Infuse machine learning into your .NET apps

HELLO!

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Microsoft MVP – AI

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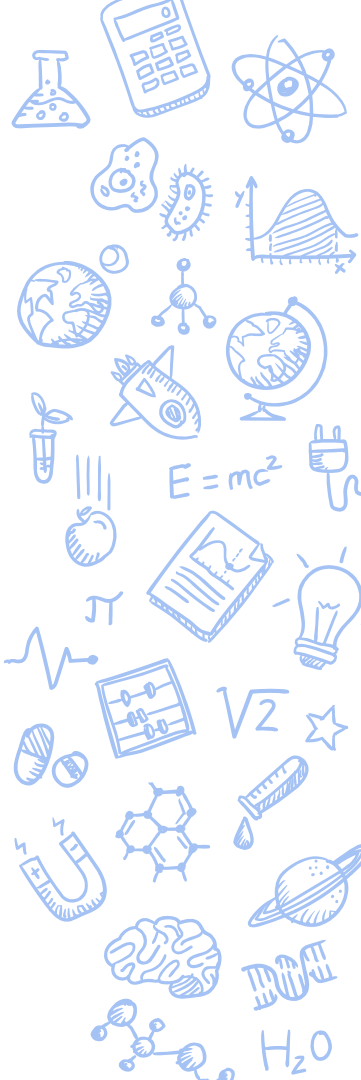
AZURE SYDNEY USER GROUP

GLOBAL AI THE PODCAST

AGENDA

- Projection of AI
- The No-code/low-code AI Landscape
- ML.NET
  - Scenarios
  - CLI
  - Model Builder
- Demos



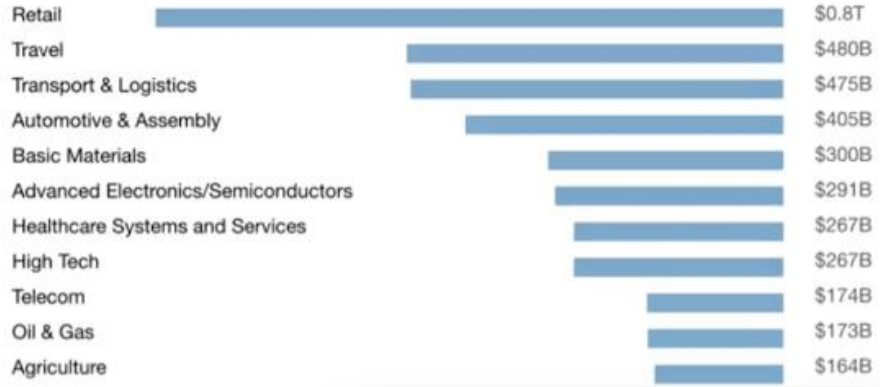
It's not enough just to sort of have AI capability that we can exercise — you also need the ability to democratize it so that every business can truly benefit from it.

– Satya Nadella

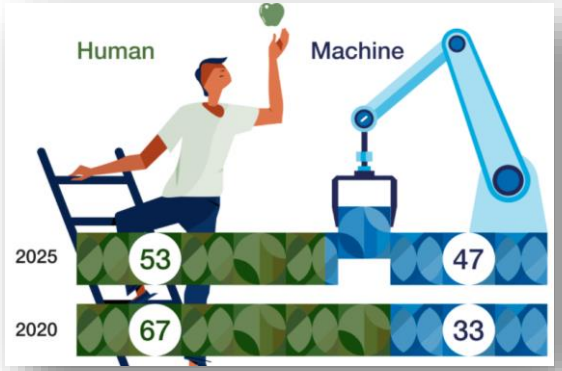
PROJECTION OF AI

AI value creation by 2030

$13 trillion



Rate of Automation



https://www.gartner.com/smarterwithgartner/5-digital-technology-trends-for-2020/
Future of Jobs Report 2020, World Economic Forum

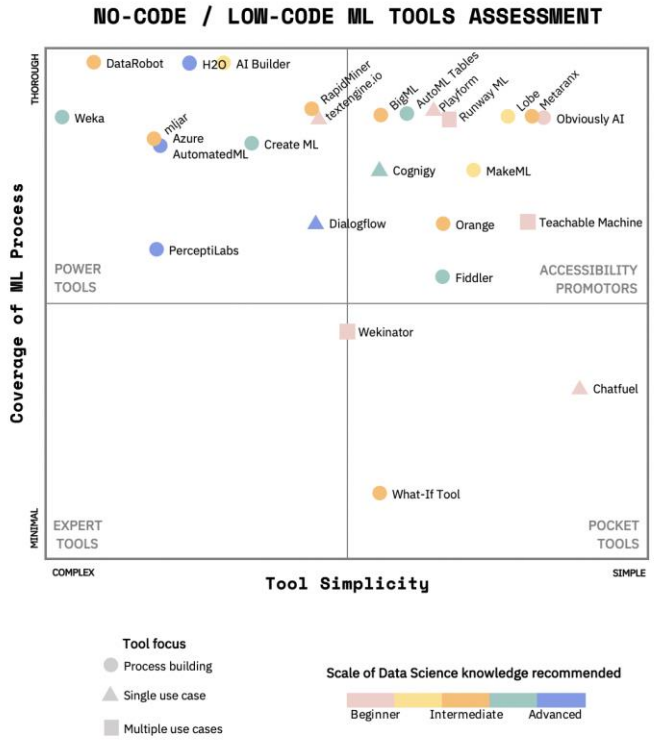
CLOUD AI DEVELOPER LEADERS

Figure 1: Magic Quadrant for Cloud AI Developer Services

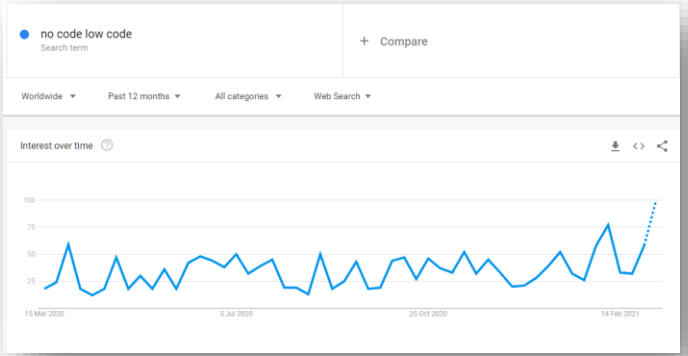
Source: Gartner (February 2021)

https://www.gartner.com/doc/reprints?id=1-25C36W9W&ct=210226&st=sb

NO-CODE / LOW-CODE AI LANDSCAPE



By 2023, over 50% of medium to large enterprises will have adopted an LCAP as one of their strategic application platforms.



https://www.gartner.com/en/documents/3991199
https://medium.com/aixdesign/26-no-code-low-code-ml-tools-to-check-out-8b3414eaa489

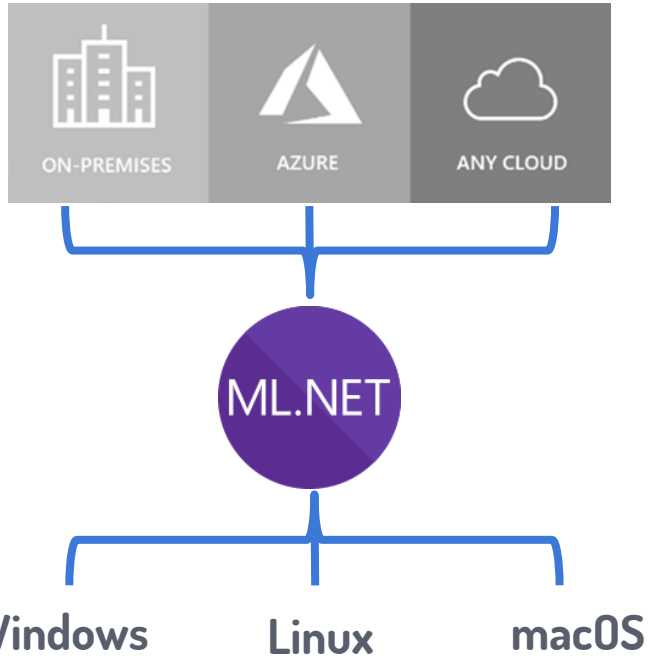
MICROSOFT AI STACK



	Azure ML	ML.NET	Cognitive Services	Lobe	AI Builder	WinML
Create & Train Custom Models	Yes	Yes	Yes	Yes (Preview)	Yes	No
Model Cosumption	Web API, ONNX	API, TensorFlow, ONNX, ML.NET	API / SDK	API (Local) / ONNX / TensorFlow / Core ML etc.	Power Platform	ONNX
Level of ML knowledge	Intermediate to Beginner	Beginner	Beginner to not required	Not required	Not required	Not required

PRO CODE → LOW CODE → NO CODE

WHAT IS ML.NET



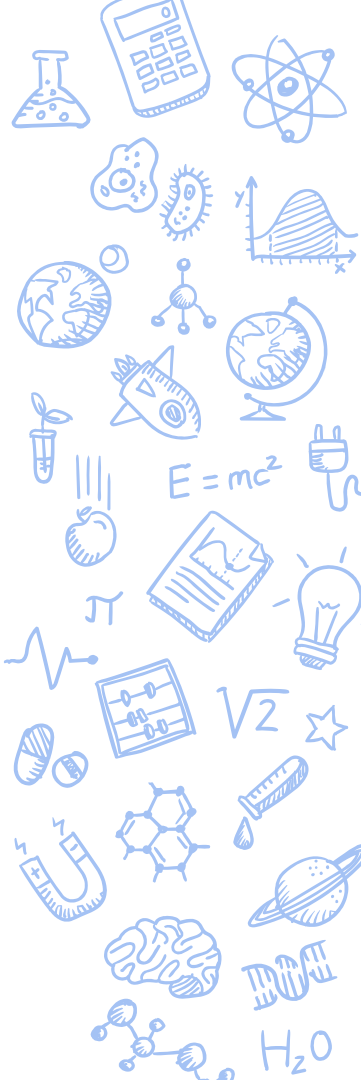
An open source and cross-platform machine learning framework for .NET

BUILT FOR .NET DEVELOPERS

- Utilitize the existing C# or F# Skills to integrate machine learning into your .NET apps
- No data science or sophisticated ML expertise is required

You may want to use ML.NET when you...

- Want to stay in .NET ecosystem
- Want to train a custom model without low-level complexities
- Want to consume a pre-trained model (ONNX runtime or TensorFlow)



POSSIBILITIES WITH ML.NET

Classification

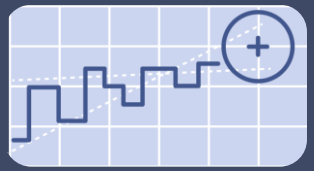
- Sentiment Analysis
- Eligibility or Non-eligibility
- Will customer buy or not?
- Which type of transaction is this?

- Predicting the price of fuel
- How many houses are going to go on rent this month?

Regression

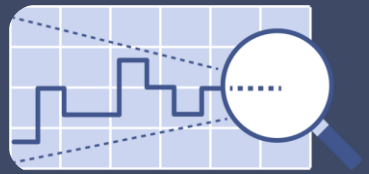
POSSIBILITIES WITH ML.NET

Forecasting



- Categories of products to be purchased
- Manufacturing flow management
- Weather forecasting

Anomaly detection



- Data center temperature
- Intrusion or fraud detection in the transactions

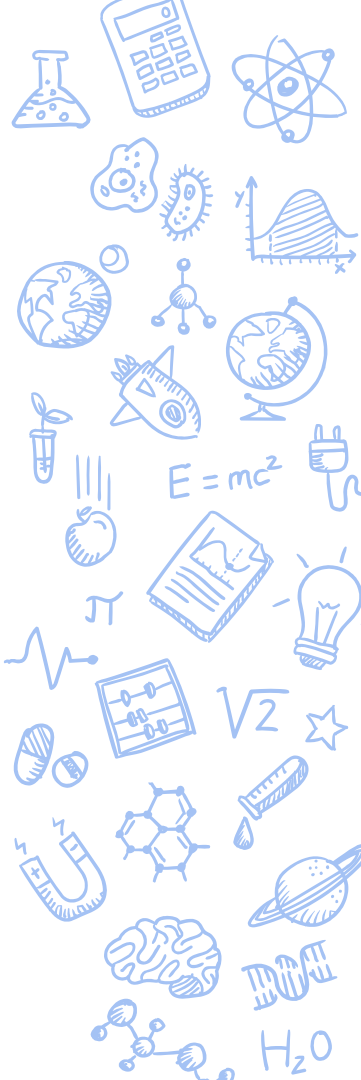
POSSIBILITIES WITH ML.NET

Recommendation

- List of the new retail products
- Smartphone applications
- Popular web services

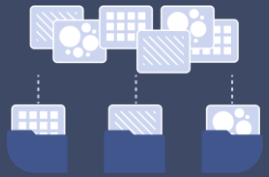
- Search capabilities
- Automatic synonym implementation

Ranking



POSSIBILITIES WITH ML.NET

Image classification

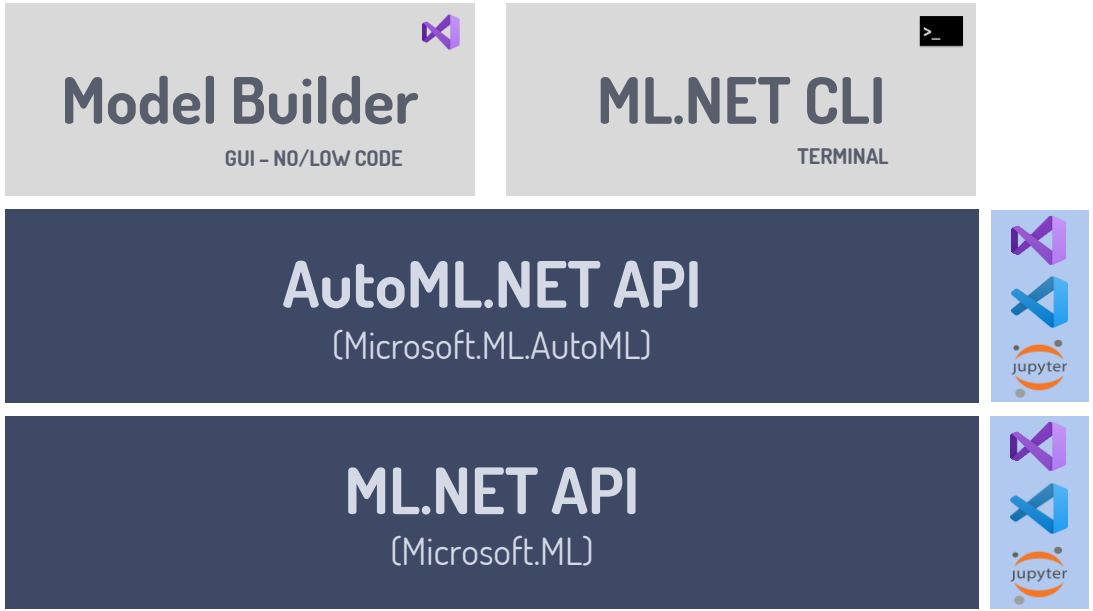


- Front or back side of the ID
- Type of desserts
- Broken swings in park

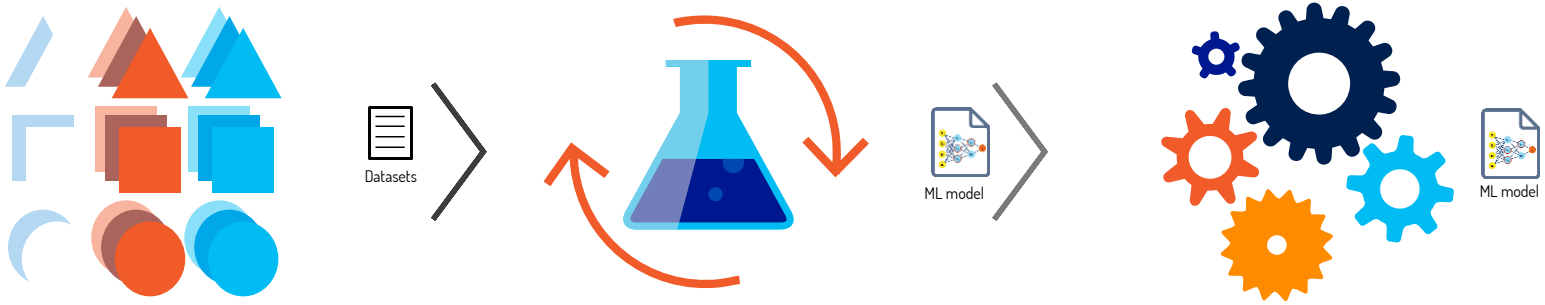
- Number of people in a café
- Types of flowers

Object detection

WHAT TOOLS DO I HAVE?



MACHINE LEARNING WORKFLOW



Prepare Your Data

Build & Train

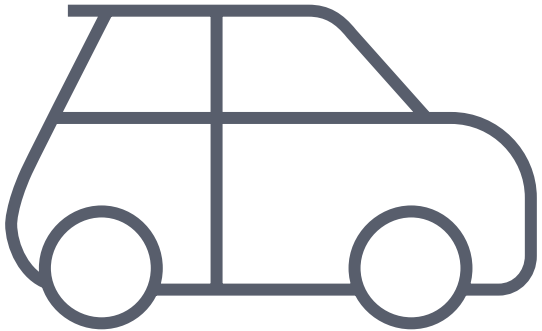
Run

App/tools for training the ML model

Model creation

End-user app using the ML model

Model consumption



How much is this car worth?

TYPICAL MODEL CREATION

Which features?

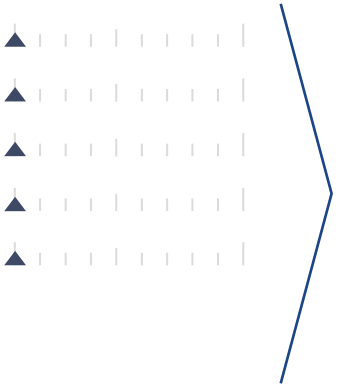
- Mileage
- Condition
- Car brand
- Year of make
- Regulations
- ...

Which algorithm?

- Gradient Boosted
- Nearest Neighbors
- SVM
- Bayesian Regression
- LGBM
- ...

Which parameters?

- Parameter 1
- Parameter 2
- Parameter 3
- Parameter 4
- Others



30%

Model

TYPICAL MODEL CREATION

Which features?

- Mileage
- Condition
- Car brand
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Which algorithm?

- Gradient Boosted
- Nearest Neighbors
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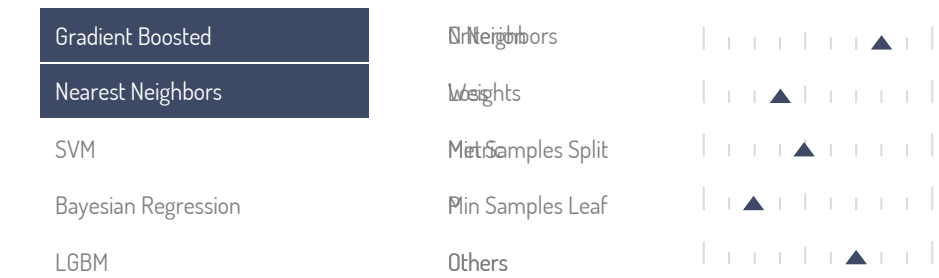
Which parameters?



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Model

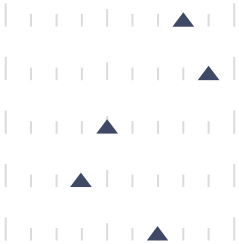
Iterate

TYPICAL MODEL CREATION

Which features?

Which algorithm?

Which parameters?



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Iterate

AUTOML MODEL CREATION

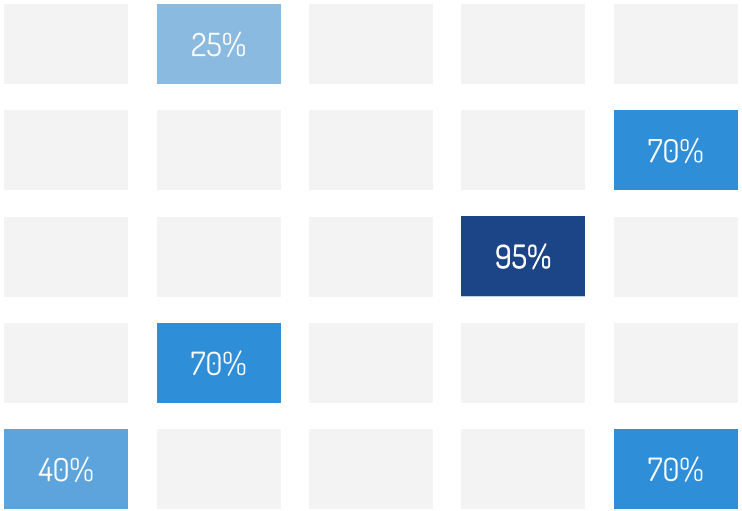
Input

101010
010101
101010
Enter data

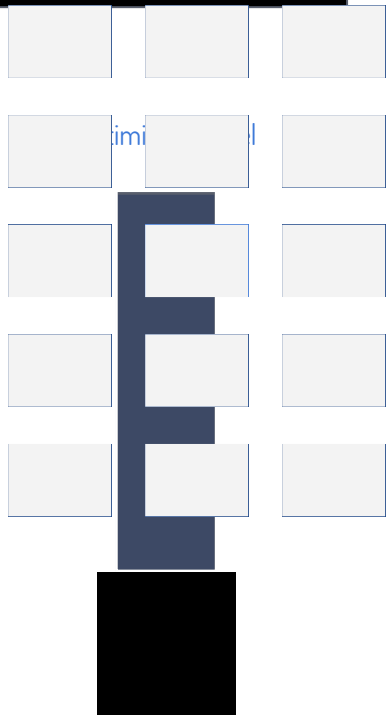
Define goals

Apply constraints

Intelligently test multiple models in parallel

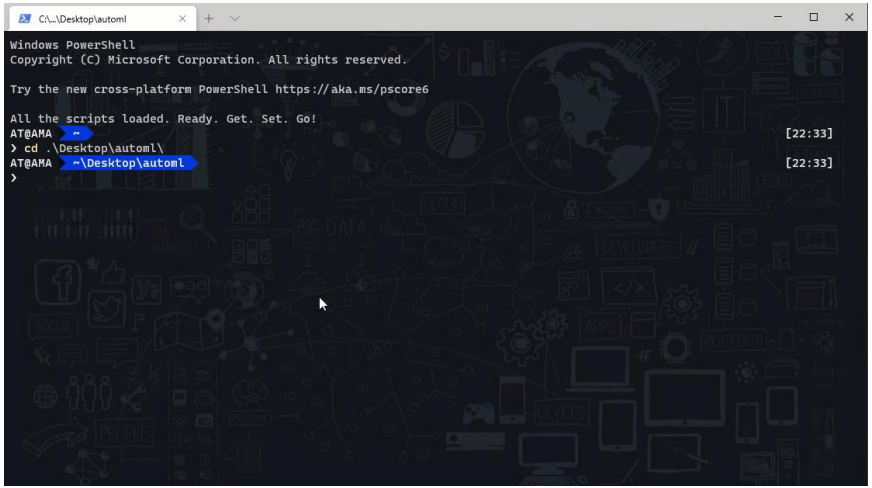


Output



ML.NET CLI

- Use the CLI to easily build custom ML models with Auto ML
- Removes the overhead of implementation, feature engineering and tweaking of hyperparameters
- Cross platform (Windows, Linux, MacOS)
- Generate code for training & consumption



SentimentAnalyzer 1.2.2

7300+ downloads

BotBuilderCommunity and many more..

ML.NET CLI

CROSS PLATFORM WITH AUTOML

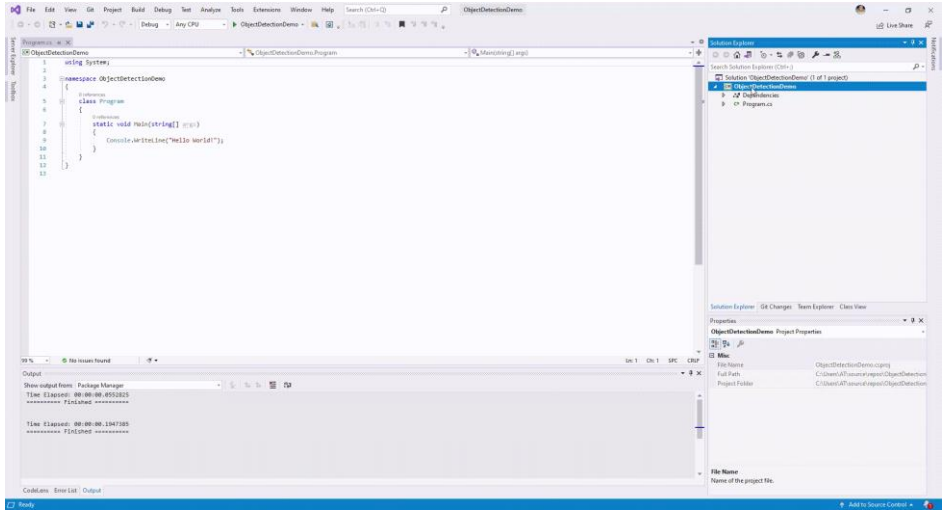
/demo

Sentiment Analysis is not the end of the world. There's so much beyond that.

- A friend

MODEL BUILDER

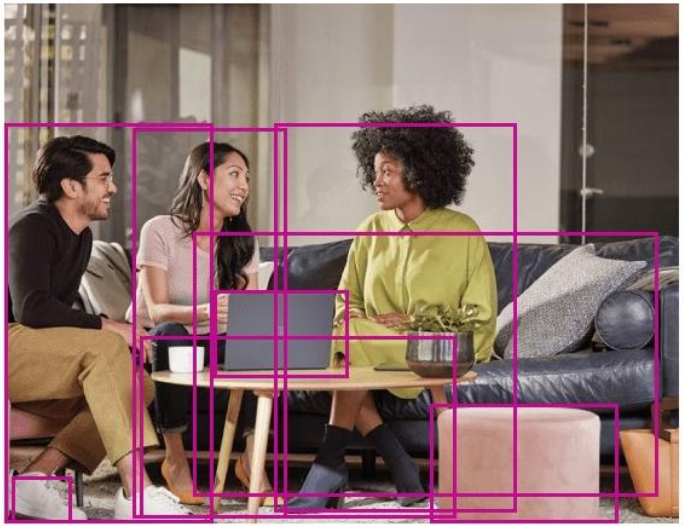
- No-code way to build custom ML models with AutoML
- Config based training with generated code-behind files
- Load from files and databases
- .mbconfig solves many problems
- Utilizes Azure ML Studio Experiments for resource intensive operations



OBJECT DETECTION WITH ML.NET

- Computer Vision problem to locate and categorizes object in images / frames

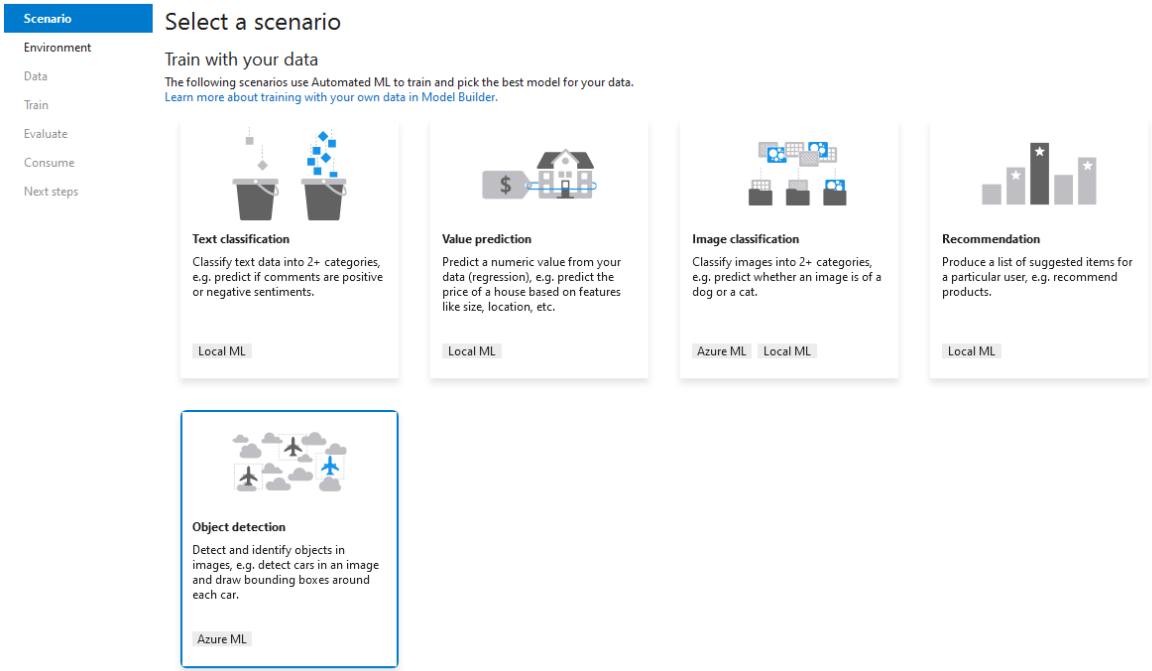
{Person} – *Image Classification*



{Footwear, Person, Laptop, Plant} – *Object Detection*

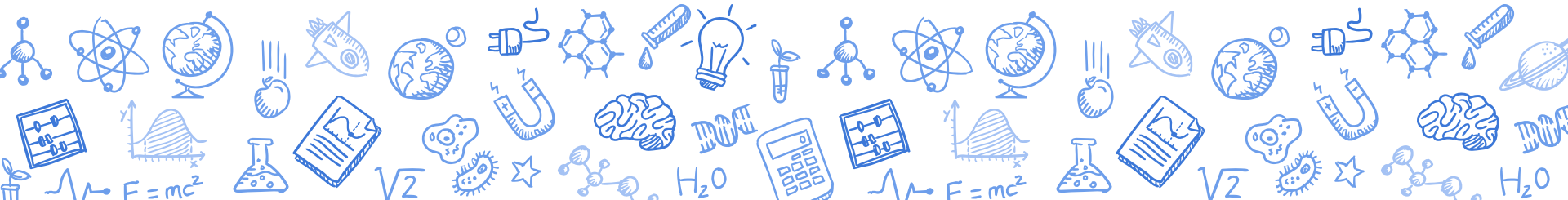
OBJECT DETECTION WITH ML.NET

- Addresses all the common scenarios



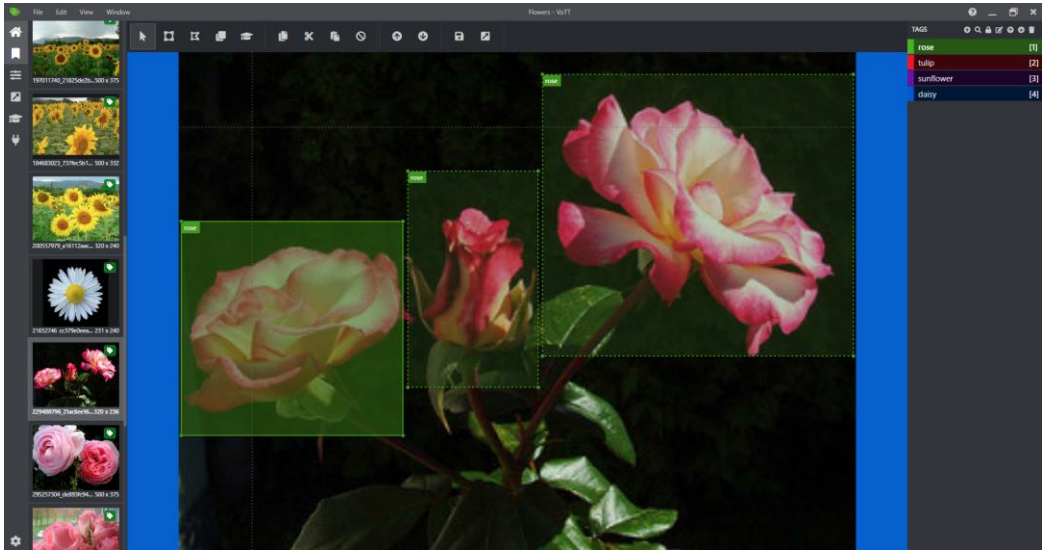
But first..

Let's talk about Tagging!



VoTT (Visual Object Tagging Tool)

- An opensource image / video tagging tool
- Developed by Microsoft CSE team
- Multiple export provider options
- Works for web / local



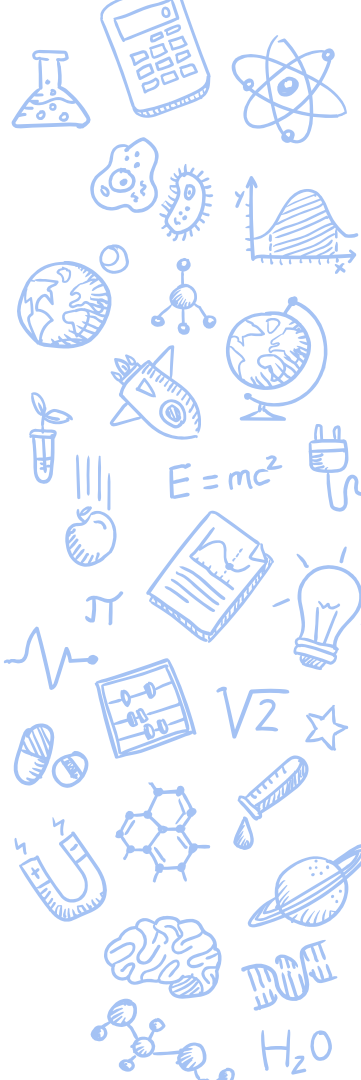
ML.NET Model Builder

CROSS PLATFORM WITH AUTOML

/demo

Resources

- ML.NET Videos – https://channel9.msdn.com/Series/MLNET/MLNET-Machine-Learning-Introduction-1-of-8
- ML.NET Docs – https://docs.microsoft.com/en-us/dotnet/machine-learning/
- ML.NET Model Builder Updates – https://devblogs.microsoft.com/dotnet/ml-net-and-model-builder-march-updates/
- SentimentAnalyzer repo – https://github.com/arafattehsin/CognitiveRocket/tree/master/Cognitive-Library/SentimentAnalyzer
- Blog Post – https://www.arafattehsin.com/beyond-sentiment-analysis-object-detection-with-ml-net/
- Object Detection with ML.NET (Docs) – https://docs.microsoft.com/en-us/dotnet/machine-learning/tutorials/object-detection-model-builder



THANKS!

Any questions?

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