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India's largest Azure Conference

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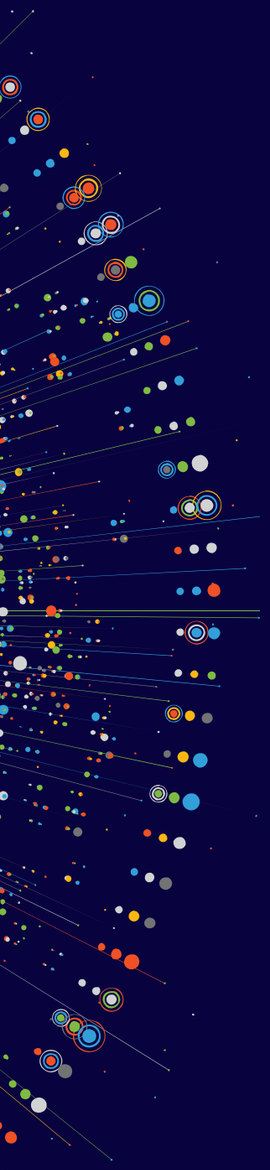

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Azure Machine Learning & ML.NET: Better Together

Jose Luis Latorre

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Agenda

- Quick refresher on AI
- Azure Machine Learning
- Designer
- AutoML
- Generating an ONNX Model with AutoML & Notebooks
- Consuming an ONNX Model with ML.NET

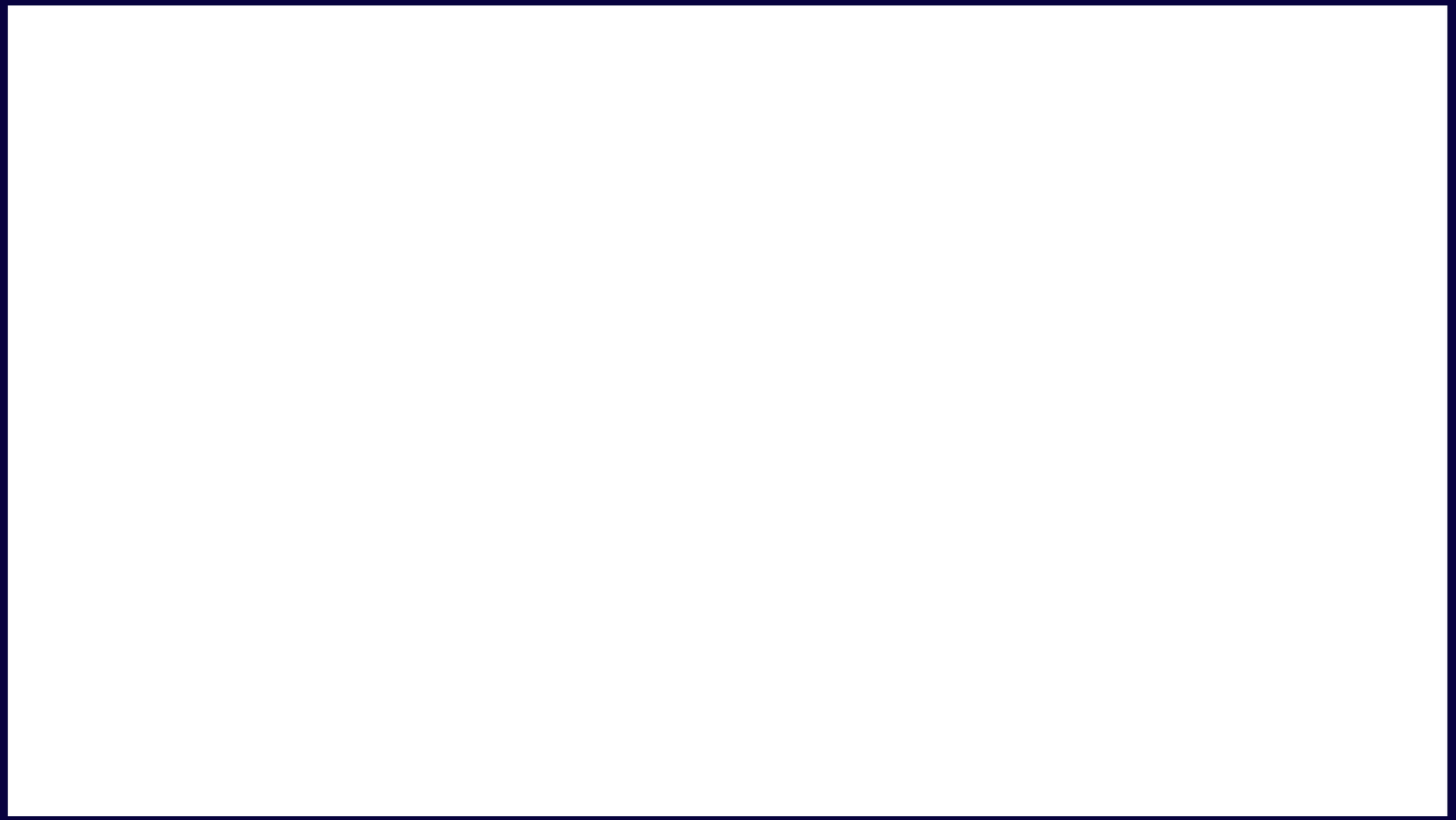
First things first! – What's AI?

AI, Artificial Intelligence refers to intelligence demonstrated by Machines, usually described as machines/software that mimics cognitive functions from humans such as learning & problem solving.

What's Machine Learning?

It is the foundation for an AI system, as it is how we do teach a computer to make a prediction and draw conclusions from data.

What's Machine Learning?



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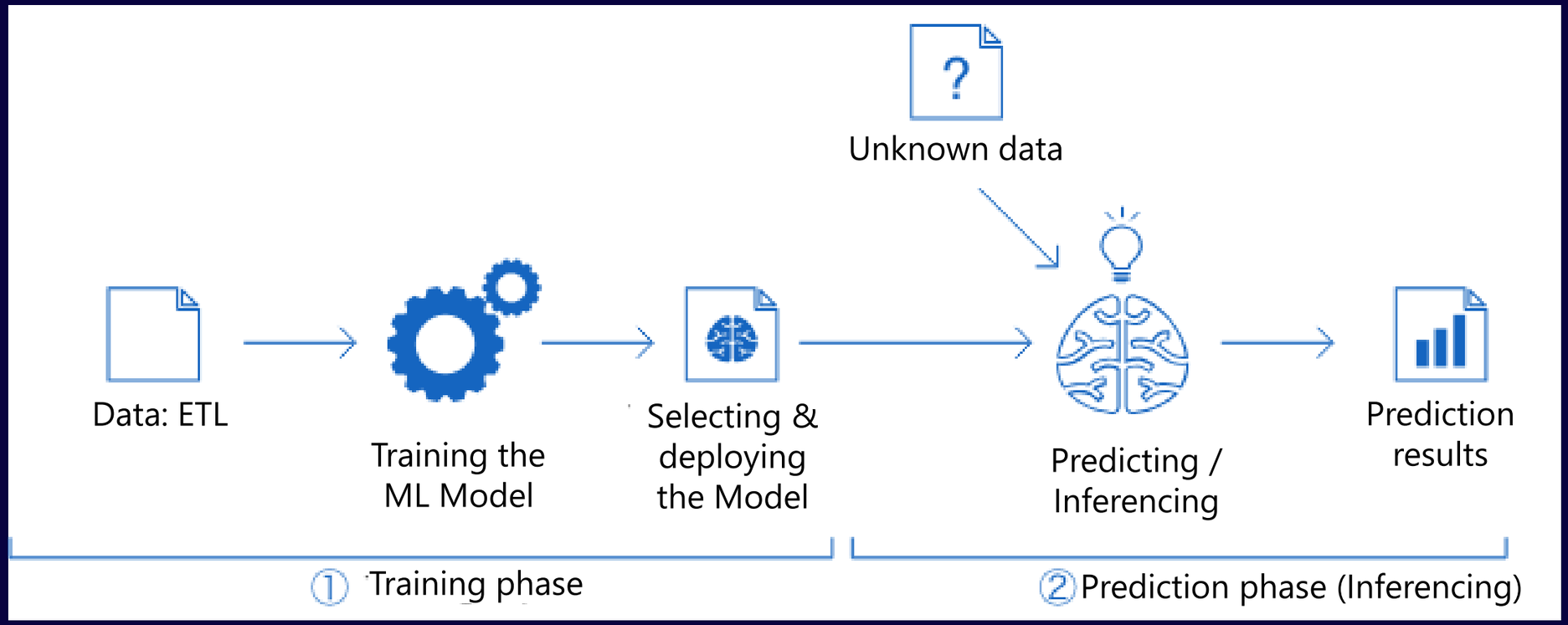
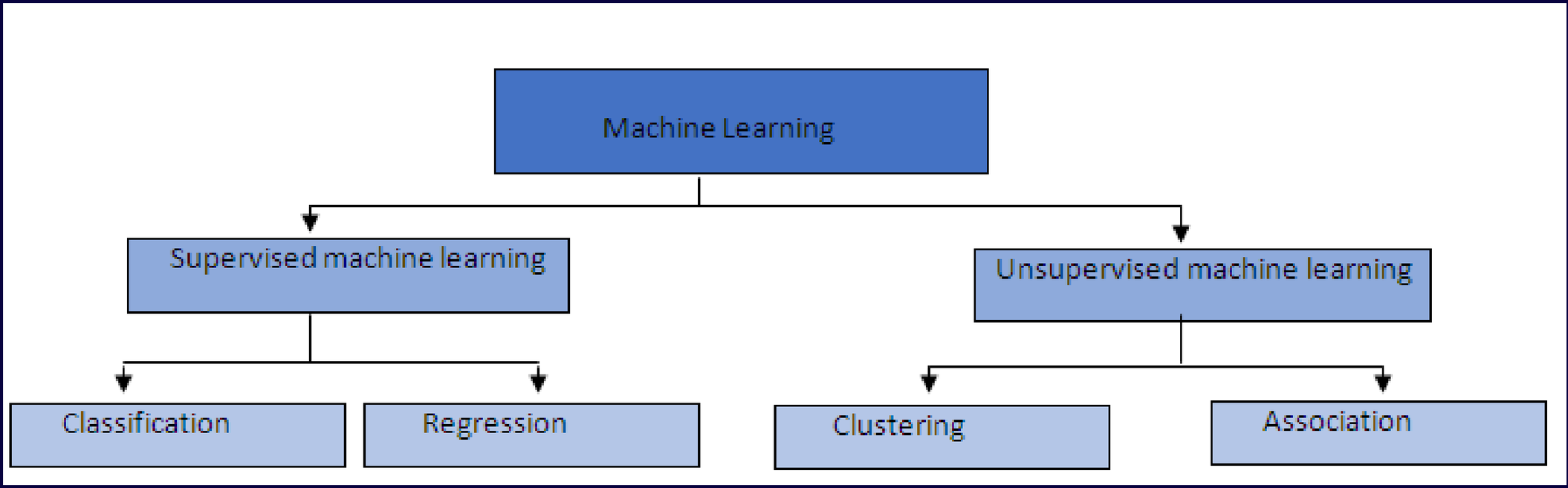
The Machine Learning Workflow

The process of training a ML model and using it involves several steps which we can summarize on the following picture.



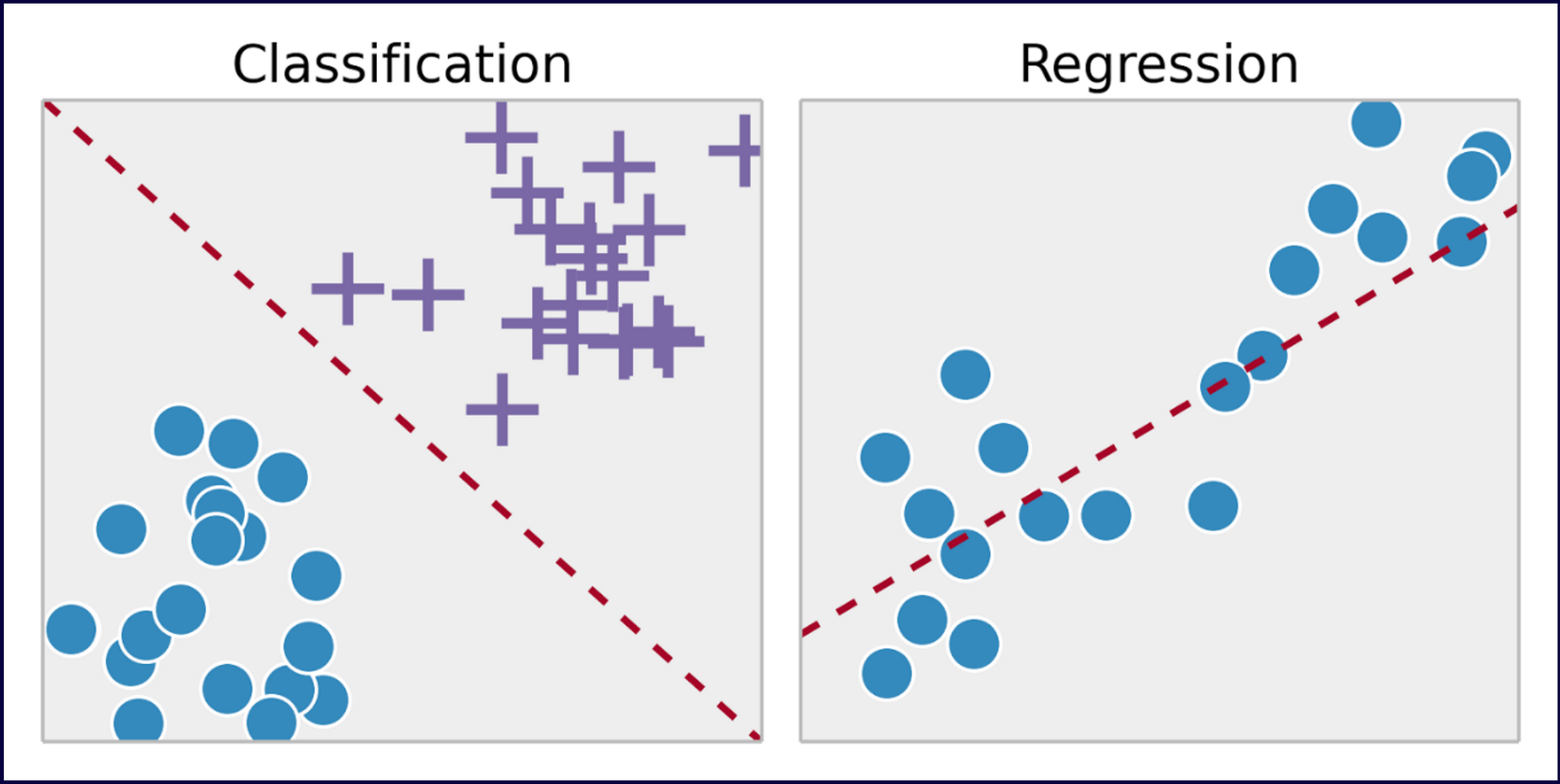
ML Algorithms

Generally, we have two main Categories or Techniques: Supervised & Unsupervised.



ML Algorithms

Generally, we have two types of Supervised ML Algorithms that we can train: Regression & Classification.



Azure Machine Learning

Bring AI to everyone with an end-to-end, scalable, trusted platform

Boost your data science productivity

Increase your rate of experimentation

Deploy and manage your models everywhere

Built with your needs in mind

- Automated machine learning
- Managed compute
- Simple deployment
- DevOps for machine learning
- Support for open source frameworks
- Tool agnostic Python SDK

Seamlessly integrated with the Azure Portfolio

Azure Machine Learning Studio

Set of Azure Cloud Services

Python SDK

That enables you to:

- Prepare Data
- Build Models
- Train Models

- Manage Models
- Track Experiments
- Deploy Models

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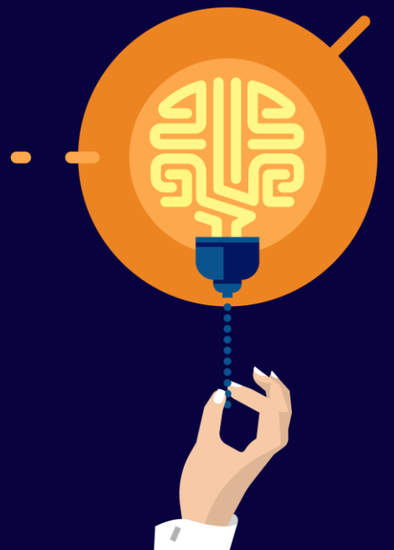
How do we get Azure ML & Overview of the Studio



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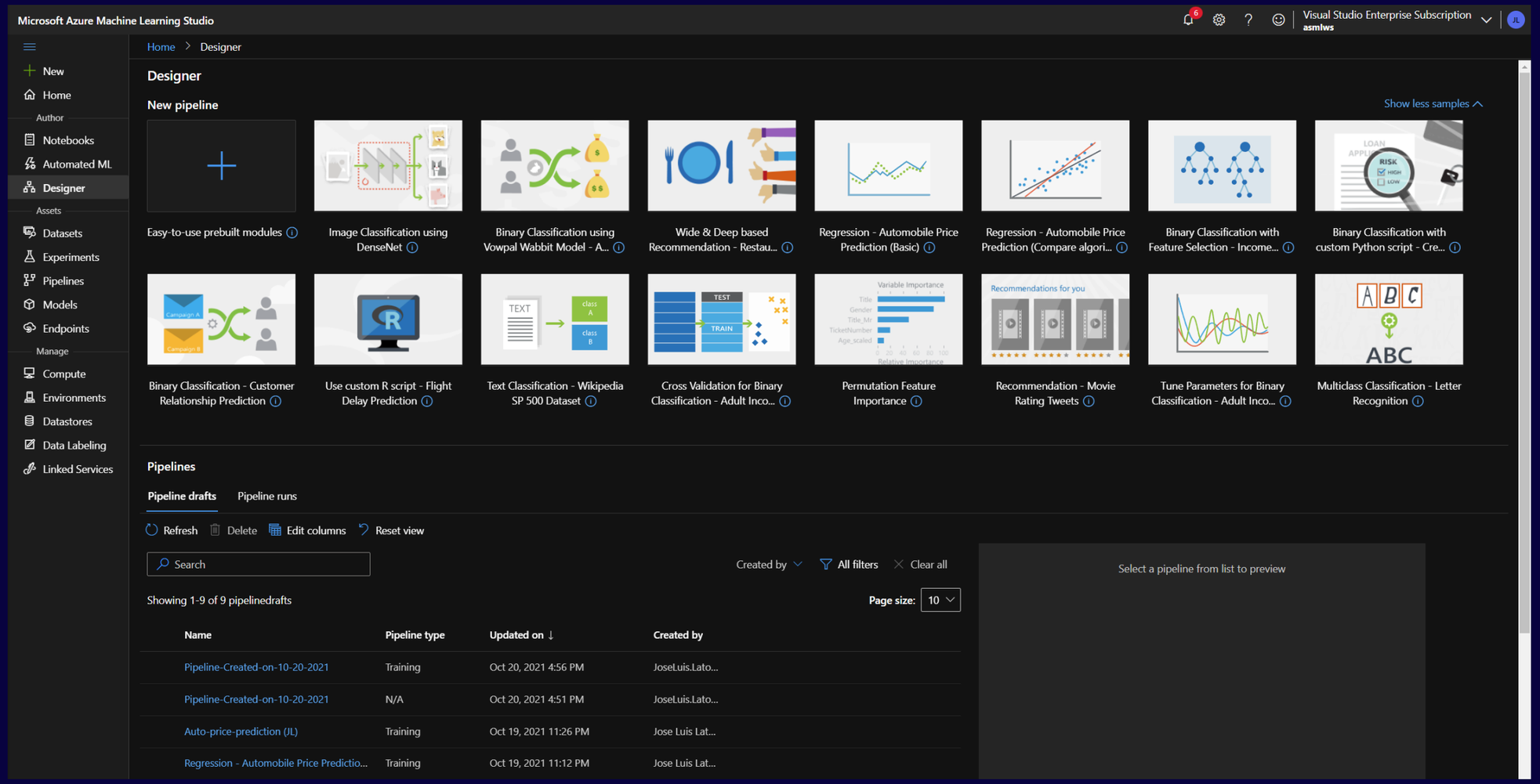
Azure Machine Learning Designer

Drag-and-drop interface to create pipelines for training models, inferencing or data processing.



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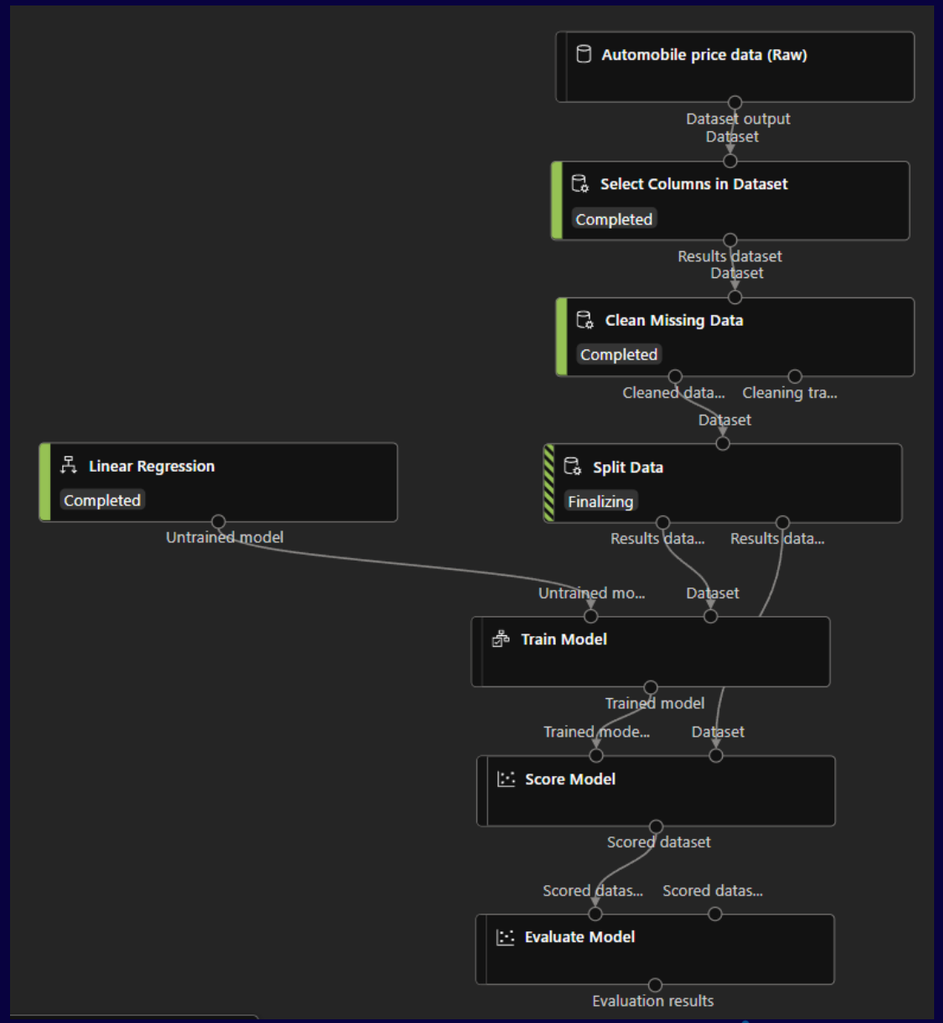
Let's Build something!



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Automated ML, aka AutoML

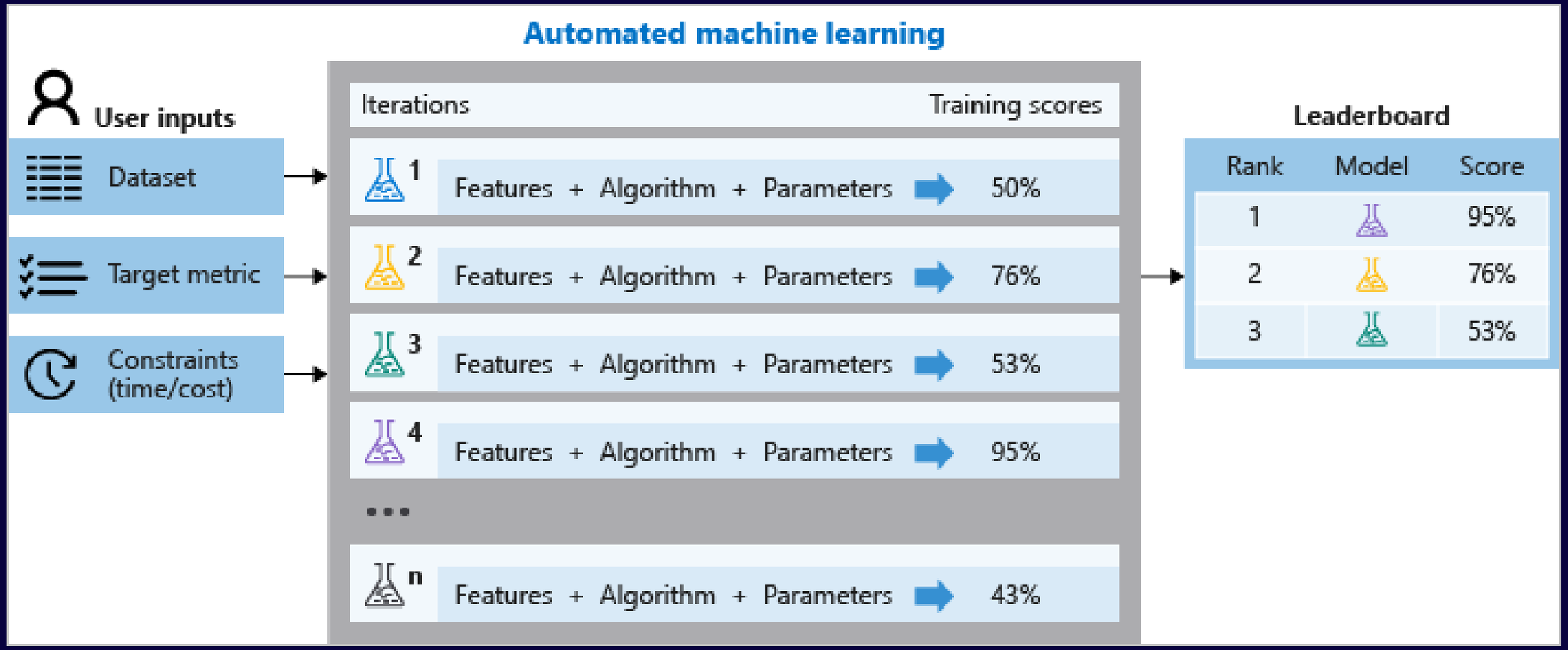
Machine Learning to create Machine Learning, ETL, Model Selection, Hyperparameter tuning and more done for you.

- Feature selection & engineering
- Data guardrails
- Best Model selection
- Hyperparameter tuning
- Model explanation & insights (feature importance)

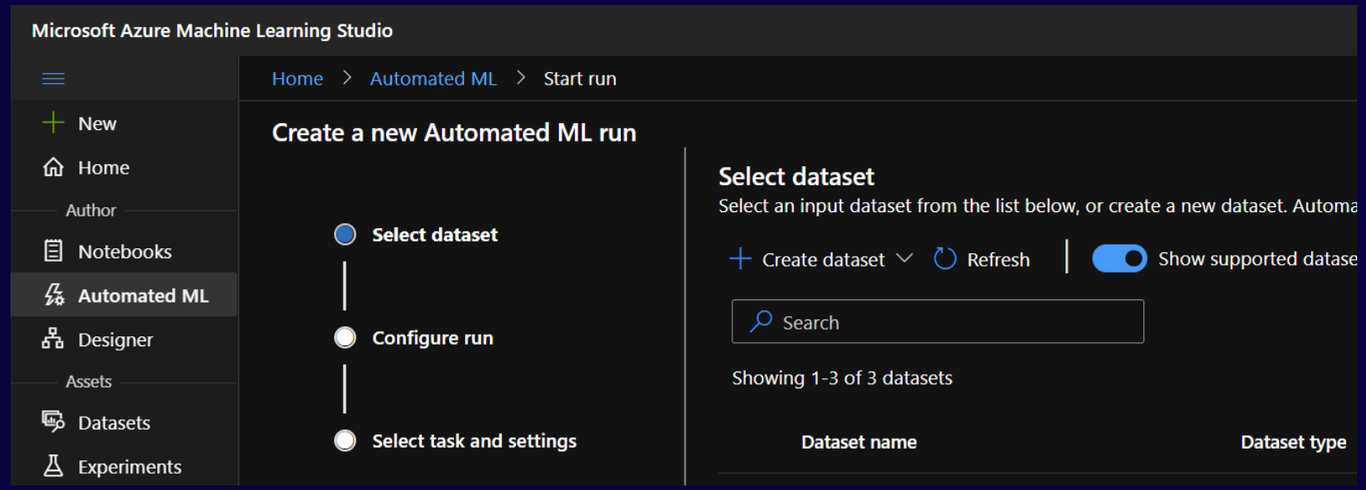
- Different supported tasks (Classification, Regression, time series)
- A Data Scientist “in a box”
- To me, the dream of an “aficionado” Data Scientist

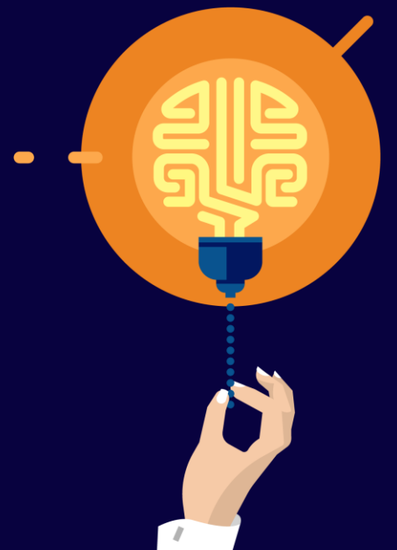
Automated ML, aka AutoML

AutoML Simplifies the ML training process greatly, doing the feature engineering, model selection, hyperparameter tuning…



Let's let the machine to do the work!





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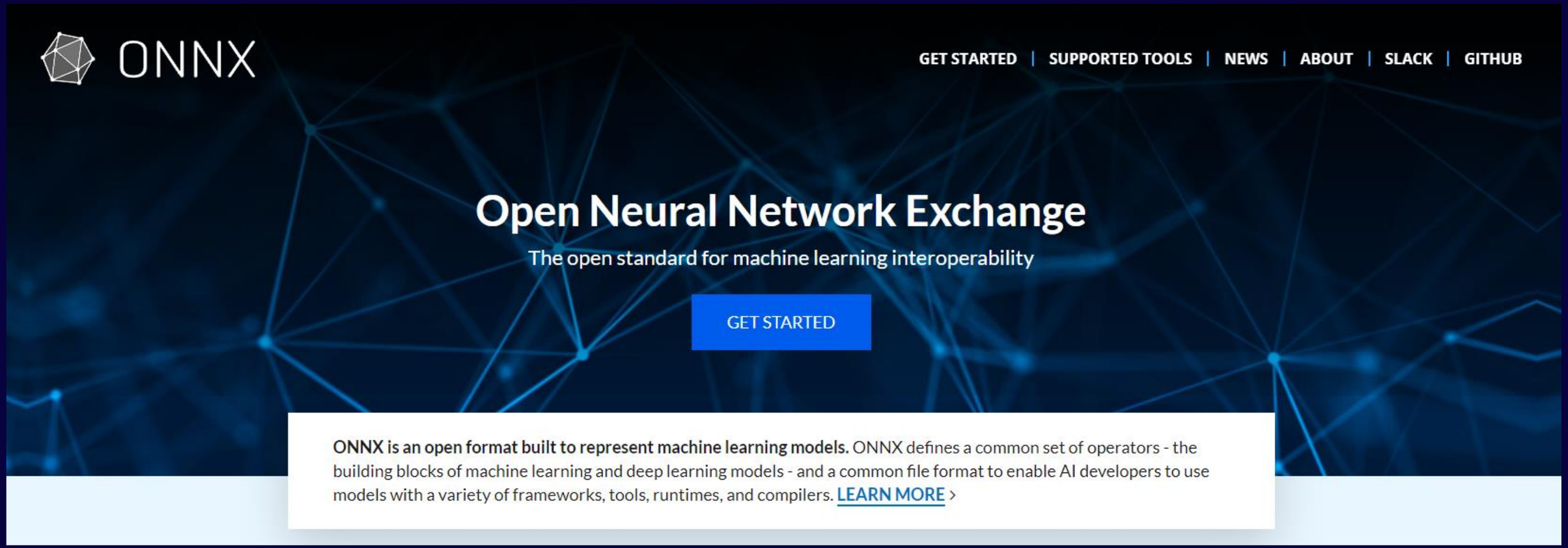
ONNX

Open Neural Network exchange



Let's build an ONNX with Python Notebooks

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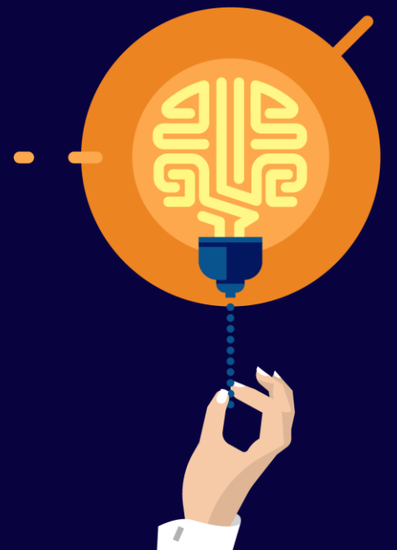
Based on:
https://docs.microsoft.com/en-us/azure/machine-learning/tutorial-auto-train-models



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ONNX generation from Azure ML

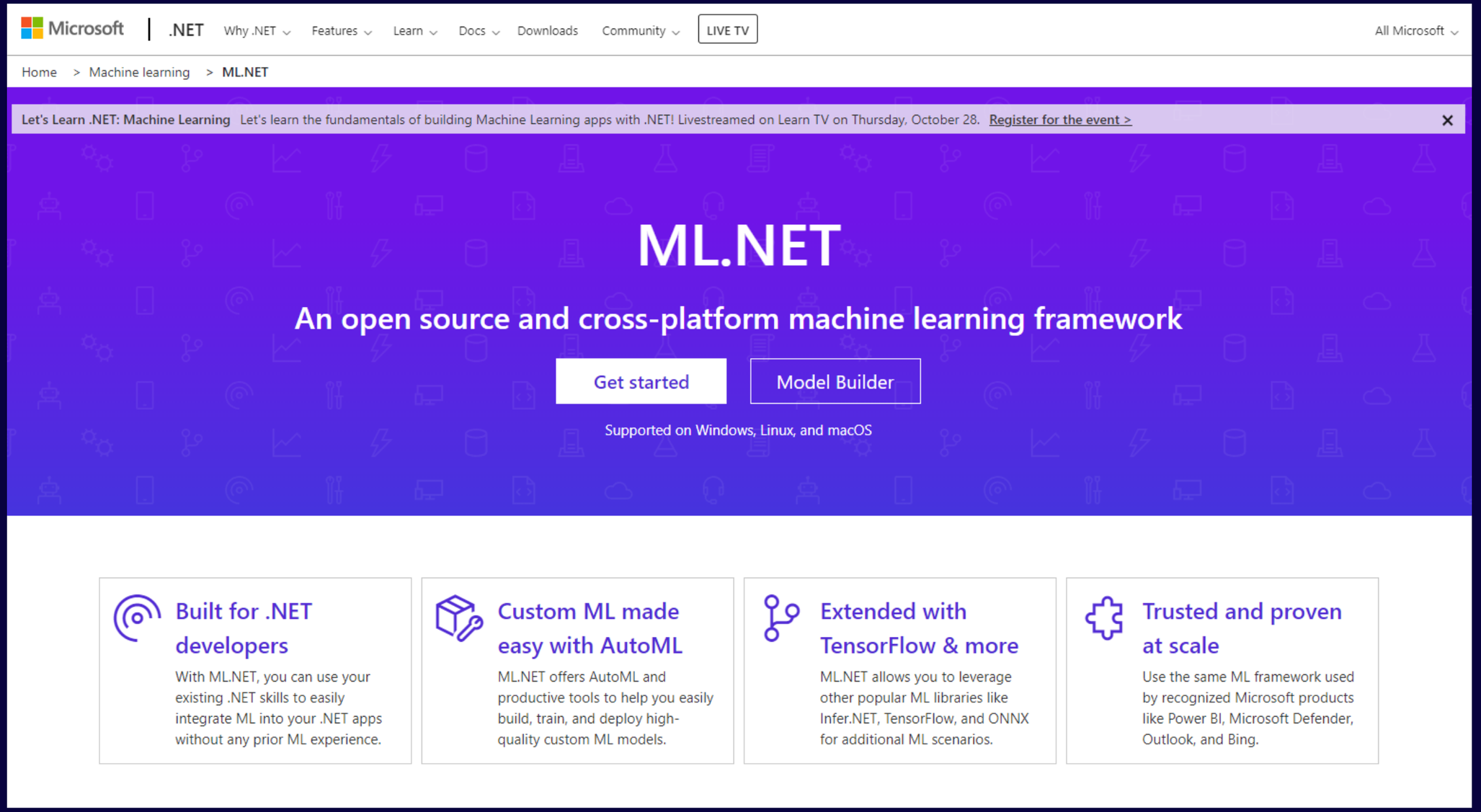
Only supported at the moment from Notebooks

Only the following changes are needed when adapting an existing Notebook that trains a model:

1. Add support for ONNX on the AutoML Configuration, AutoMLConfig:
   - enable_onnx_compatible_models=True,
2. Once the model is built, to export it as ONNX….
   1. First, retrieve the model
      - best_run, onnx_mdl = local_run.get_output(return_onnx_model=True)
   2. Second, convert and save it
      - from azureml.automl.runtime.onnx_convert import OnnxConverter
      - onnx_fl_path = "./best_model.onnx"
      - OnnxConverter.save_onnx_model(onnx_mdl, onnx_fl_path)

ML.NET

An open source and cross-platform machine learning framework, VS Code & Visual Studio supported.



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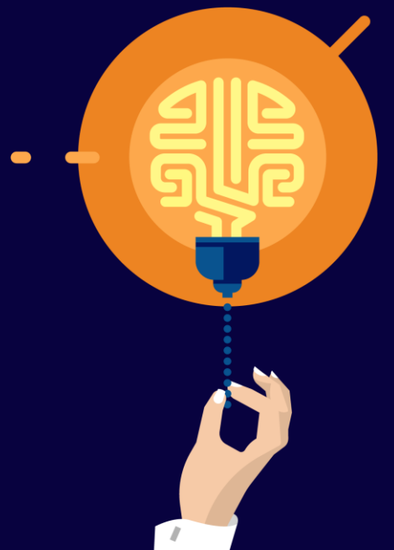
Using ONNX on ML.NET

Based on:
https://docs.microsoft.com/en-gb/azure/machine-learning/how-to-use-automl-onnx-model-dotnet



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Conclusions & take aways

Some points to remember and take away with you…

- Azure Machine Learning rocks
- The Designer is cool
- AutoML is also very cool
- Still no ONNX on AML no-code (but coming!)
- We can get the ONNX model with Notebooks! – And AutoML!!
- And run it from ML.NET
- We could also generate it on ML.NET and deploy it in Azure Machine Learning.
- The best is if you try it yourself!

Slides and the code for the ONNX generating Notebook & ML.NET are located at my GitHub: https://github.com/joslat/ONNX-with-ML.NET

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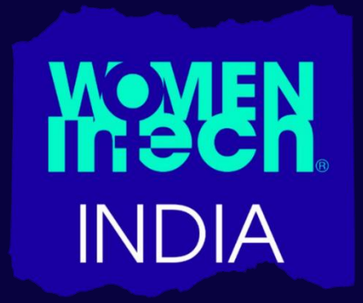

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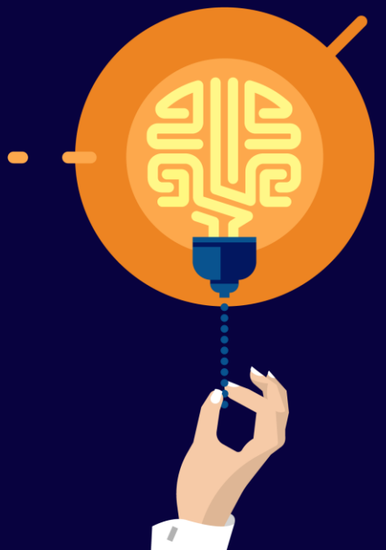
Q & A



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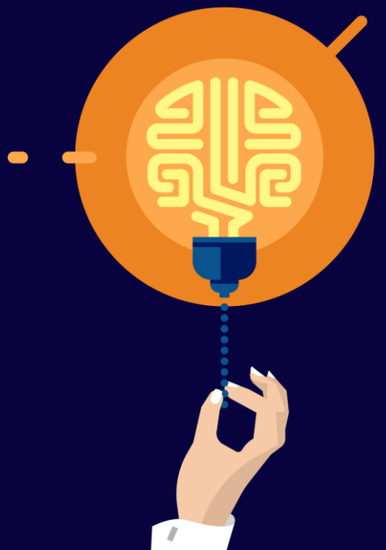
Feedback



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THANK YOU!

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