



Azure Community Conference 2021

***India's largest Azure
Conference***



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9 year Microsoft MVP (not anymore)

Software architect & DEV Community Lead

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.NET User Group Zürich



Azure Machine Learning & ML.NET: Better Together

Jose Luis Latorre



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?

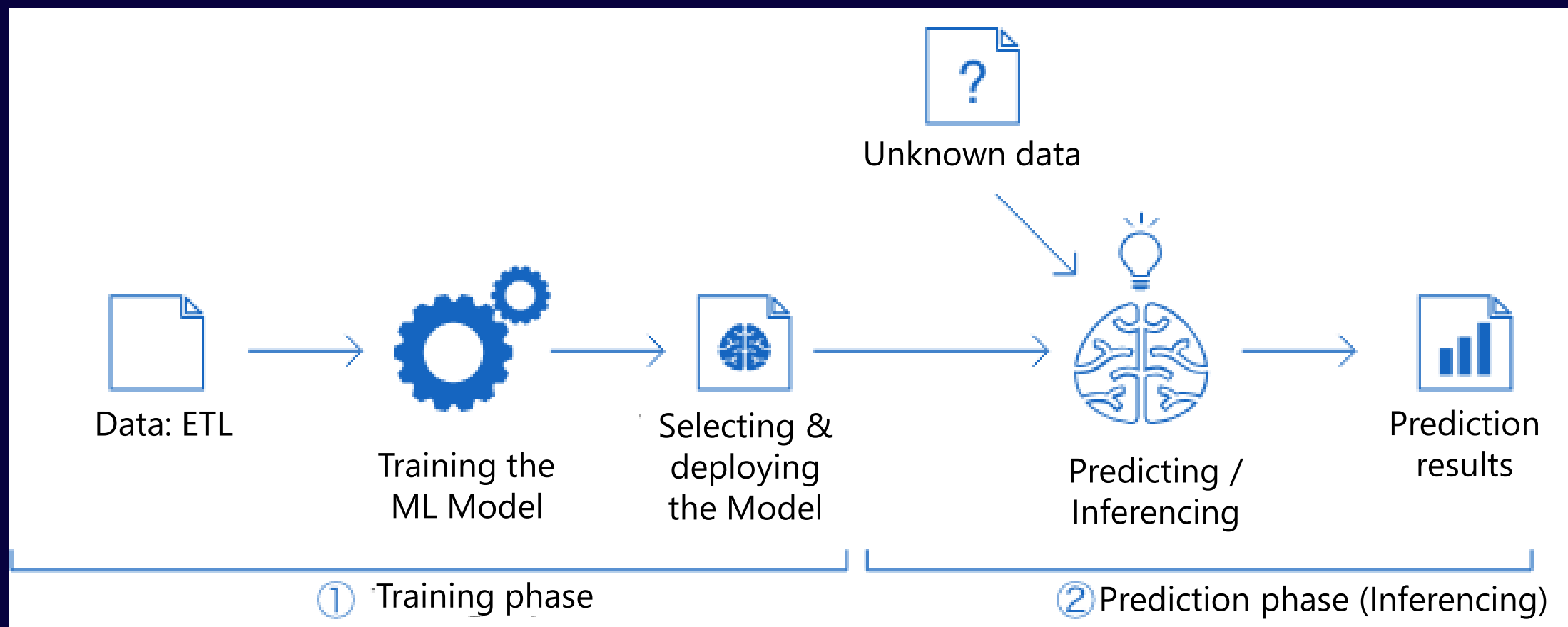
It is the foundation for an AI system, as it is how we do teach a computer to make a prediction and draw conclusions from data.

What's Machine Learning?



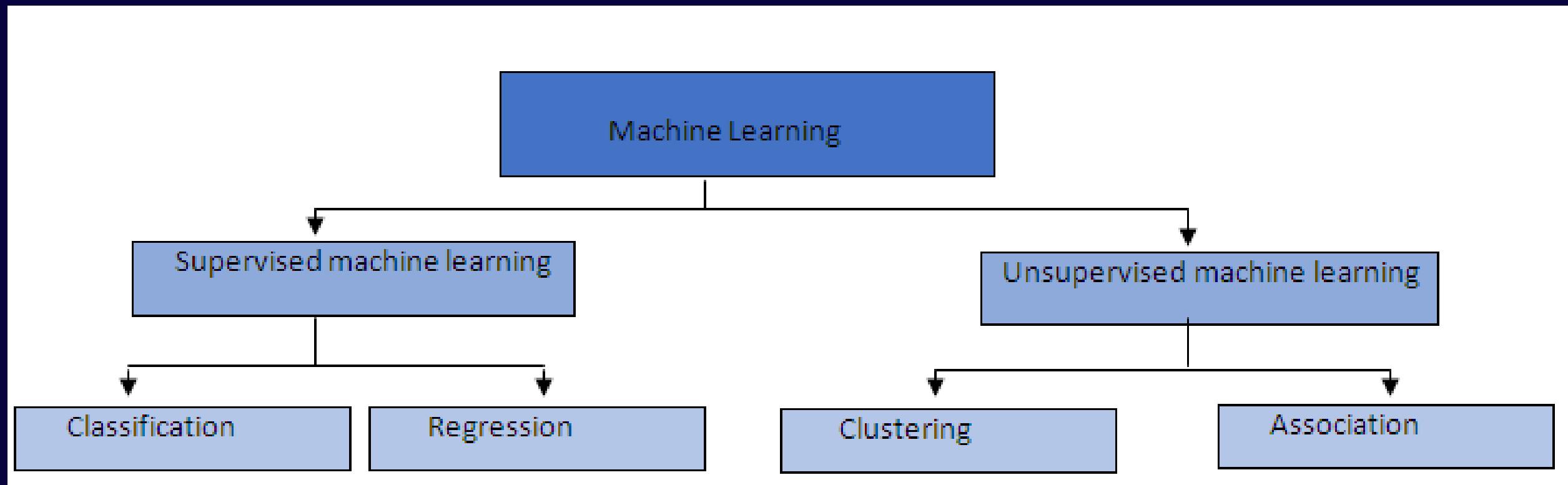
The Machine Learning Workflow

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



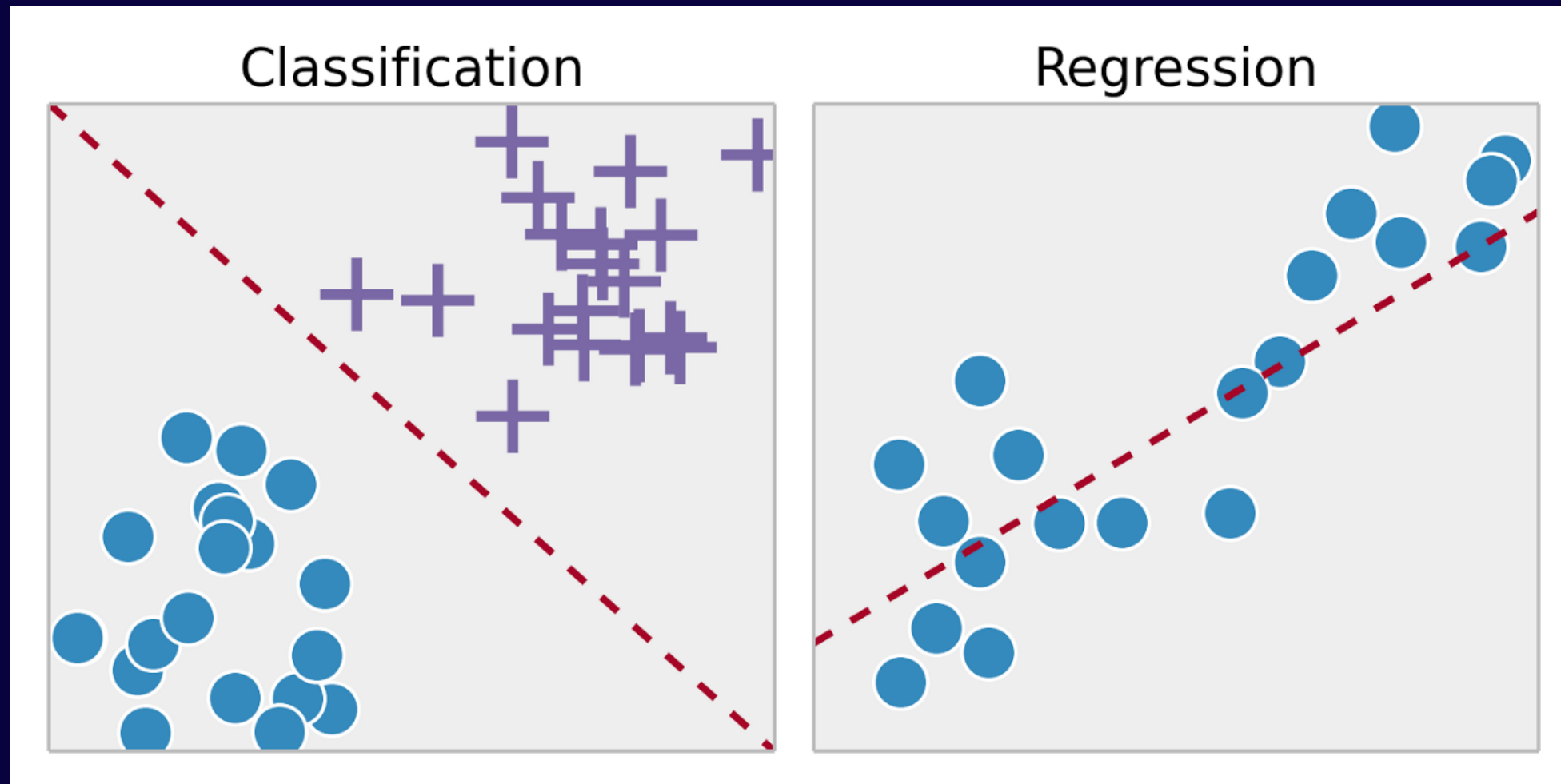
ML Algorithms

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



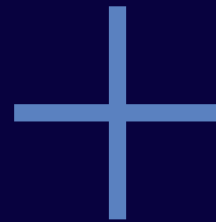
Built with your needs in mind

- 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

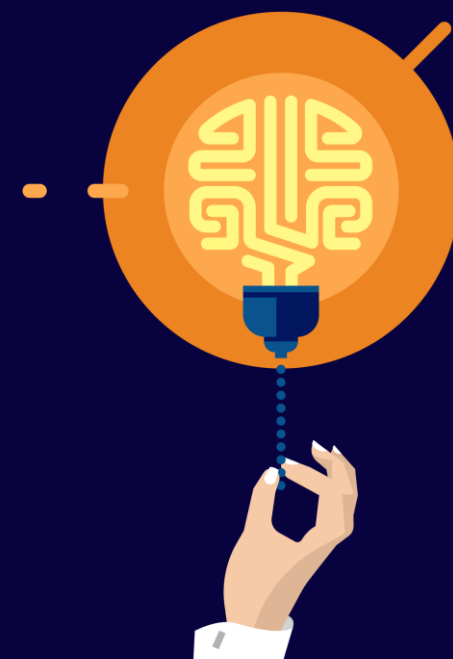


Python
SDK

That enables you to:

- Prepare Data
- Build Models
- Train Models
- Manage Models
- Track Experiments
- Deploy Models

How do we get Azure ML & Overview of the Studio



Azure Machine Learning Designer

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

Microsoft Azure Machine Learning Studio

6

?

?

?

Visual Studio Enterprise Subscription
asmlws

JL

Home > Designer

Designer

New pipeline

Easy-to-use prebuilt modules

Image Classification using DenseNet

Binary Classification using Vowpal Wabbit Model - A...

Wide & Deep based Recommendation - Restau...

Regression - Automobile Price Prediction (Basic)

Regression - Automobile Price Prediction (Compare algori...

Binary Classification with Feature Selection - Income...

Binary Classification with custom Python script - Cre...

Binary Classification - Customer Relationship Prediction

Use custom R script - Flight Delay Prediction

Text Classification - Wikipedia SP 500 Dataset

Cross Validation for Binary Classification - Adult Inco...

Permutation Feature Importance

Recommendation - Movie Rating Tweets

Tune Parameters for Binary Classification - Adult Inco...

Multiclass Classification - Letter Recognition

Pipelines

Pipeline draftsPipeline runs

RefreshDeleteEdit columnsReset view

Search

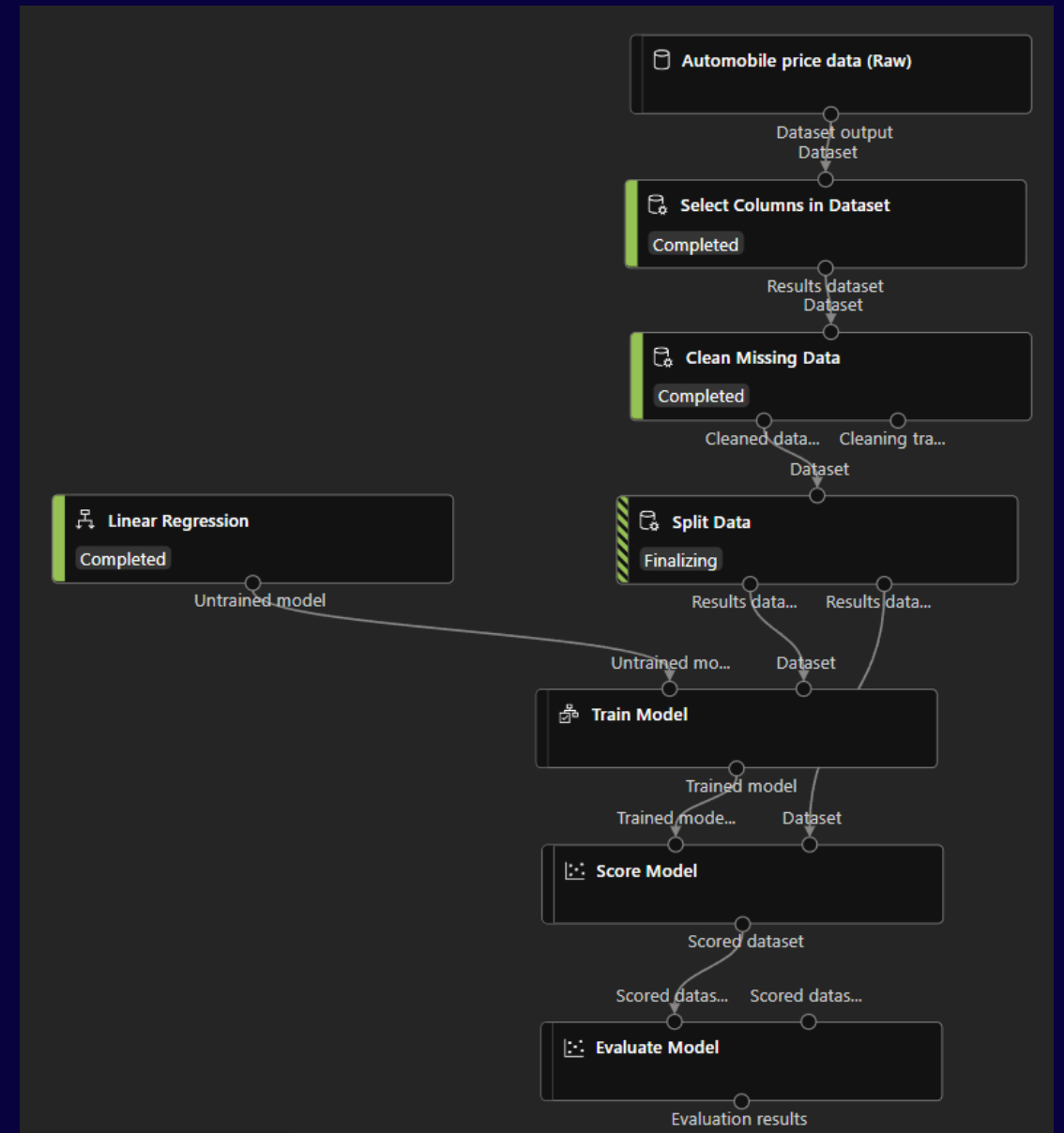
Created byAll filtersClear all

Showing 1-9 of 9 pipelinedraftsPage size: 10

Name	Pipeline type	Updated on ↓	Created by
Pipeline-Created-on-10-20-2021	Training	Oct 20, 2021 4:56 PM	JoseLuis.Lato...
Pipeline-Created-on-10-20-2021	N/A	Oct 20, 2021 4:51 PM	JoseLuis.Lato...
Auto-price-prediction (JL)	Training	Oct 19, 2021 11:26 PM	Jose Luis Lat...
Regression - Automobile Price Predictio...	Training	Oct 19, 2021 11:12 PM	Jose Luis Lat...

Select a pipeline from list to preview

Let's Build something!



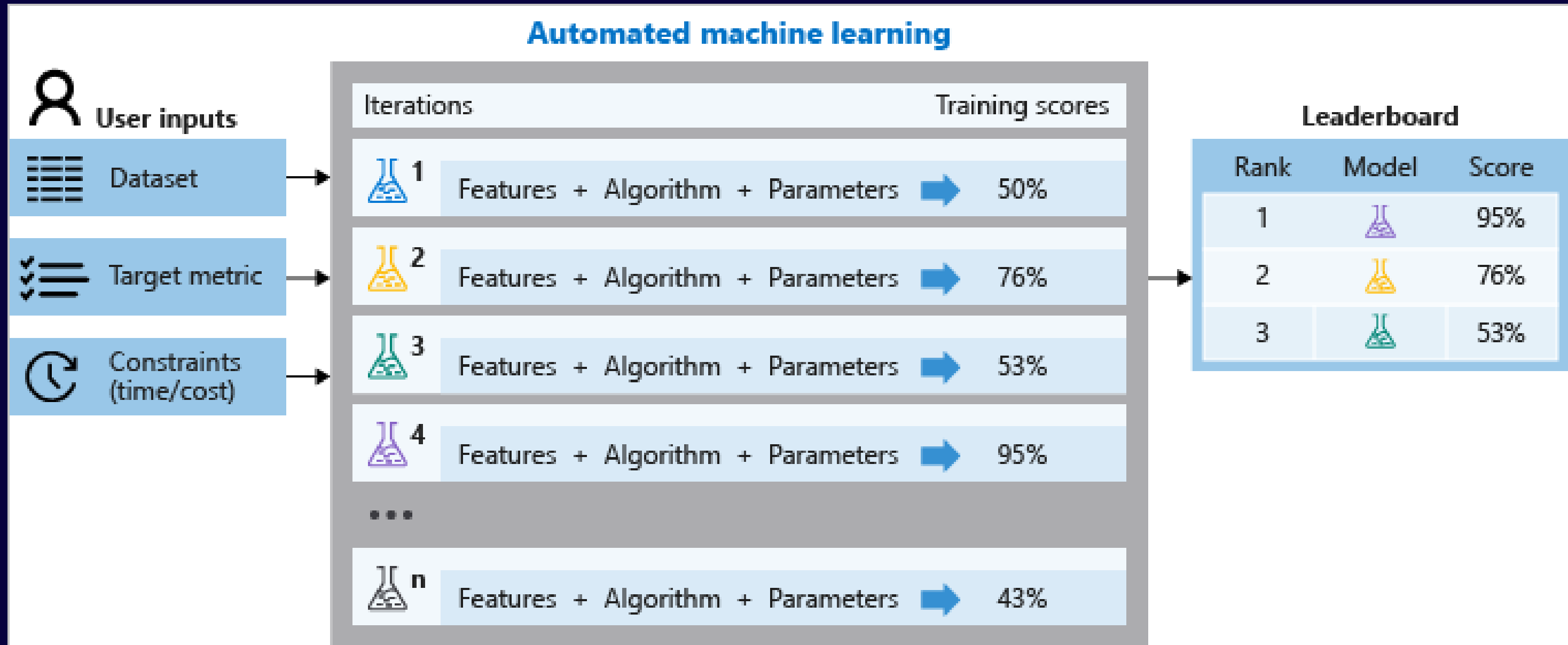
Automated ML, aka AutoML

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

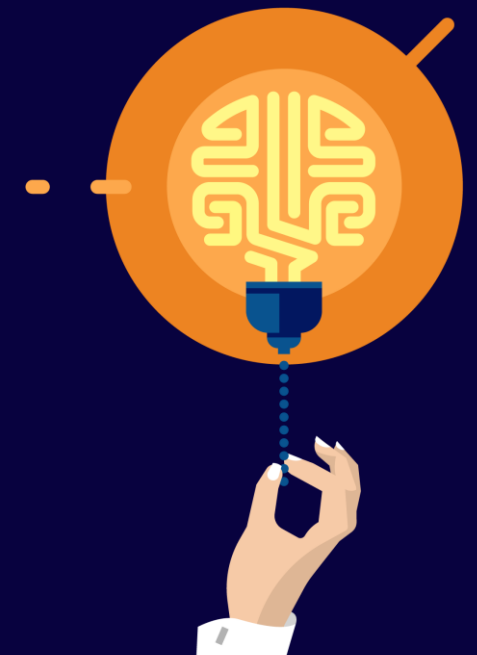
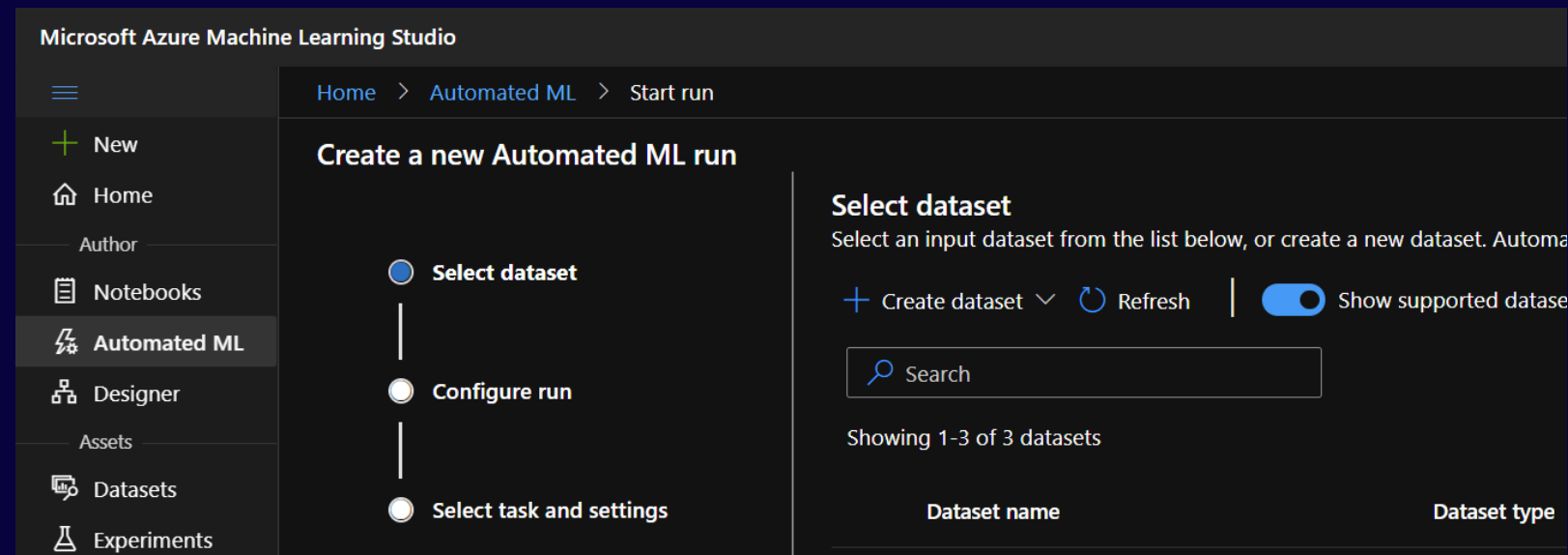
- Feature selection & engineering
- Data guardrails
- Best Model selection
- Hyperparameter tuning
- Model explanation & insights (feature importance)
- Different supported tasks (Classification, Regression, time series)
- A Data Scientist “in a box”
- To me, the dream of an “aficionado” Data Scientist

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!



ONNX

Open Neural Network exchange



[GET STARTED](#) | [SUPPORTED TOOLS](#) | [NEWS](#) | [ABOUT](#) | [SLACK](#) | [GITHUB](#)

Open Neural Network Exchange

The open standard for machine learning interoperability

[GET STARTED](#)

ONNX is an open format built to represent machine learning models. ONNX defines a common set of operators - the building blocks of machine learning and deep learning models - and a common file format to enable AI developers to use models with a variety of frameworks, tools, runtimes, and compilers. [LEARN MORE](#) >

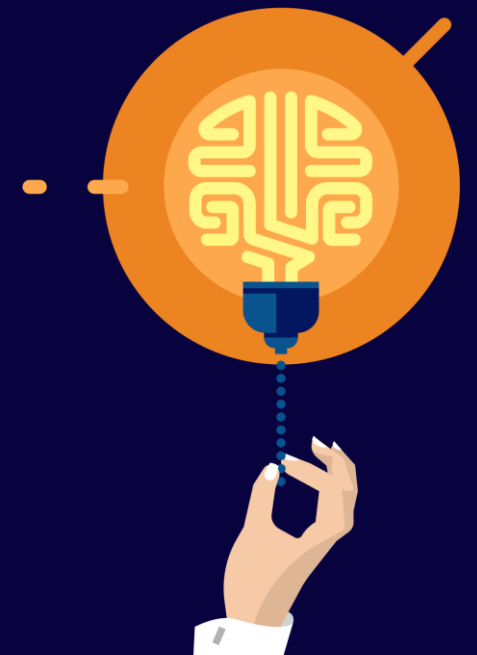
Let's build an ONNX with Python Notebooks

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_md1 = 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_md1, onnx_fl_path)`

ML.NET

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

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[Home](#) > [Machine learning](#) > **ML.NET**


Let's Learn .NET: Machine Learning Let's learn the fundamentals of building Machine Learning apps with .NET! Livestreamed on Learn TV on Thursday, October 28. [Register for the event >](#)

ML.NET

An open source and cross-platform machine learning framework


[Get started](#)[Model Builder](#)

Supported on Windows, Linux, and macOS




Built for .NET developers

With ML.NET, you can use your existing .NET skills to easily integrate ML into your .NET apps without any prior ML experience.




Custom ML made easy with AutoML

ML.NET offers AutoML and productive tools to help you easily build, train, and deploy high-quality custom ML models.



Extended with TensorFlow & more

ML.NET allows you to leverage other popular ML libraries like Infer.NET, TensorFlow, and ONNX for additional ML scenarios.



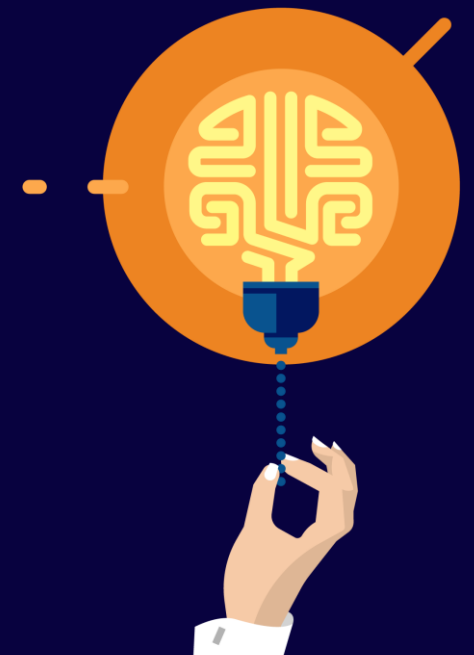
Trusted and proven at scale

Use the same ML framework used by recognized Microsoft products like Power BI, Microsoft Defender, Outlook, and Bing.

Using ONNX on ML.NET

Based on:

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



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>

Learning Partners

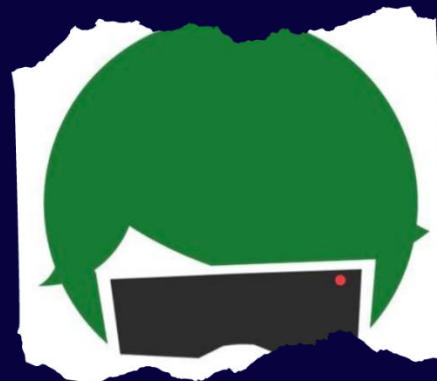
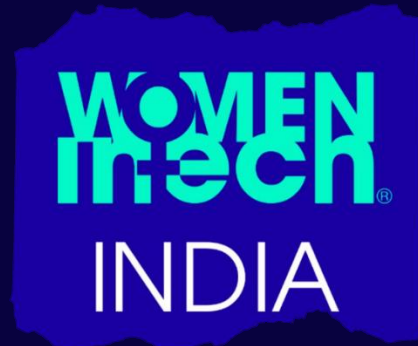


DEVELOPERS
ROAD AHEAD

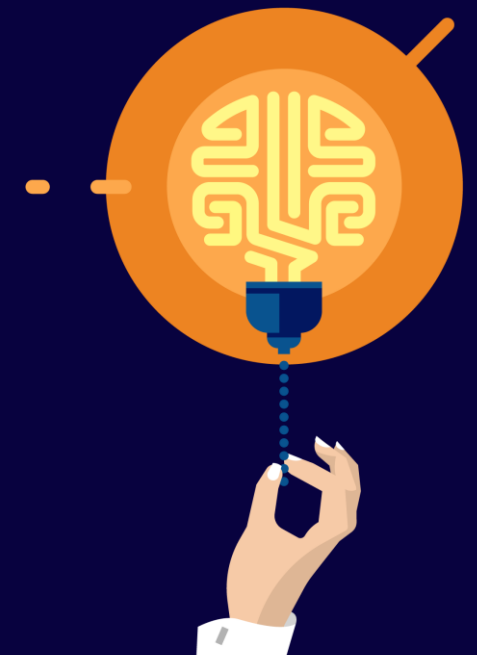
Security Partner

FEITIAN
WE BUILD SECURITY

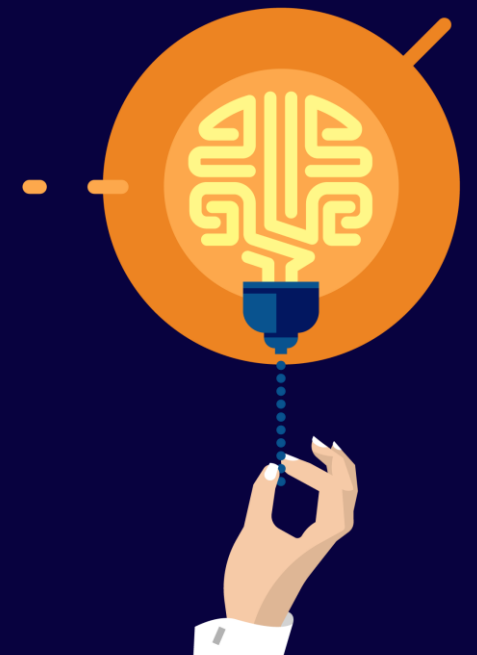
Communities



Q & A



Feedback



THANK YOU!



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