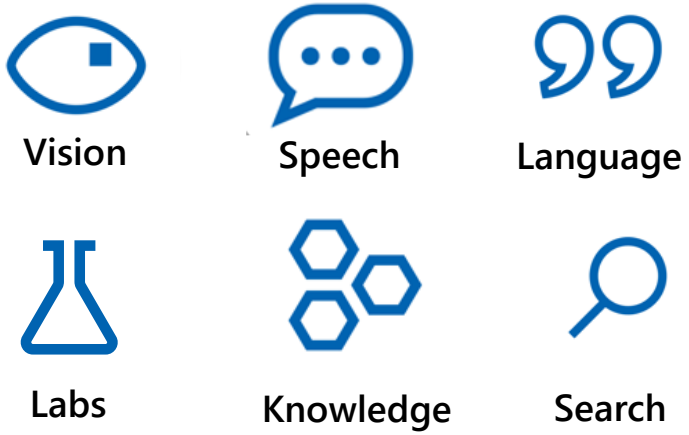
Pre-built ML Models (Azure Cognitive Services)



Consume (C#, VB, F#)

e.g. Sentiment Analysis using Azure Cognitive Services

```
TextAnalyticsAPI client = new TextAnalyticsAPI();
client.AzureRegion = AzureRegions.Westus;
client.SubscriptionKey = "1bf33391DeadFish";

client.Sentiment(
new MultiLanguageBatchInput(
new List<MultiLanguageInput>()
{
new MultiLanguageInput("en","0",
    "This vacuum cleaner sucks so much dirt")
}));
```

☹ 9% positive

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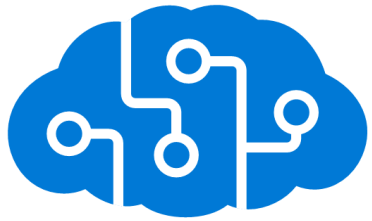
ML.NET is for building custom models

Pre-built models



Azure Cognitive Services

Custom models

TensorFlow

ML.NET

Easier / Less Control

Harder / Full Control

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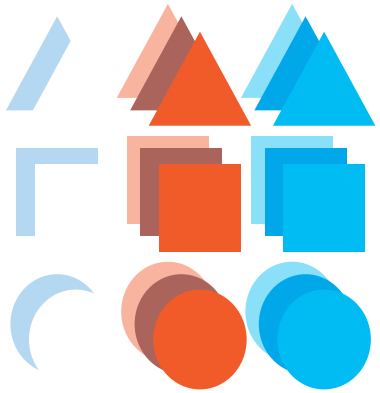
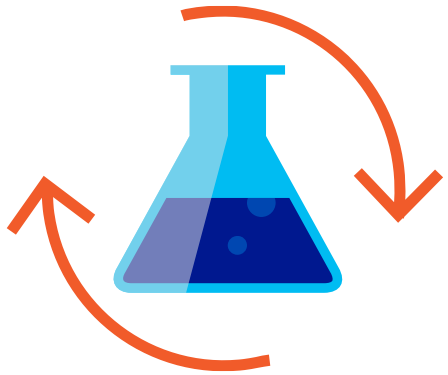
Build your own custom machine learning models



Prepare Your Data



Build & Train

Run

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Artificial Intelligence: Image Analysis

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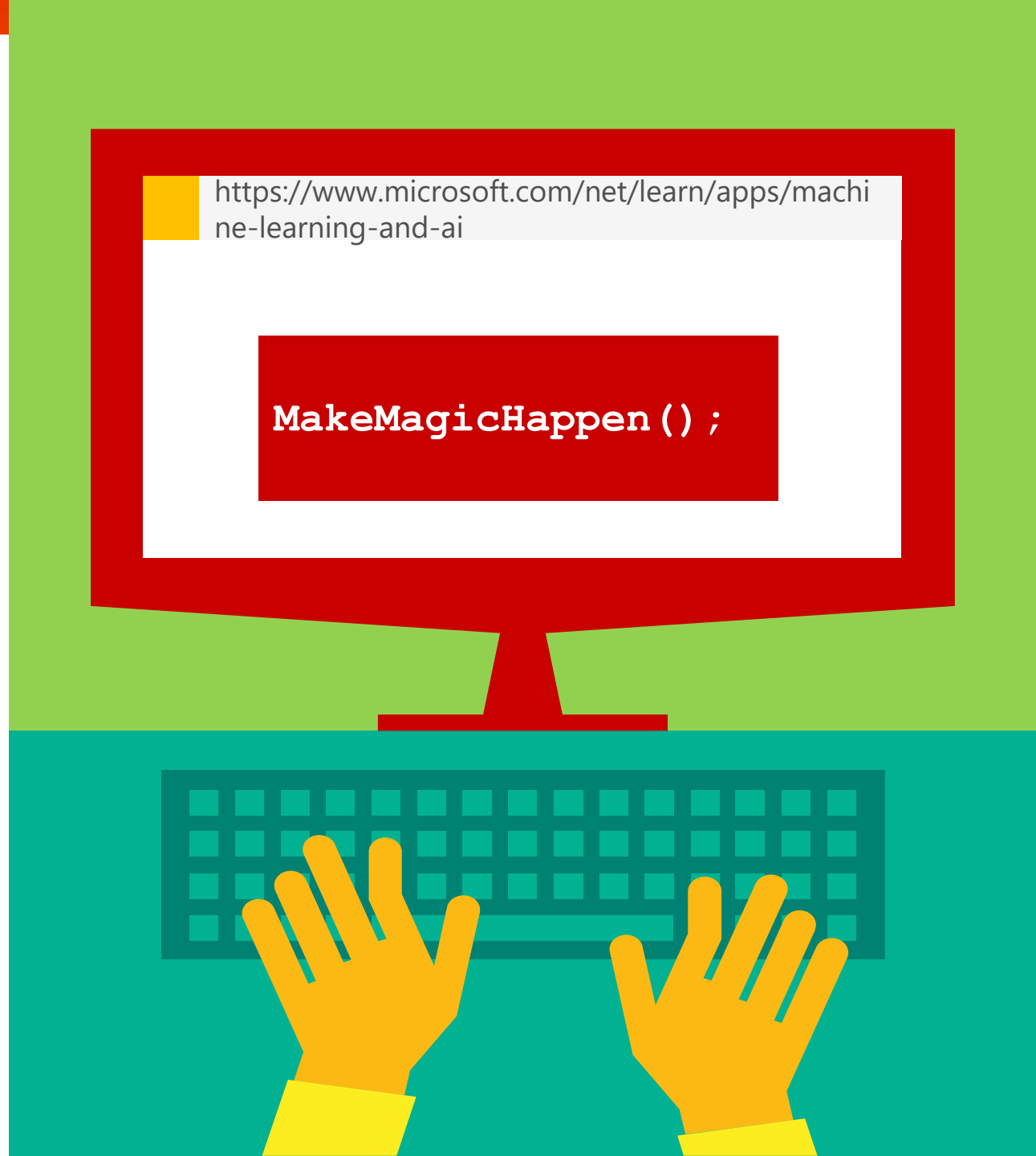
ML.Net
Hello World



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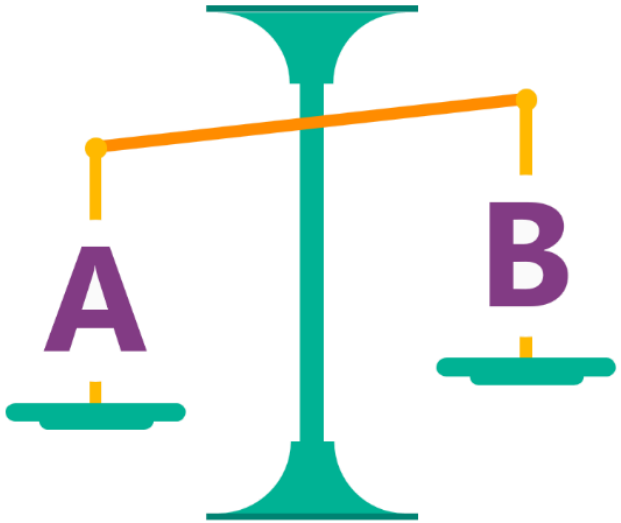
Age classes explained

Is this A or B? Kid or Baby



Based on the age:

Kid or Baby

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A few things you can do with ML.NET …

- Sentiment Analysis
- Forecasting
- Issue Classification
- Predictive maintenance
- Image classification
- Recommendations
- Object detection
- Customer segmentation

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

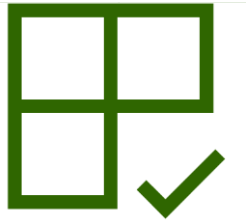
ML.NET 0.7.0 (Preview)

Machine Learning framework made for .NET developers

Supported on Windows, Linux, and macOS

Build your own

Developer Focused



Proven & Extensible

Open Source

https://github.com/dotnet/machinelearning

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ML.NET is Proven at scale, enterprise ready

Bing Ads (Ad Predictions)

Excel (Chart Recommendations)

Power Point (Design Ideas)

Windows 10 (Windows Defender)

Azure Stream Analytics (Anomaly Detection)

+ more

ML.NET is a framework for building custom ML Models

Developer friendly APIs for Machine Learning

Training & Consumption

Transforms

- Text
- Schema
- Missing values
- Categorical
- Normalization
- Feature Selection

Learners

- Linear
- Boosted Trees
- Svm
- K-Means

Misc.

- ML Data framework
- Evaluators
- Calibrators
- Data loaders

Extensions

Machine Learning.Net

How to use ML.Net

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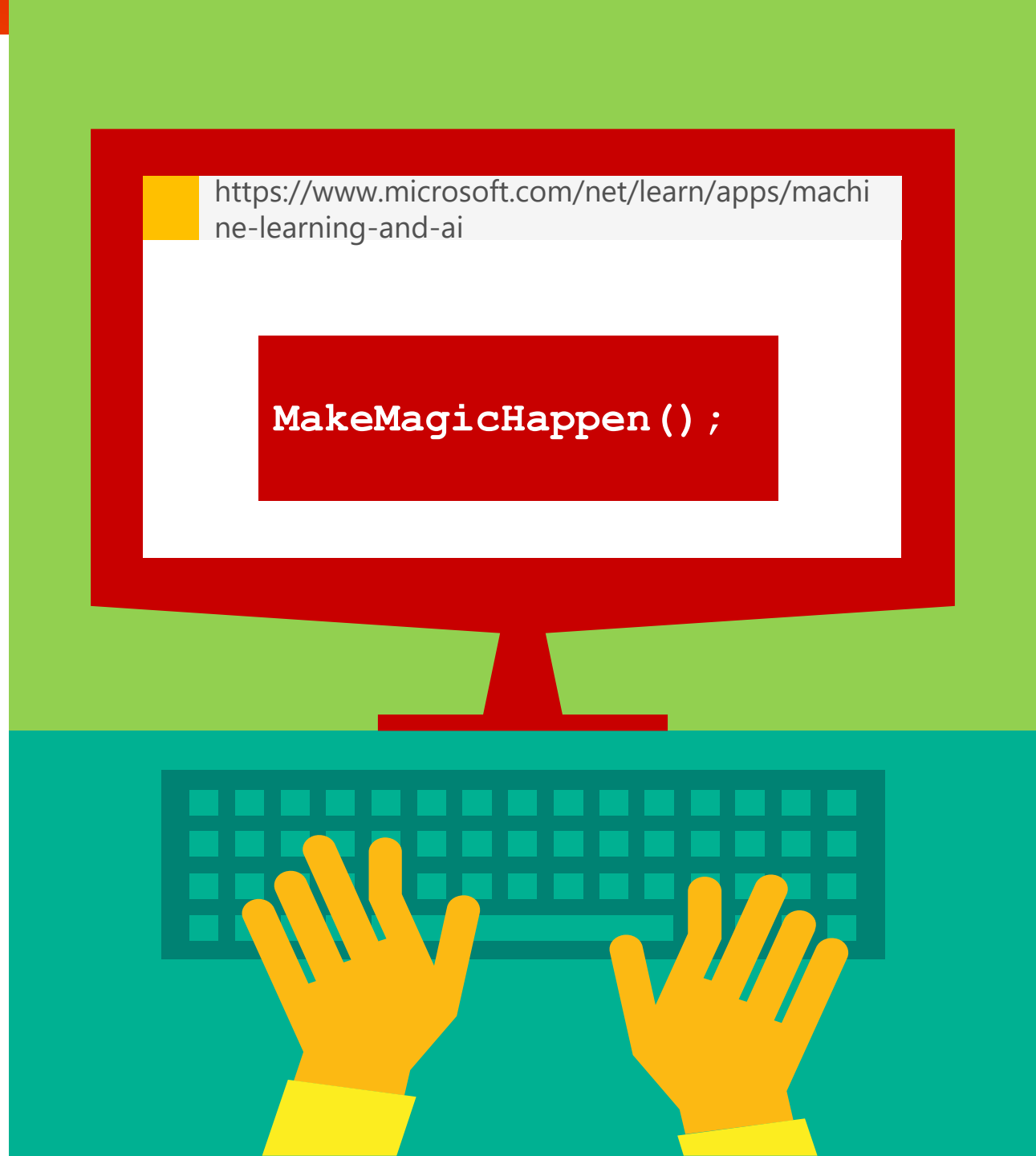
Build your own (custom) ML Models

Existing Solutions

- Python, R are great for ML and Data Science
- ML.NET is another way to do it with familiar tools
  - .NET currently lacks ML libraries and ML essentials
- ML.NET complements the experience that AML, CogSvcs provides
  - Build your own
  - Code First approach
  - AppLocal Model deployment

ML.Net
Working with 2 or more columns



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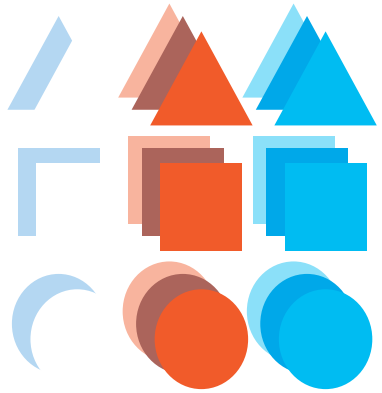
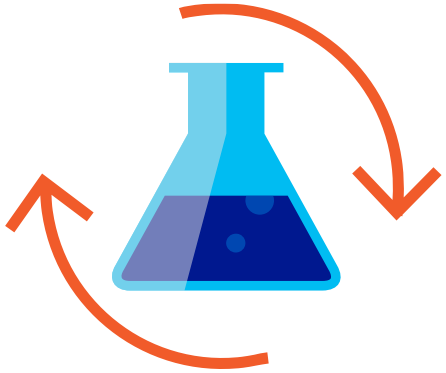
Machine learning workflow





Prepare Your Data

Build & Train

Run

Load Data → Extract Features → Train Model → Evaluate Model → Model Consumption

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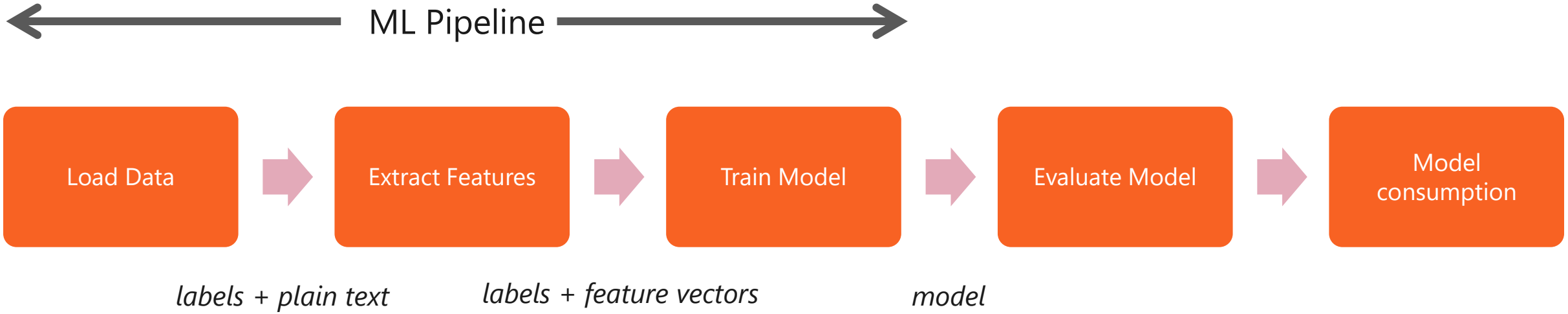
End to End ML Workflow



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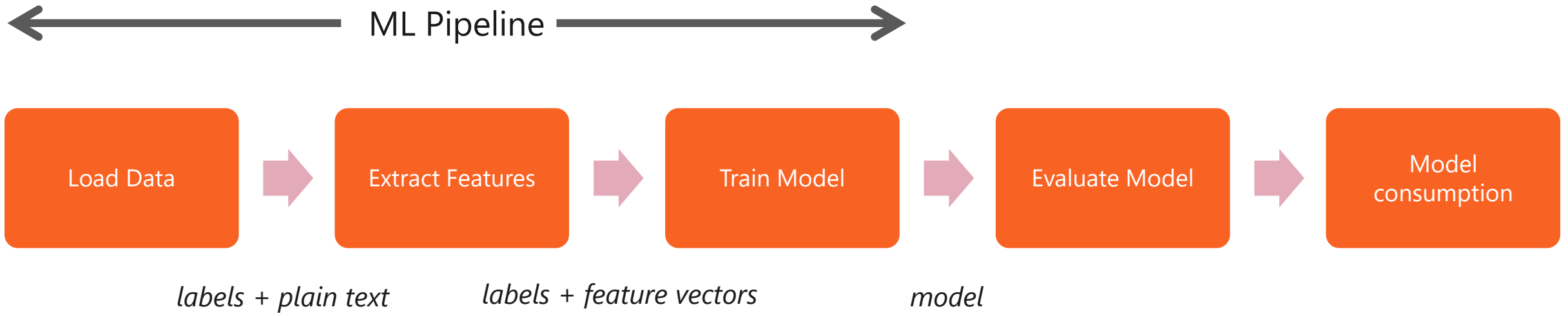
End to End ML Workflow



Enter...

LearningPipelines! *in ML.NET*

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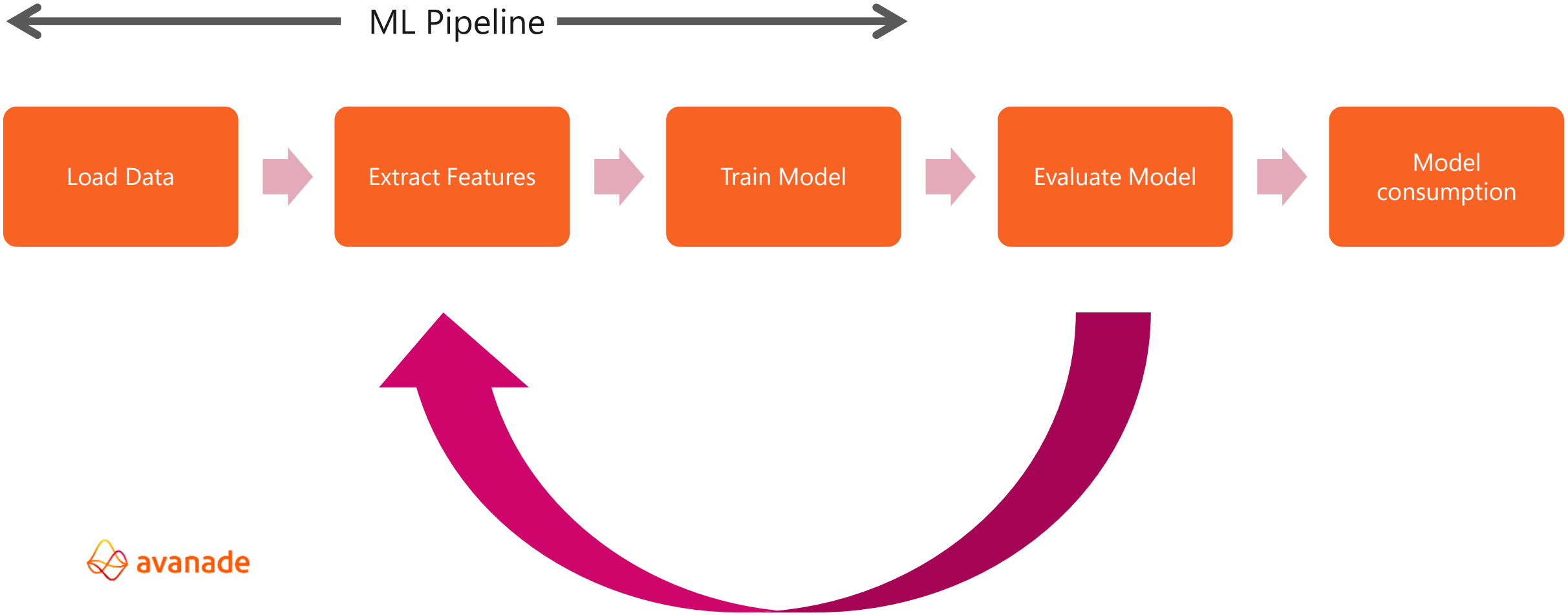
Machine Learning is Iterative



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Machine Learning.Net

Demo scenarios

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ML.Net
GitHub Issue Automatic Label

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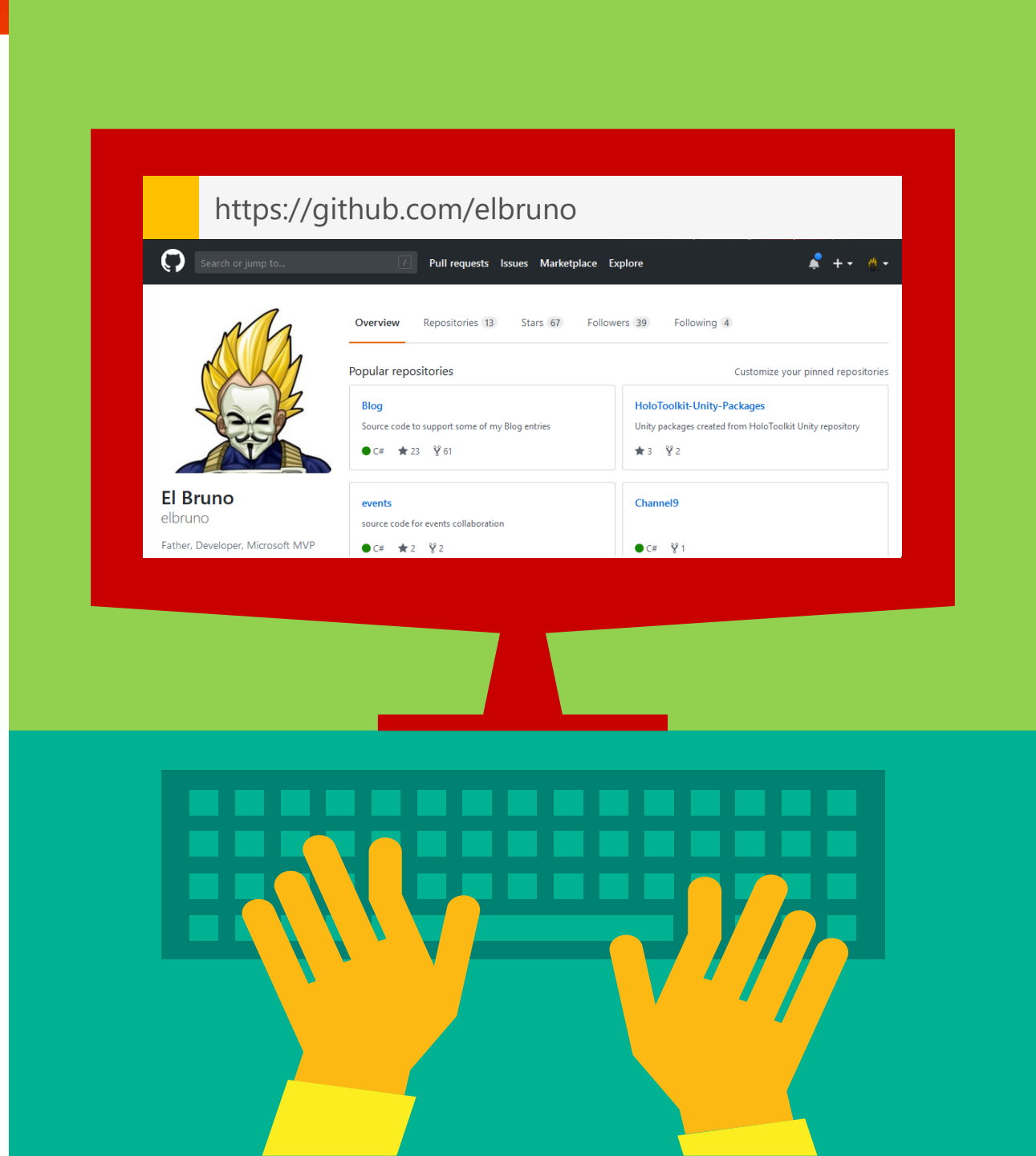

ML.Net, working with TensorFlow frozen models

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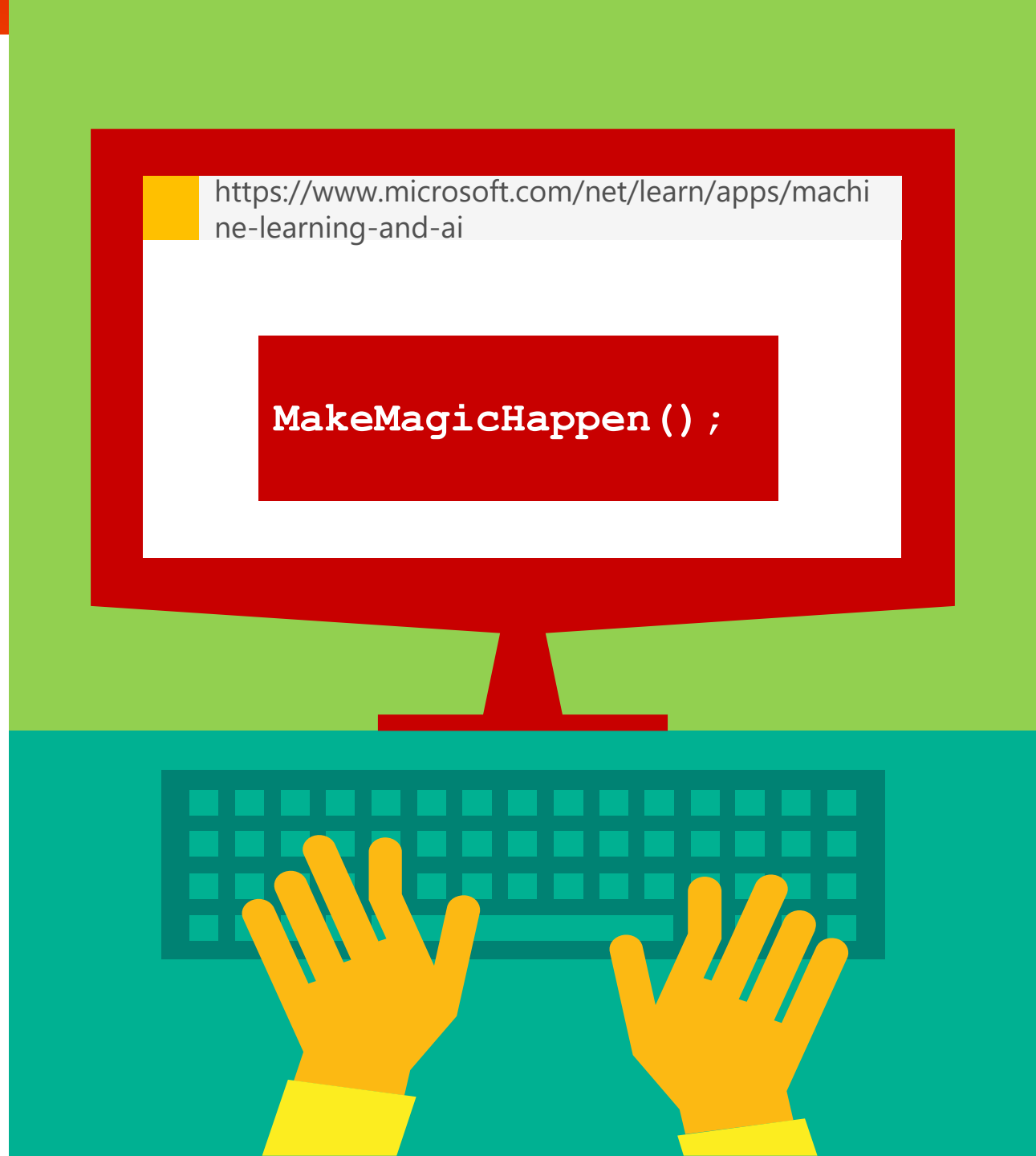

Road Ahead for ML.NET

- API improvements
- Additional ML Tasks and Scenarios
- Improved Deep Learning with TensorFlow
- Scale-out on Azure
- Better GUI to simplify ML tasks
- Improved tooling in Visual Studio
- Improvements for F#
- Language Innovation for .NET

Q&A

Thanks!

Bruno Capuano

Innovation Lead @Avanade

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