SQL Day

15 edycja konferencji SQLDay

8-10 maja 2023, WROCŁAW + ONLINE

Data Community

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Andrea Martorana Tusa

Artificial Intelligence and Machine Learning with Power BI

Andrea Martorana Tusa

- Italian, living in Denmark
- MVP Data Platform
- Product Manger in Pandora.
  - Product Owner for the Content Management platform, Co-admin of the Power BI tenant, Solution Owner for the Data and Analytics platform
- 20+ years of experience in the world of data with special focus on BI
- Speaker in many events worldwide (SQL Saturday, PASS Summit, Power BI Summit, Data Platform Summit, Power Platform Bootcamp, European Sharepoint Conference …)
- Author for sqlservercentral.com and sqlshack.com

AGENDA

- Automated Machine Learning (40 min)
  - Dataflows
  - No Premium
- Cognitive Services (15 min)
  - Language Services
- Q&A (5 min)

Automated Machine Learning

40 min

AutoML

Automated machine learning (AutoML) for dataflows is a set of machine learning algorithms ready to train, validate, and invoke ML models directly in Power BI.

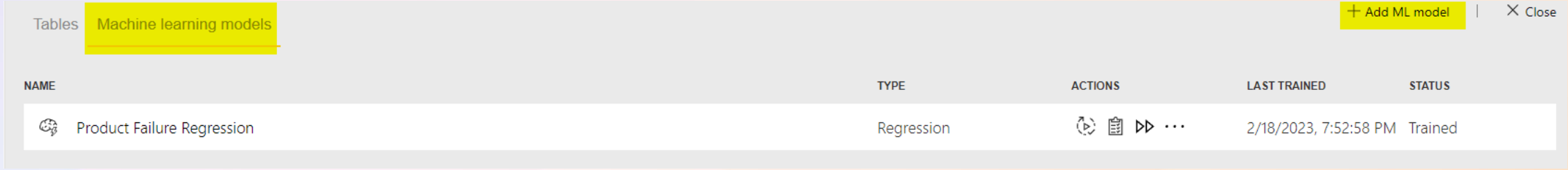
Any user can easily create a new model adding his/her own dataset in a graphical interface.

The service automatically extracts the most relevant features, selects an appropriate algorithm, and tunes and validates the ML model.

https://learn.microsoft.com/en-us/power-bi/transform-model/dataflows/dataflows-machine-learning-integration

AutoML

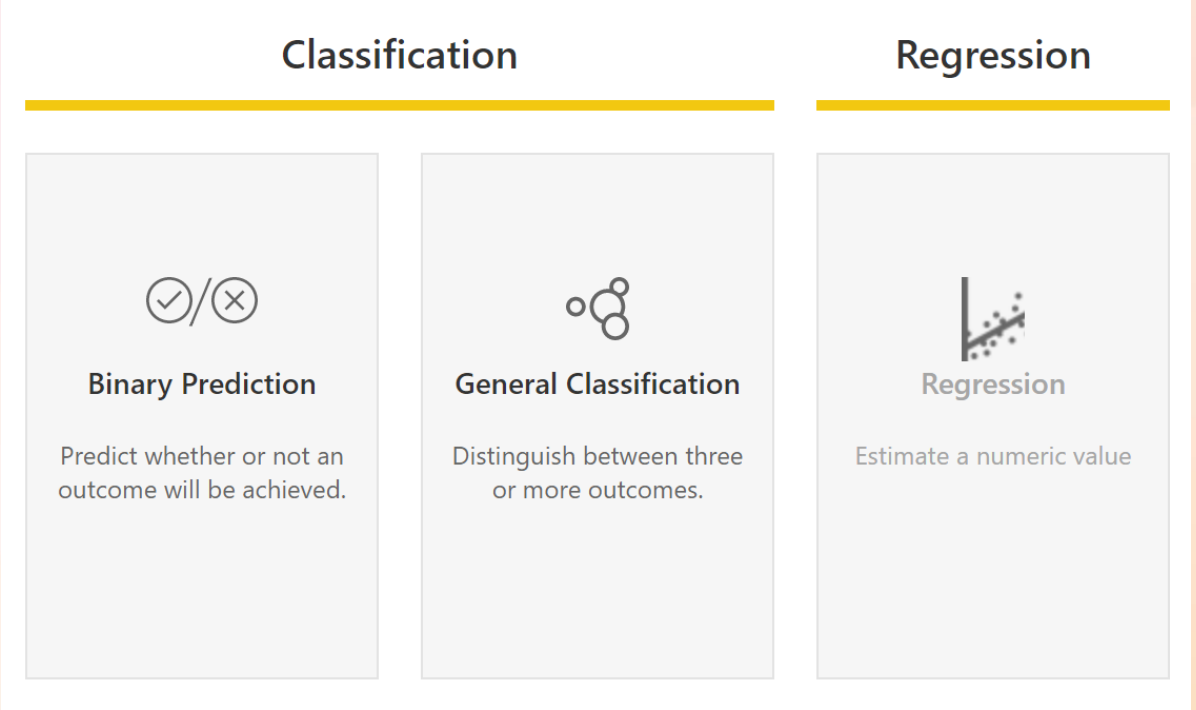
Available as Premium feature for dataflows



AutoML

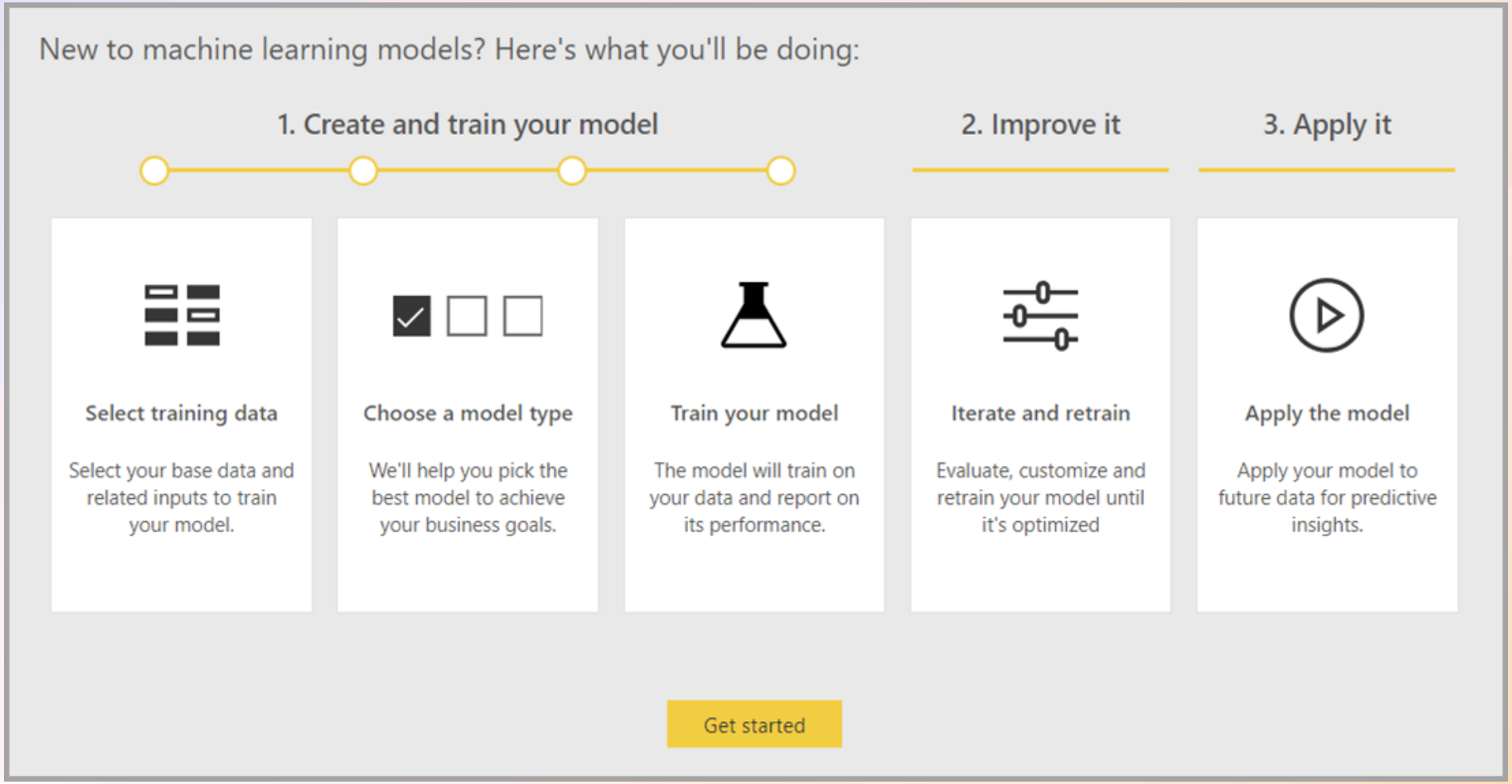
AutoML supports the creation of

- **Binary Prediction models**
- **Classification models**
- **Regression models**

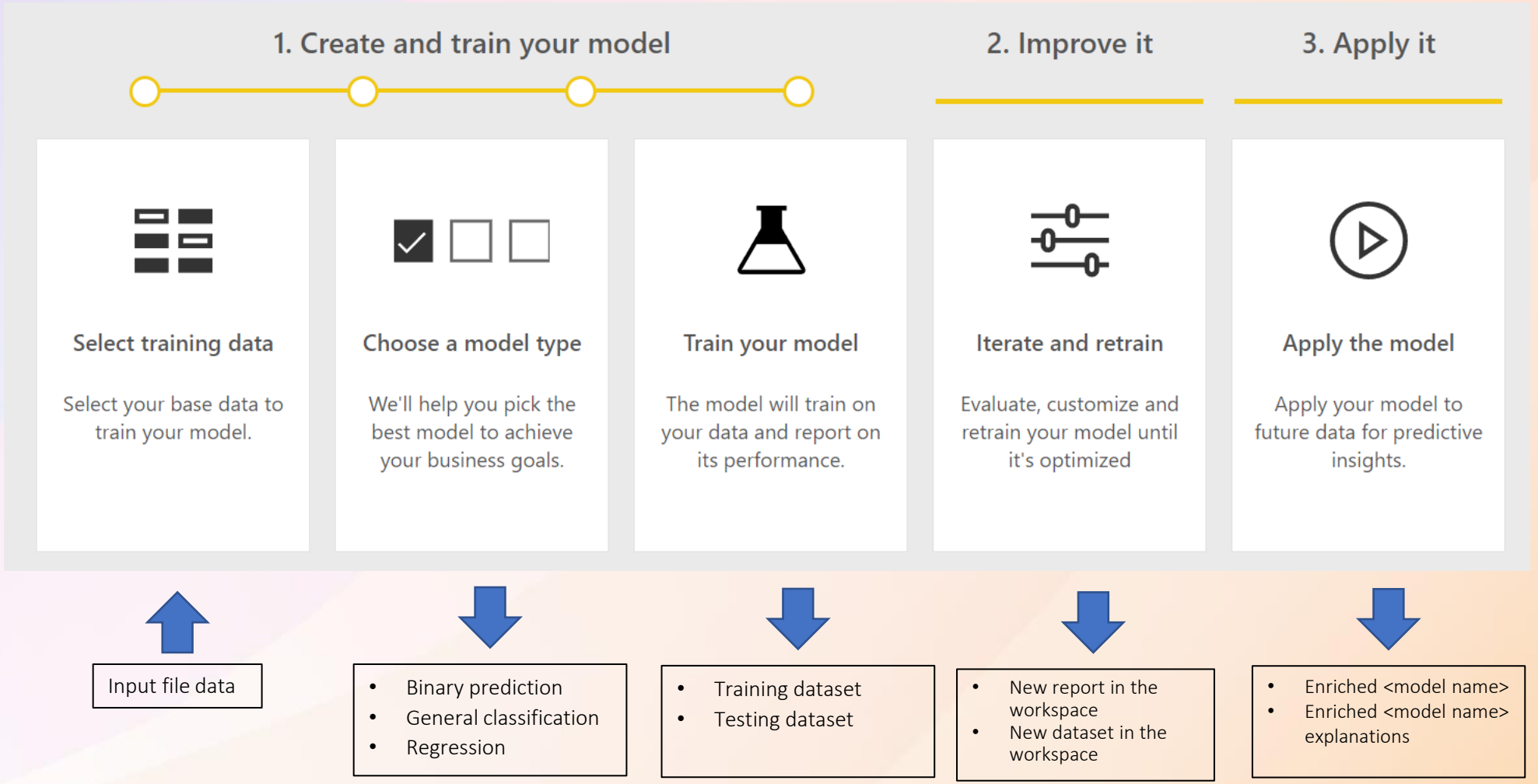


AutoML

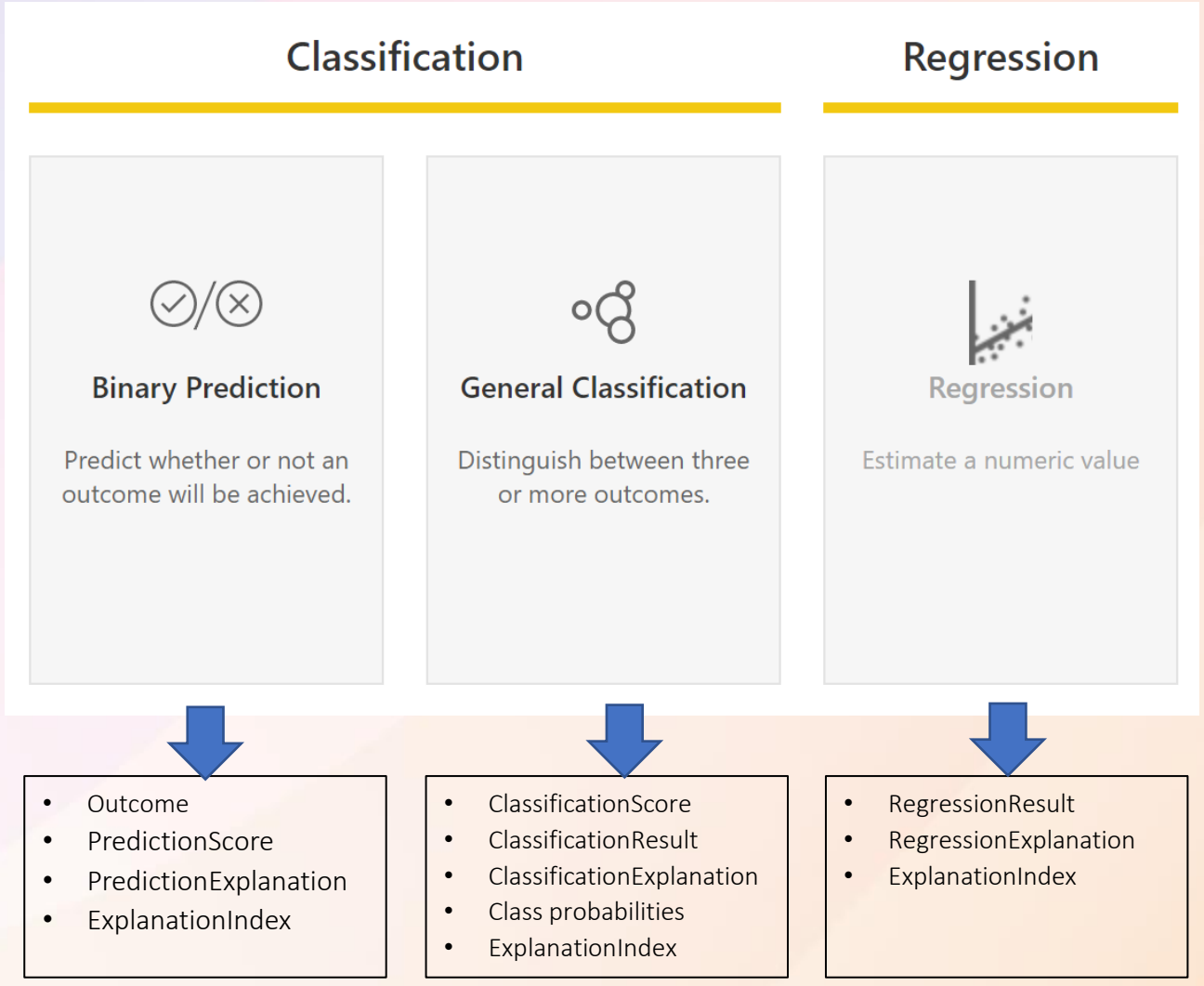
Workflow



AutoML


1. Create and train your model
2. Improve it
3. Apply it
Select training data
Select your base data to train your model.
Choose a model type
We'll help you pick the best model to achieve your business goals.
Train your model
The model will train on your data and report on its performance.
Iterate and retrain
Evaluate, customize and retrain your model until it's optimized
Apply the model
Apply your model to future data for predictive insights.
Input file data
Binary prediction
General classification
Regression
Training dataset
Testing dataset
New report in the workspace
New dataset in the workspace
Enriched <model name>
Enriched <model name> explanations

AutoML


Classification
Regression
Binary Prediction
Predict whether or not an outcome will be achieved.
General Classification
Distinguish between three or more outcomes.
Regression
Estimate a numeric value
Outcome
PredictionScore
PredictionExplanation
ExplanationIndex
ClassificationScore
ClassificationResult
ClassificationExplanation
Class probabilities
ExplanationIndex
RegressionResult
RegressionExplanation
ExplanationIndex

AutoML

Demo – Binary classification

- Credit risk prediction with the UCI German Credit card dataset. Released by the University of California, Irvine
  - 1 = Good credit risk
  - 2 = Bad

Statlog (German Credit Data) Data Set

Download: Data Folder, Data Set Description

Abstract: This dataset classifies people described by a set of attributes as good or bad credit risks. Comes in two formats (one all numeric). Also comes with a cost matrix

Data Set Characteristics:	Multivariate	**Number of Instances:**	1000	**Area:**	Financial
Attribute Characteristics:	Categorical, Integer	**Number of Attributes:**	20	**Date Donated**	1994-11-17
Associated Tasks:	Classification	**Missing Values?**	N/A	**Number of Web Hits:**	870269

http://archive.ics.uci.edu/ml/datasets/Statlog+%28German+Credit+Data%29

https://learn.microsoft.com/en-us/power-bi/connect-data/service-tutorial-build-machine-learning-model

Azure ML no Premium

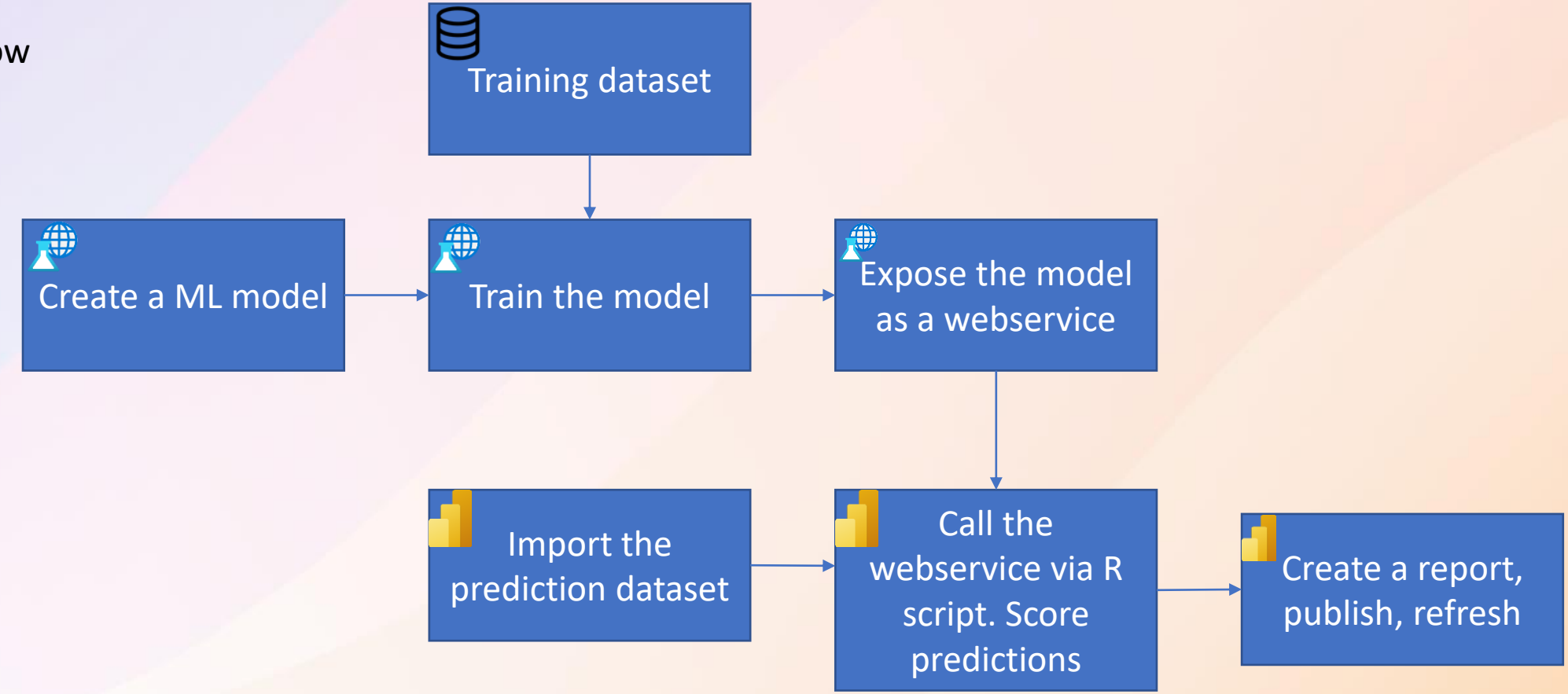
- The same predictive model can be built in **Azure Machine Learning** and consumed by a Power BI desktop report, by-passing the Premium capacity.

- What do you need:
- An Azure Machine Learning prediction model
- An endpoint and key to call
- A release of R running on your local machine

https://gallery.azure.ai/Experiment/Binary-Classfication-Credit-risk-prediction-5

Azure ML no Premium

Workflow



Azure ML no Premium

Demo – Credit risk prediction with no Premium

- The UCI German Credit card dataset. University of California, Irvine
  - 1 = Good credit risk
  - 2 = Bad
- Experiment in Azure Machine Learning Studio Classic

Cognitive Services

15 min

Cognitive Services

Azure Cognitive Services are cloud-based artificial intelligence (AI) services that help developers build cognitive intelligence into applications without having direct AI or data science skills or knowledge.
They are available through REST APIs and client library SDKs in popular development languages.
Azure Cognitive Services enables developers to easily add cognitive features into their applications with cognitive solutions that can see, hear, speak, and analyze.

https://learn.microsoft.com/en-us/azure/cognitive-services/what-are-cognitive-services

Cognitive Services

Categories of Cognitive Services

- Vision
- Speech
- **Language**
- Decision

https://learn.microsoft.com/en-us/azure/cognitive-services/what-are-cognitive-services

Cognitive Services

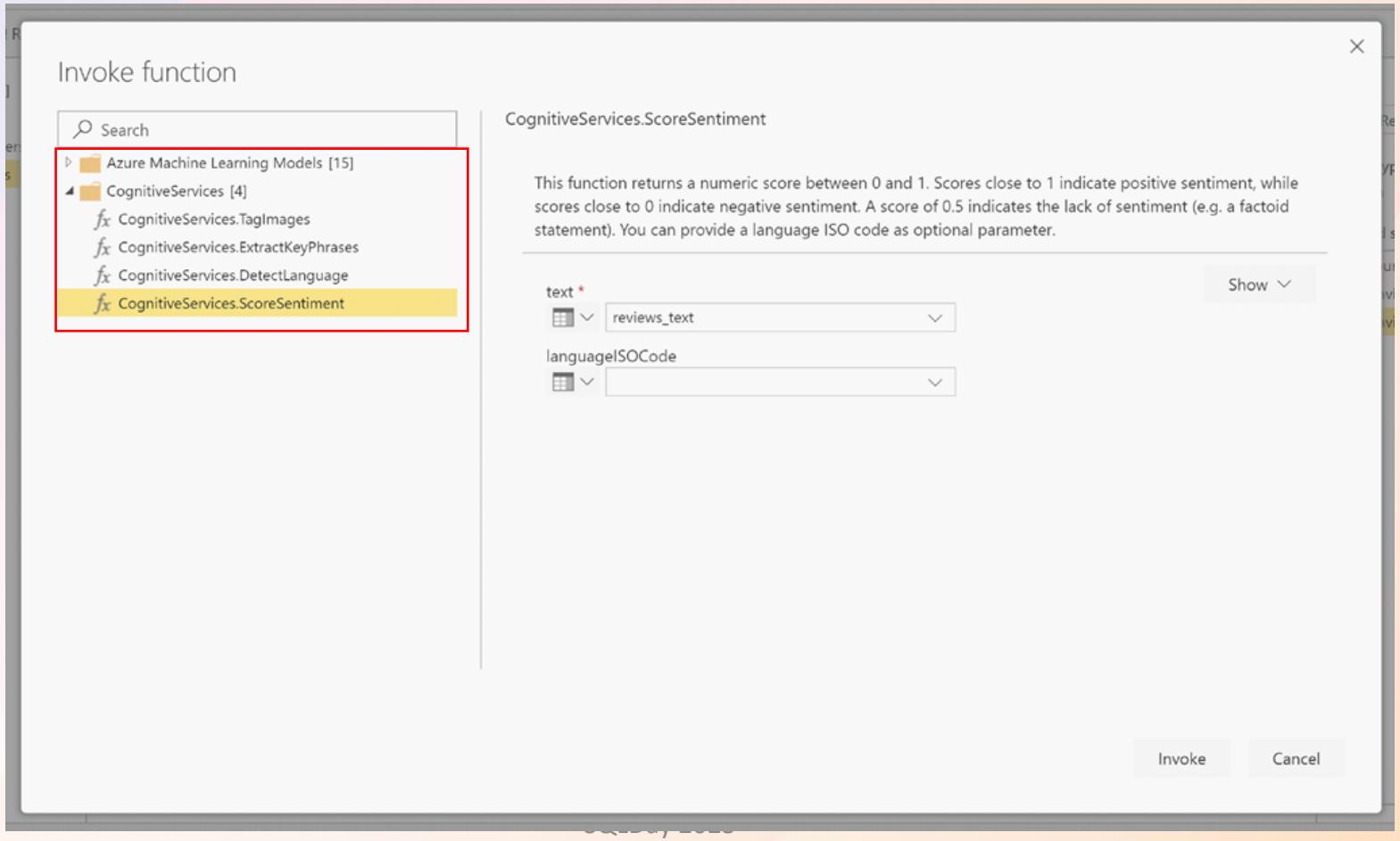
Language APIs

Service Name	Service Description	Quickstart
Language service	Azure Language service provides several Natural Language Processing (NLP) features to understand and analyze text.	Go to the Language documentation to choose a subservice quickstart.
Translator	Translator provides machine-based text translation in near real time.	Translator quickstart
Language Understanding LUIS	Language Understanding (LUIS) is a cloud-based conversational AI service that applies custom machine-learning intelligence to a user's conversational or natural language text to predict overall meaning and pull out relevant information.	LUIS quickstart
QnA Maker	QnA Maker allows you to build a question and answer service from your semi-structured content.	QnA Maker quickstart

https://learn.microsoft.com/en-us/azure/cognitive-services/what-are-cognitive-services

Cognitive Services

AI functions directly available in Dataflows. Premium feature



Cognitive Services

Real reviews from Airnbnb for Copenhagen - http://insideairbnb.com/get-the-data/

Copenhagen, Hovedstaden, Denmark

Explore the Copenhagen data.

Date Compiled	Country/City	File Name	Description
29 December, 2022	Copenhagen	listings.csv.gz	Detailed Listings data
29 December, 2022	Copenhagen	calendar.csv.gz	Detailed Calendar Data
29 December, 2022	Copenhagen	reviews.csv.gz	Detailed Review Data
29 December, 2022	Copenhagen	listings.csv	Summary information and metrics for listings in Copenhagen (good for visualisations).
29 December, 2022	Copenhagen	reviews.csv	Summary Review data and Listing ID (to facilitate time based analytics and visualisations linked to a listing).
N/A	Copenhagen	neighbourhoods.csv	Neighbourhood list for geo filter. Sourced from city or open source GIS files.
N/A	Copenhagen	neighbourhoods.geojson	GeoJSON file of neighbourhoods of the city.

Cognitive Services

Demo: Power BI Premium + Power BI Desktop

- Dataflows + AI
  - Sentiment Analysis
  - Key Phrases
  - Language detection

Q&A

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https://github.com/Andrea-Martorana-Tusa/AI_ML_PowerBI

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References

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- https://learn.microsoft.com/en-us/azure/cognitive-services/language-service/
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- https://radacad.com/using-cognitive-service-for-translation-in-power-bi
- https://learn.microsoft.com/en-us/power-bi/transform-model/dataflows/dataflows-machine-learning-integration
- https://learn.microsoft.com/en-us/power-bi/connect-data/service-tutorial-build-machine-learning-model
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- http://archive.ics.uci.edu/ml/datasets/Statlog+%28German+Credit+Data%29
- https://gallery.azure.ai/Experiment/Binary-Classfication-Credit-risk-prediction-5
- https://powerbi.microsoft.com/en-us/blog/power-bi-azure-ml/
- https://www4.stat.ncsu.edu/~boos/var.select/diabetes.html
- https://learn.microsoft.com/en-us/azure/machine-learning/how-to-understand-automated-ml
- https://radacad.com/ai-in-dataflow-power-bi-webservice-cognitive-service-part1