



Microsoft Developer School

30 листопада 2017 року, Київ

<https://aka.ms/msdevschoolnov>

#msdevschool

How to make your data smart with Artificial Intelligence and Machine Learning services?

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Borys Rybak,
Technical Evangelist
Commercial Software Engineering

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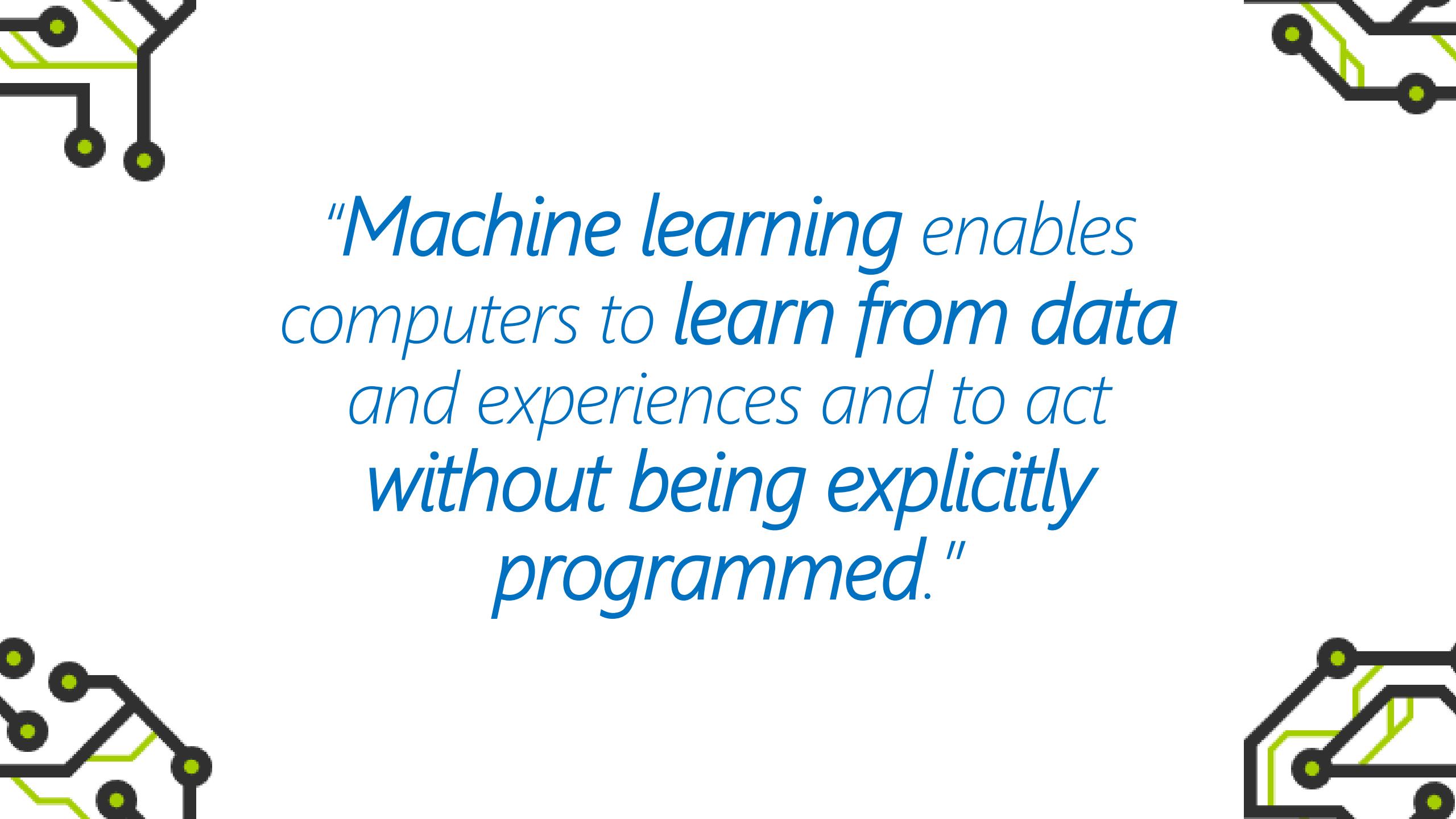


?

What is Machine Learning?

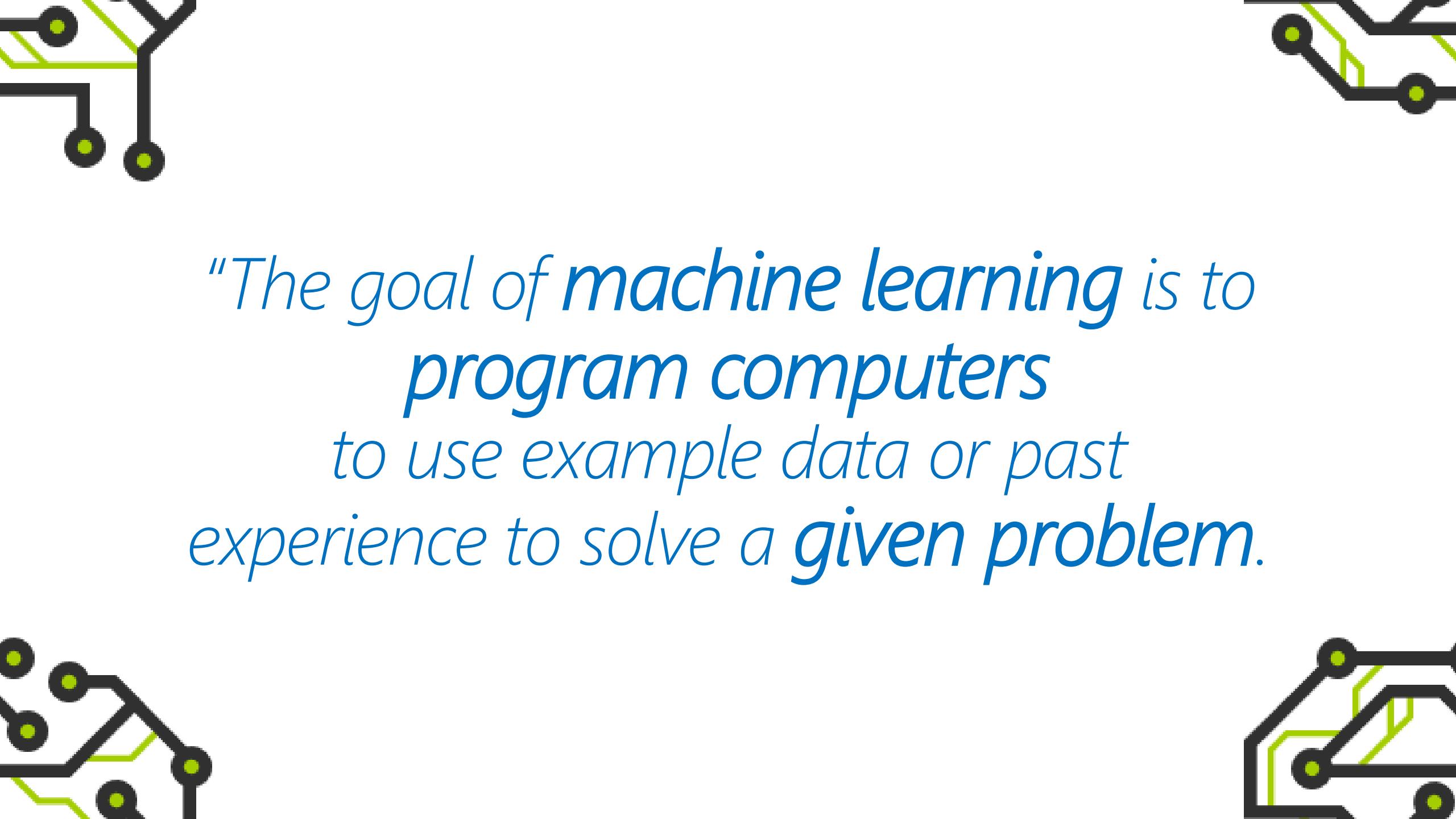


What exactly is Machine Learning?



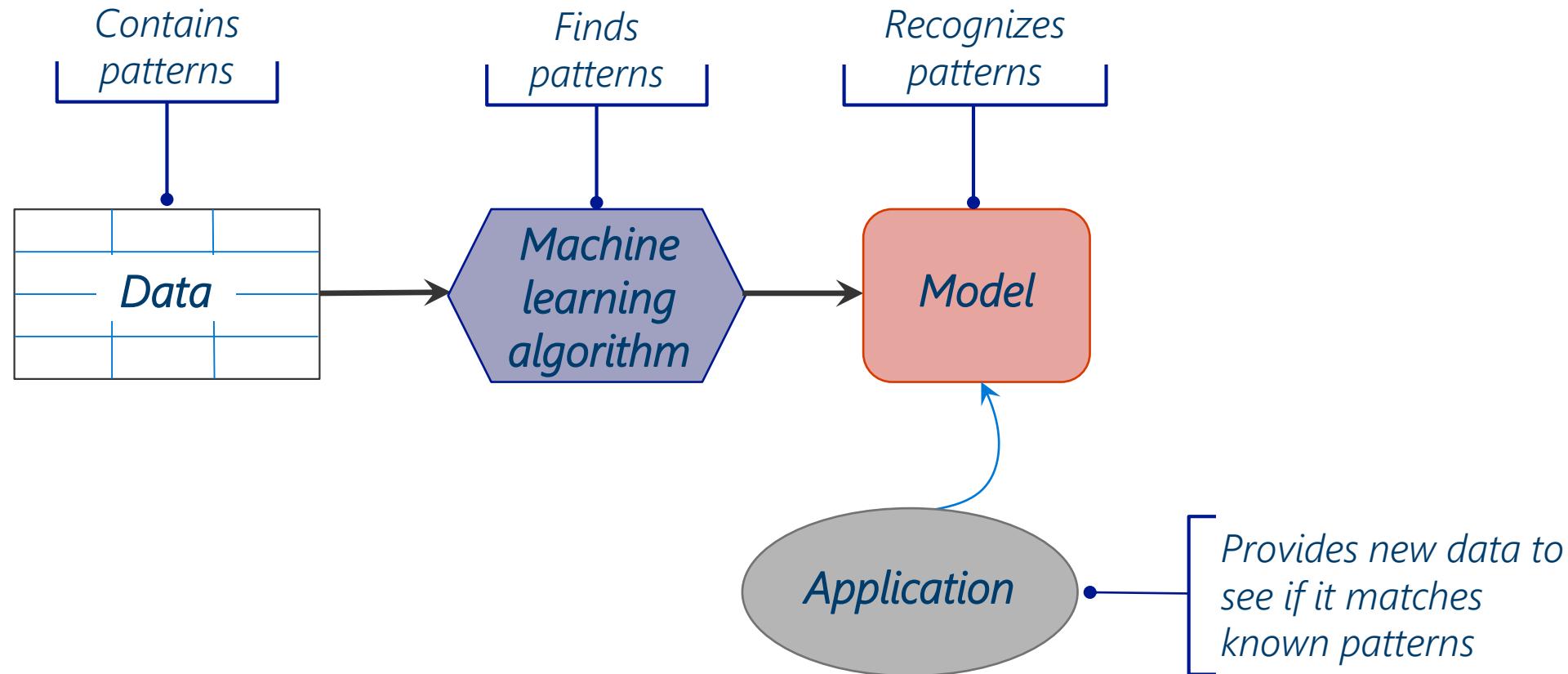
"Machine learning enables computers to learn from data and experiences and to act without being explicitly programmed."

What is the goal
of Machine Learning?



"The goal of machine learning is to program computers to use example data or past experience to solve a given problem.

Machine Learning in a Nutshell



Finding Patterns: A Simple Example

Name	Amount	Fraudulent
Smith	\$2,600.45	No
Potter	\$2,294.58	Yes
Peters	\$1,003.30	Yes
Adams	\$8,488.32	No

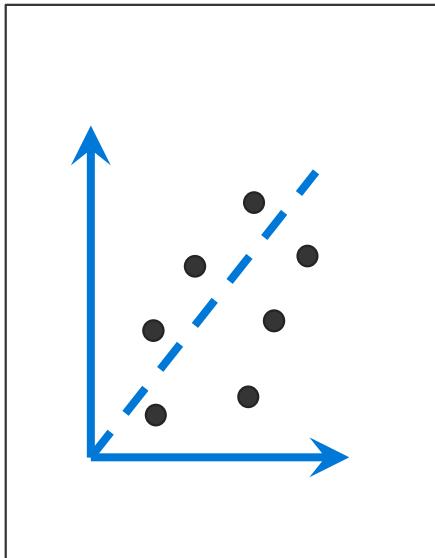
*What's the pattern for
fraudulent
transactions?*

Finding Patterns: Another Example

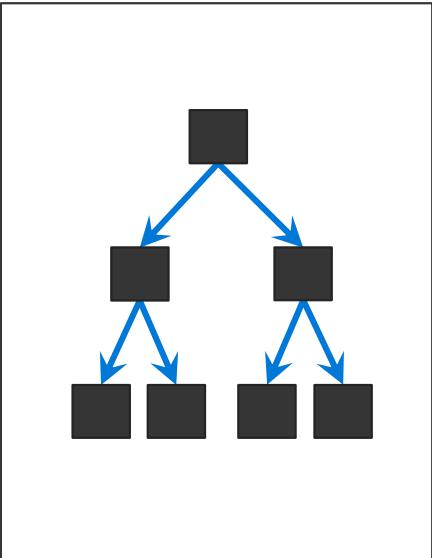
Name	Amount	Where Issued	Where Used	Age	Fraudulent
Smith	\$2,600.45	USA	USA	22	No
Potter	\$2,294.58	RUS	USA	29	Yes
Peters	\$1,003.30	USA	RUS	25	Yes
Adams	\$8,488.32	FRA	USA	64	No
Pali	\$200.12	AUS	JAP	58	No
Jones	\$3,250.11	USA	RUS	43	No
Hanford	\$8,156.20	USA	UK	27	Yes
Marx	\$7,475.11	UK	GER	32	No
Norse	\$540.00	USA	ITA	27	No
Edson	\$7,475.11	USA	RUS	20	Yes

What's the pattern for fraudulent transactions?

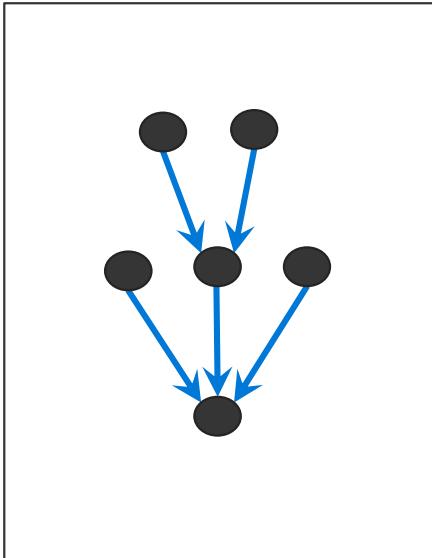
Styles of ML Algorithms: Examples



Regression



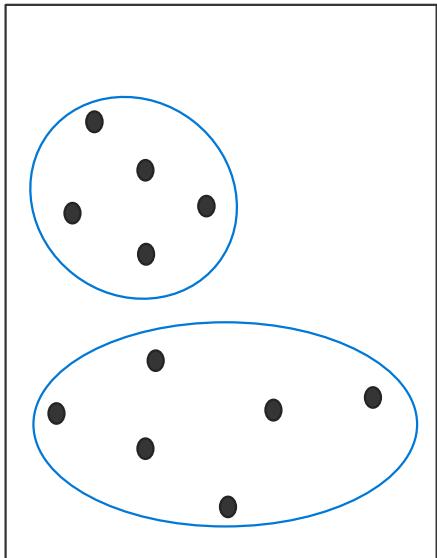
Decision tree



Neural network

$$P(A|B) = \frac{P(A) P(B|A)}{P(B)}$$

Bayesian



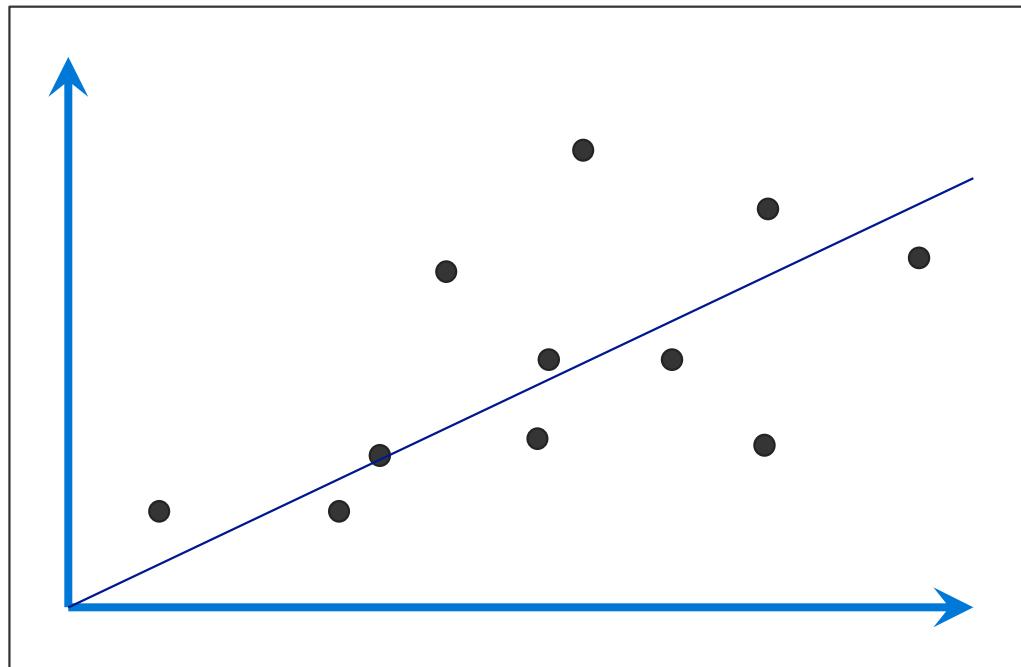
K-means

*Deep
learning uses
this*

- ✓ Developers
- ✓ BI Analytics
- ✓ Data Professionals
- ✓ Data Scientists

- ✓ Linear Algebra
- ✓ Analysis
- ✓ Statistics / Probability Theory

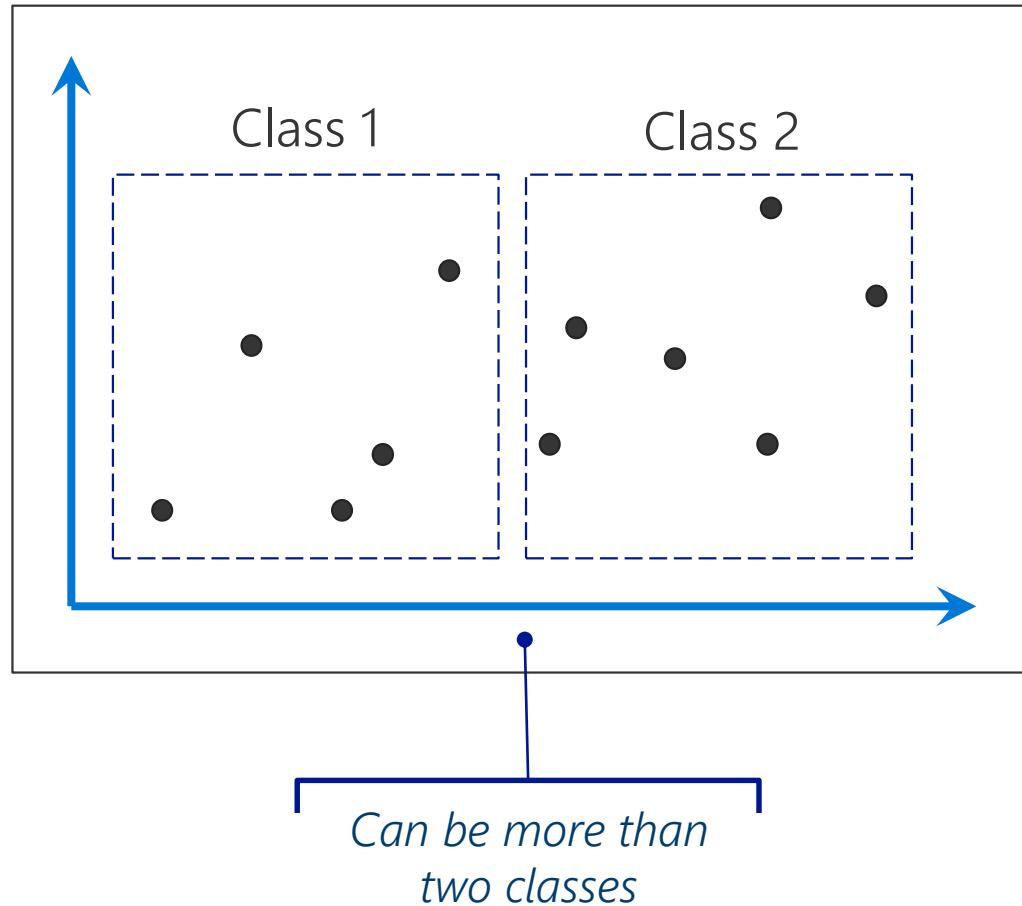
Categorizing ML Problems: Regression



Goal: Predict a value
For *supervised* learning

Example question:
How many units of this product
will we sell next month?

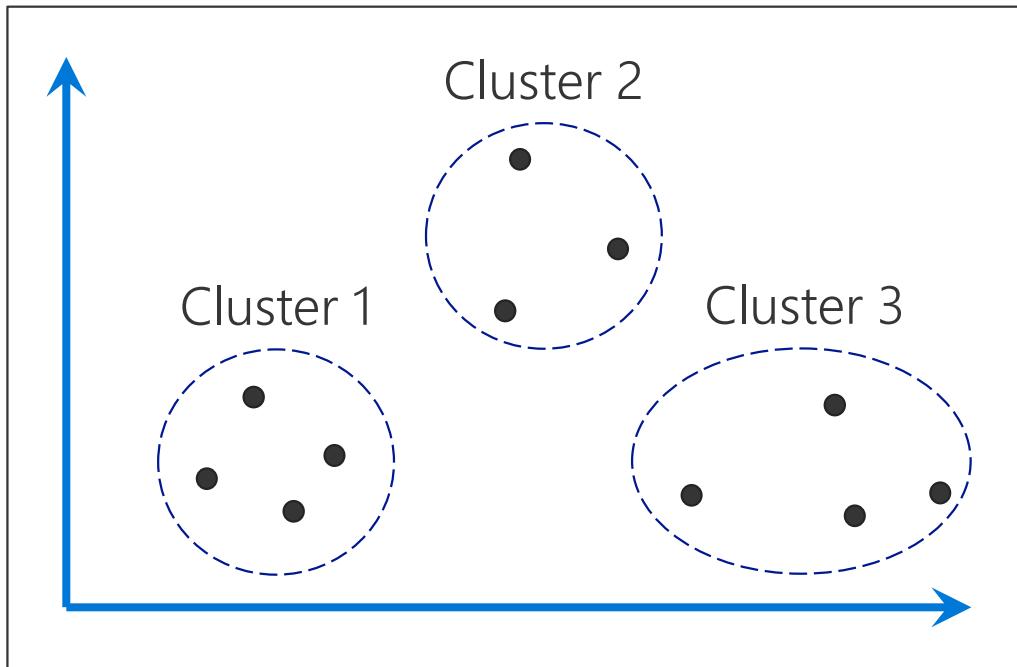
Categorizing ML Problems: Classification



Goal: Predict a class
For *supervised* learning

Example question:
Is this credit card transaction
fraudulent?

Categorizing ML Problems: Clustering



Goal: Discover structure
For *unsupervised* learning

Example question:
What are our customer
segments?

Too complex:

(When you can't code it....)

- NLP
- H-W recognition
- CV

Too much:

(When you can't scale it....)

- Spam detection
- Fraud detection
- Healthcare

Too specialized:

(When you have to adapt...)

- Amazon
- Netflix
- Predictive typing

Too robotic:

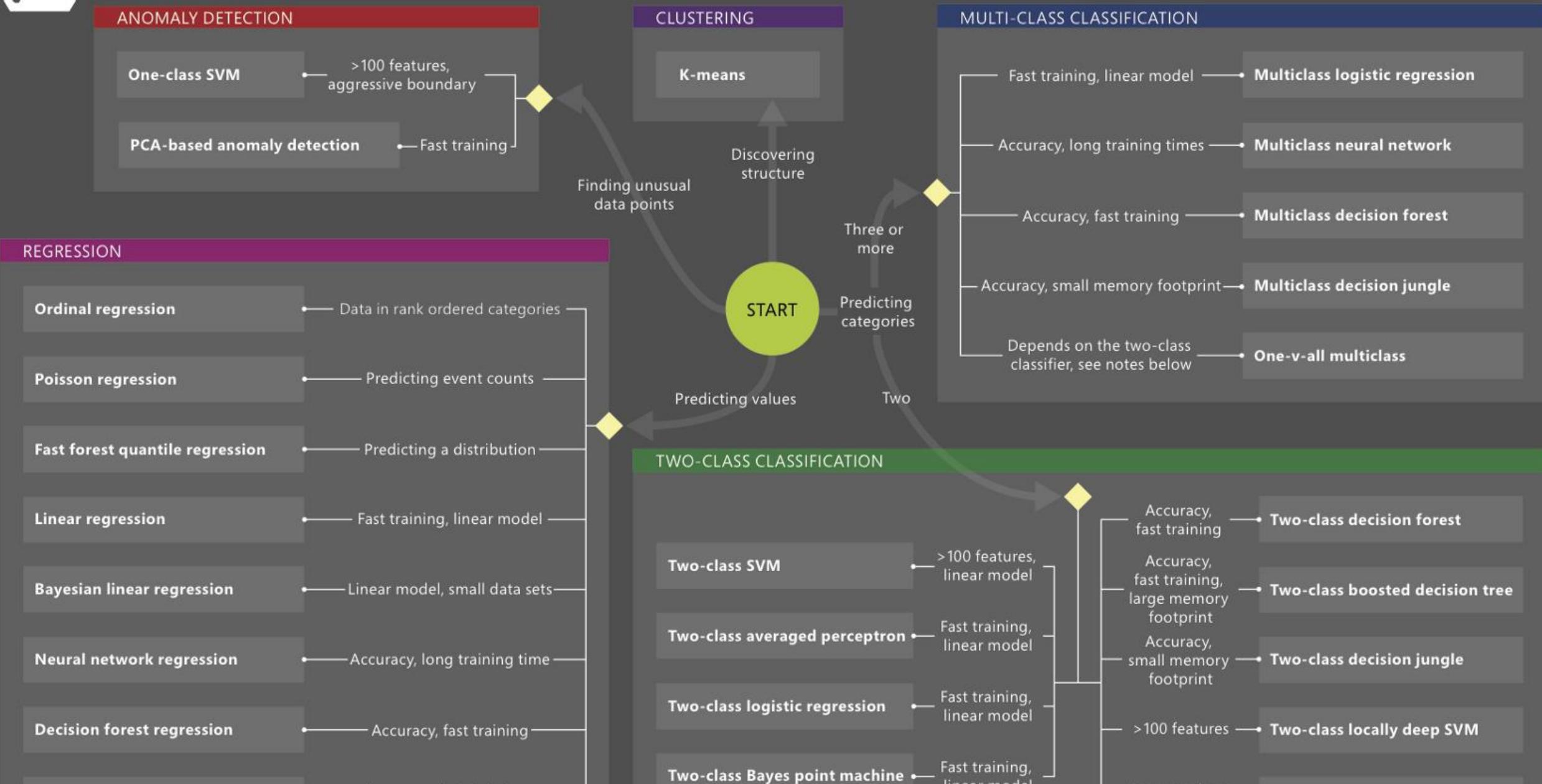
(When you can't track it....)

- AI gaming
- Robot control



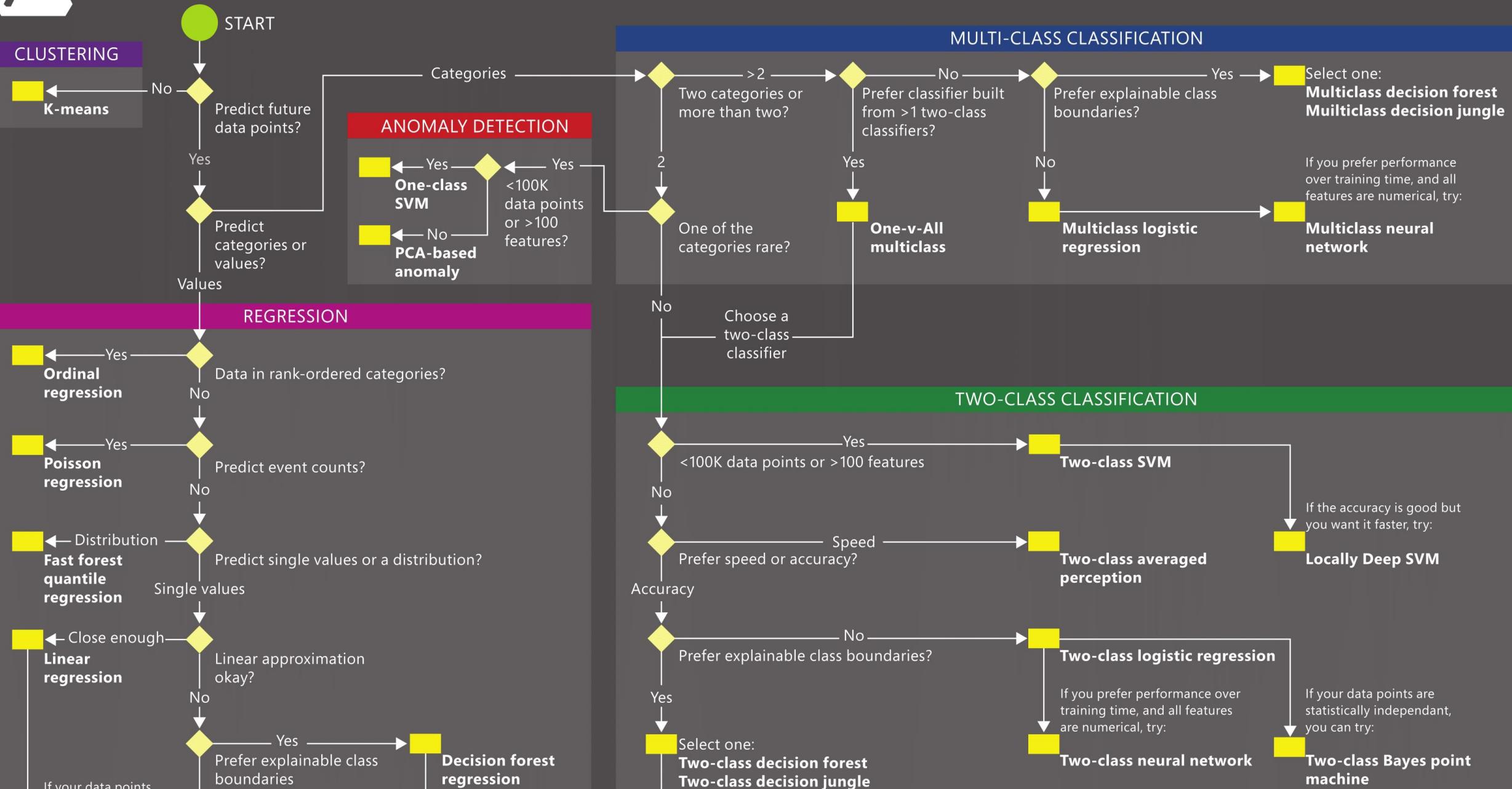
Microsoft Azure Machine Learning: Algorithm Cheat Sheet

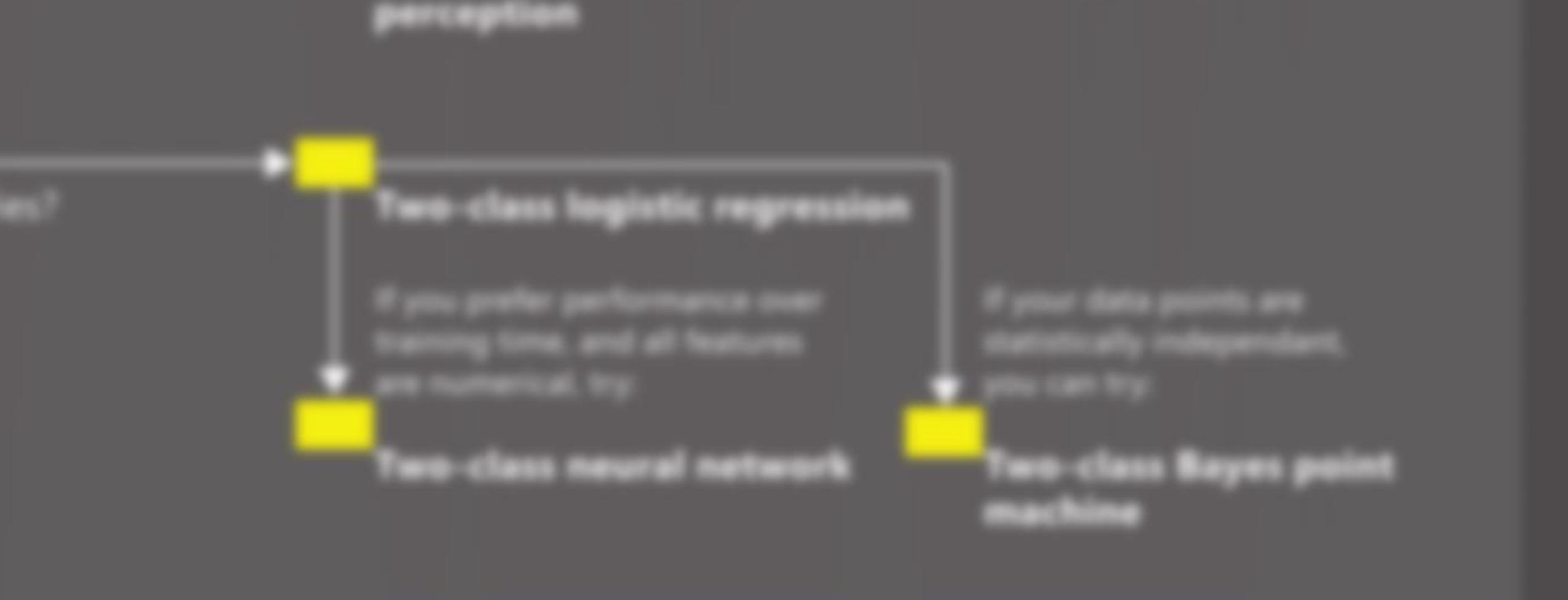
This cheat sheet helps you choose the best Azure Machine Learning Studio algorithm for your predictive analytics solution. Your decision is driven by both the nature of your data and the question you're trying to answer.





Microsoft Azure Machine Learning: Algorithm Cheat Sheet

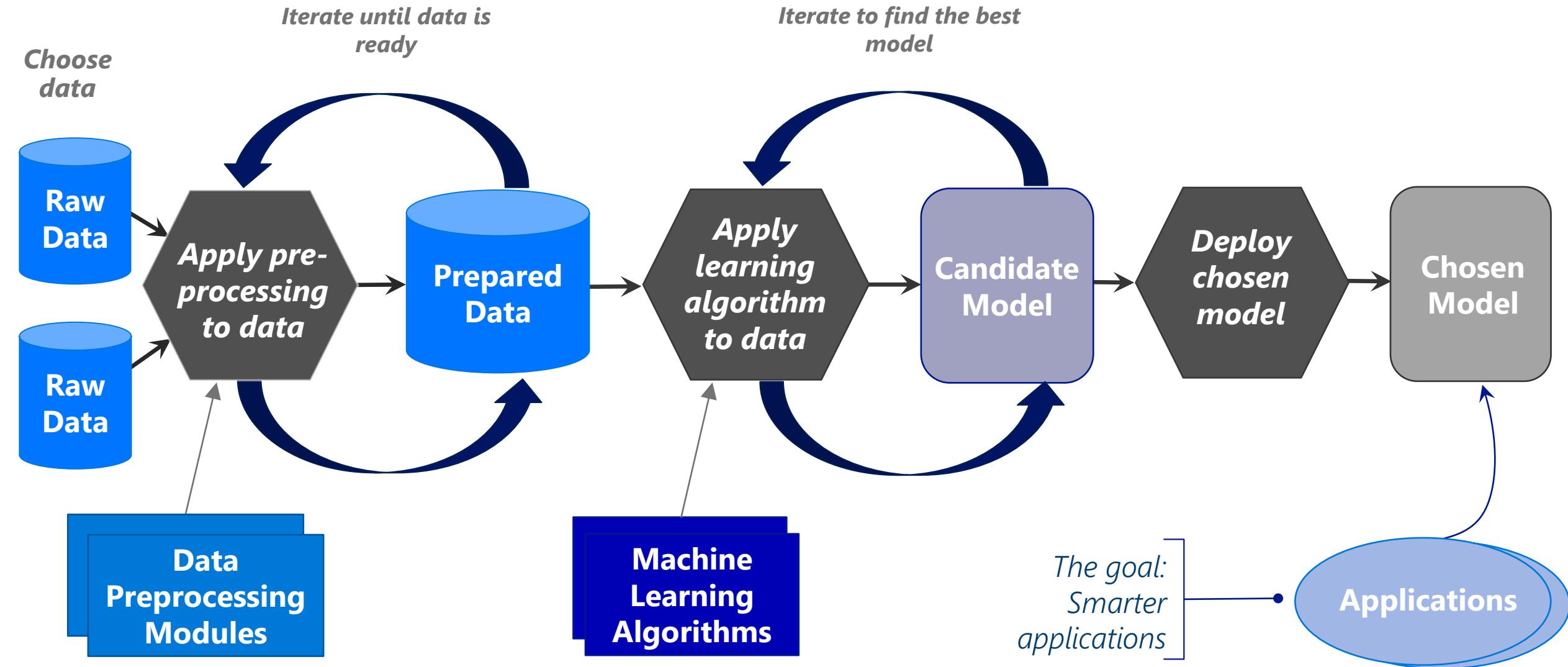




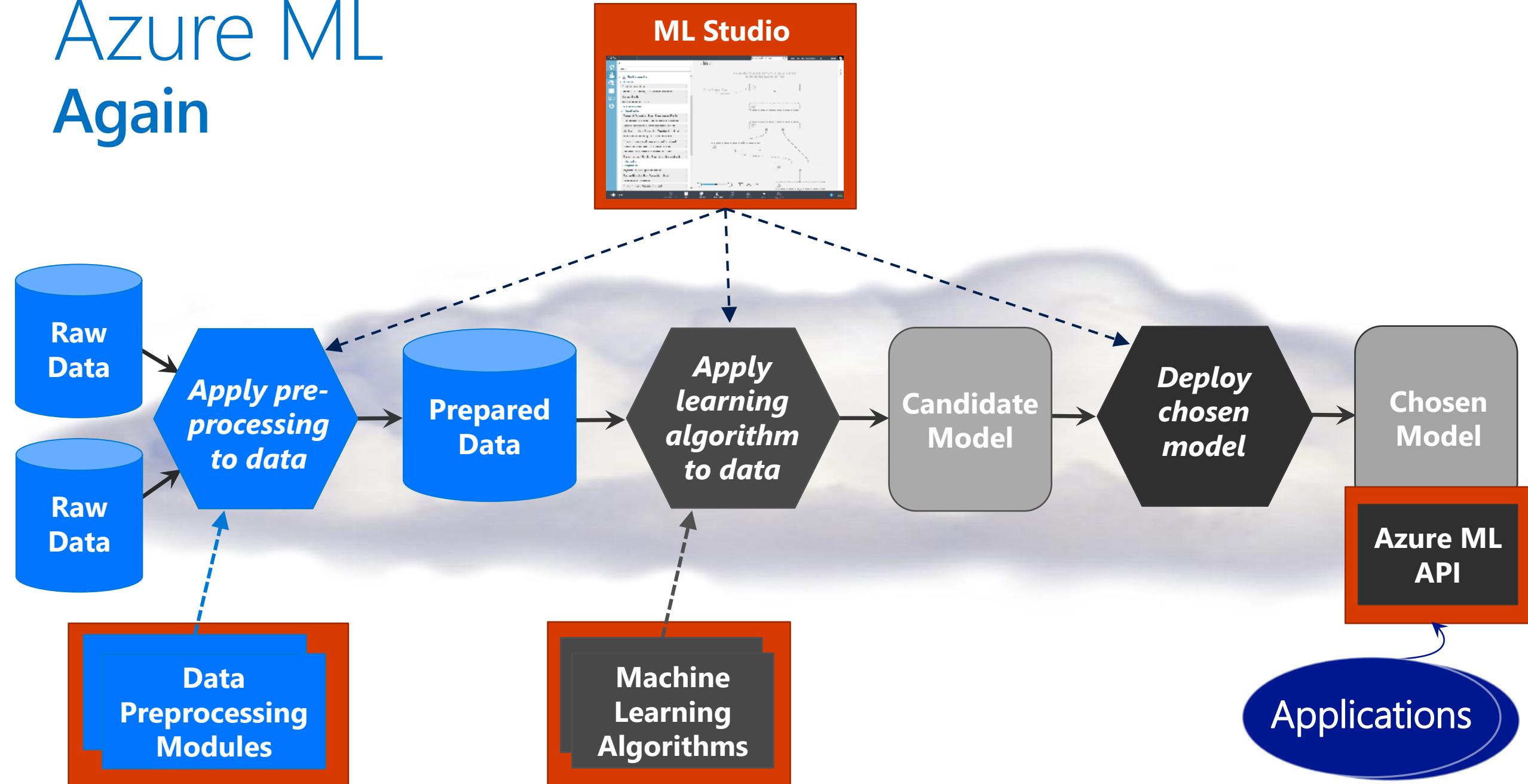
This cheat sheet helps you choose the best Azure Machine Learning Studio algorithm for your predictive analytics solution. Your decision is driven by both the nature of your data and the question you're trying to answer.



The Machine Learning Process



Azure ML Again



Azure ML Studio

ML Studio | Fraud Detection

Credit Card Transactions Europe... Draft saved at 5:39:35 PM

Properties

Train Model

- Label column: Selected columns: Column names: Fraud
- Launch column selector
- START TIME: 6/6/2014 4:23:18...
- END TIME: 6/6/2014 4:23:23...
- ELAPSED TIME: 0:00:05.007
- STATUS CODE: Finished
- STATUS DETAILS: None
- View output log

Experiment Properties

- START TIME: -
- END TIME: -
- STATUS CODE: InDraft
- STATUS DETAILS: None
- Disable upgrades

Prior Run

Quick Help

Census Income dataset

Search

- Saved Datasets
- Trained Models
- Data Format Conversions
- Data Input and Output
- Data Transformation
- Feature Selection
- Machine Learning
- Math and Statistics

ML Studio

Fraud Detection Workspace

Menu

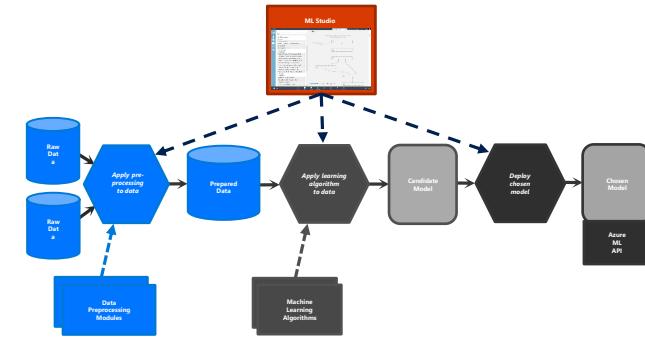
Enter feedback here

+

NEW

?

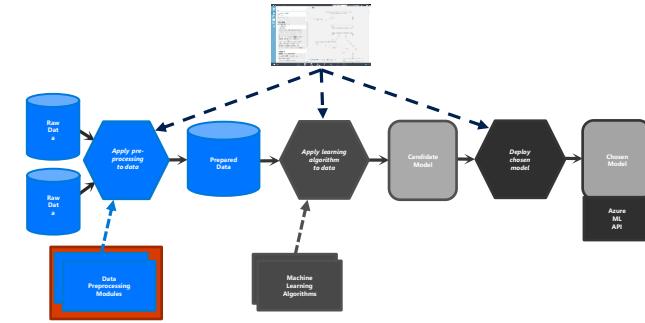
5



Allows running
"experiments"

Azure ML Data Preprocessing

Example modules



*There are dozens more
data preprocessing modules*

Clean Missing Data

Removes or fills in missing values in a dataset

Example: Replace each missing value with the mean of the other values in this column

Select Columns in Dataset

Creates a view of a dataset that includes or excludes specific columns

Example: Delete a column whose data is highly correlated with data in another column

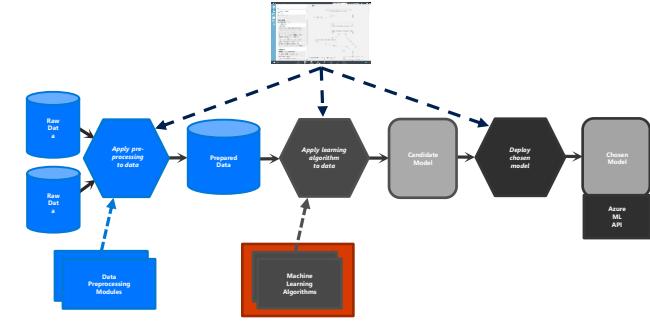
Partition and Sample

Divides or extracts a subset of a dataset

Example: Select a specific number of rows from the data

Azure ML Learning

Example algorithms



Regression

- Linear regression
- Ordinal regression
- Bayesian linear regression
- Neural network regression
- Decision forest regression
- Boosted decision tree regression

Classification

- Two-class neural network
- Two-class decision forest
- Multiclass neural network
- Multiclass decision forest
- Multiclass decision jungle

Clustering

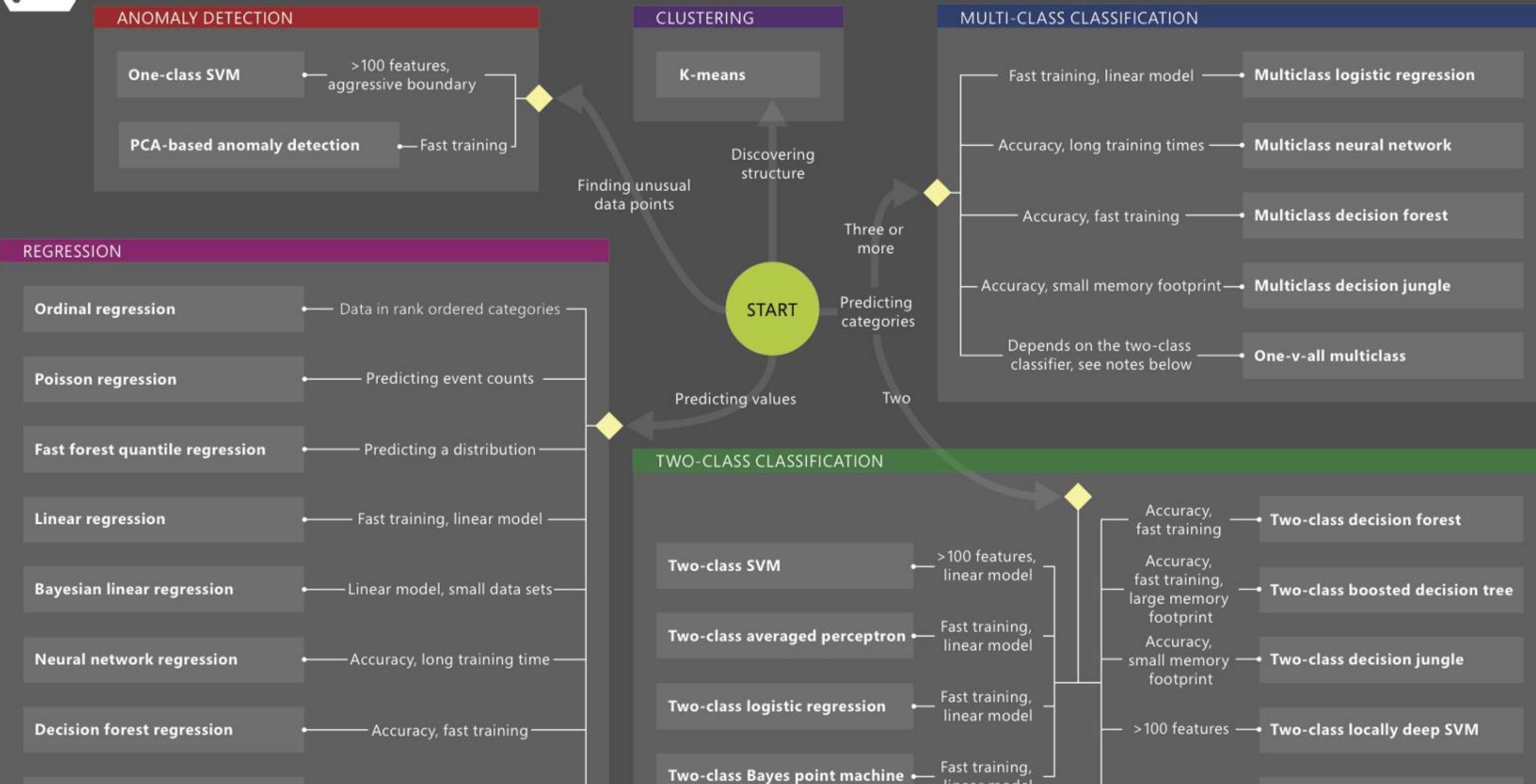
- K-means

*Azure ML is designed
for data scientists*



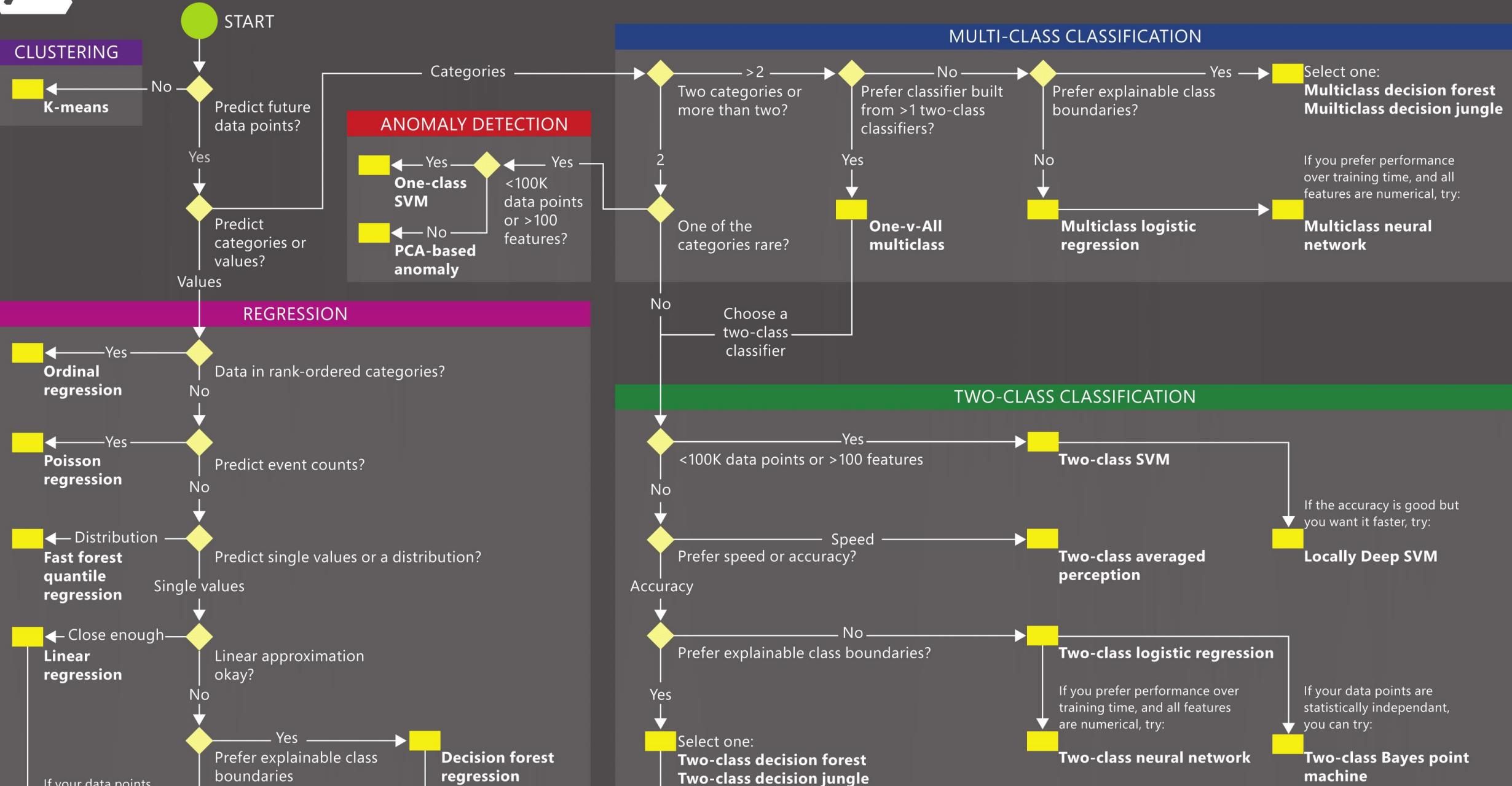
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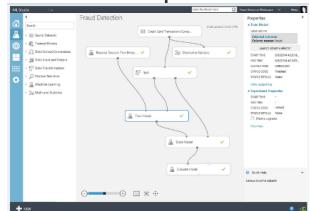
Microsoft Azure Machine Learning: Algorithm Cheat Sheet



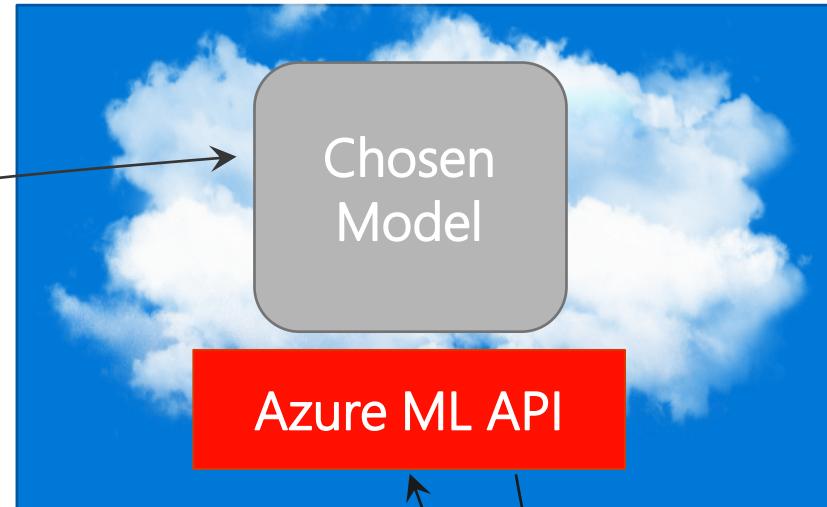
Azure ML API

Deploying and using a model

Microsoft Azure



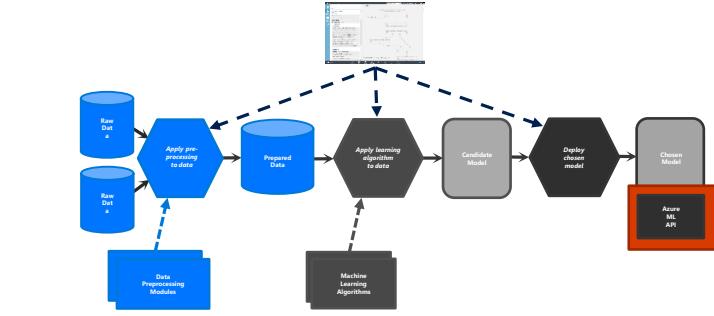
ML Studio



1) Deploy chosen model

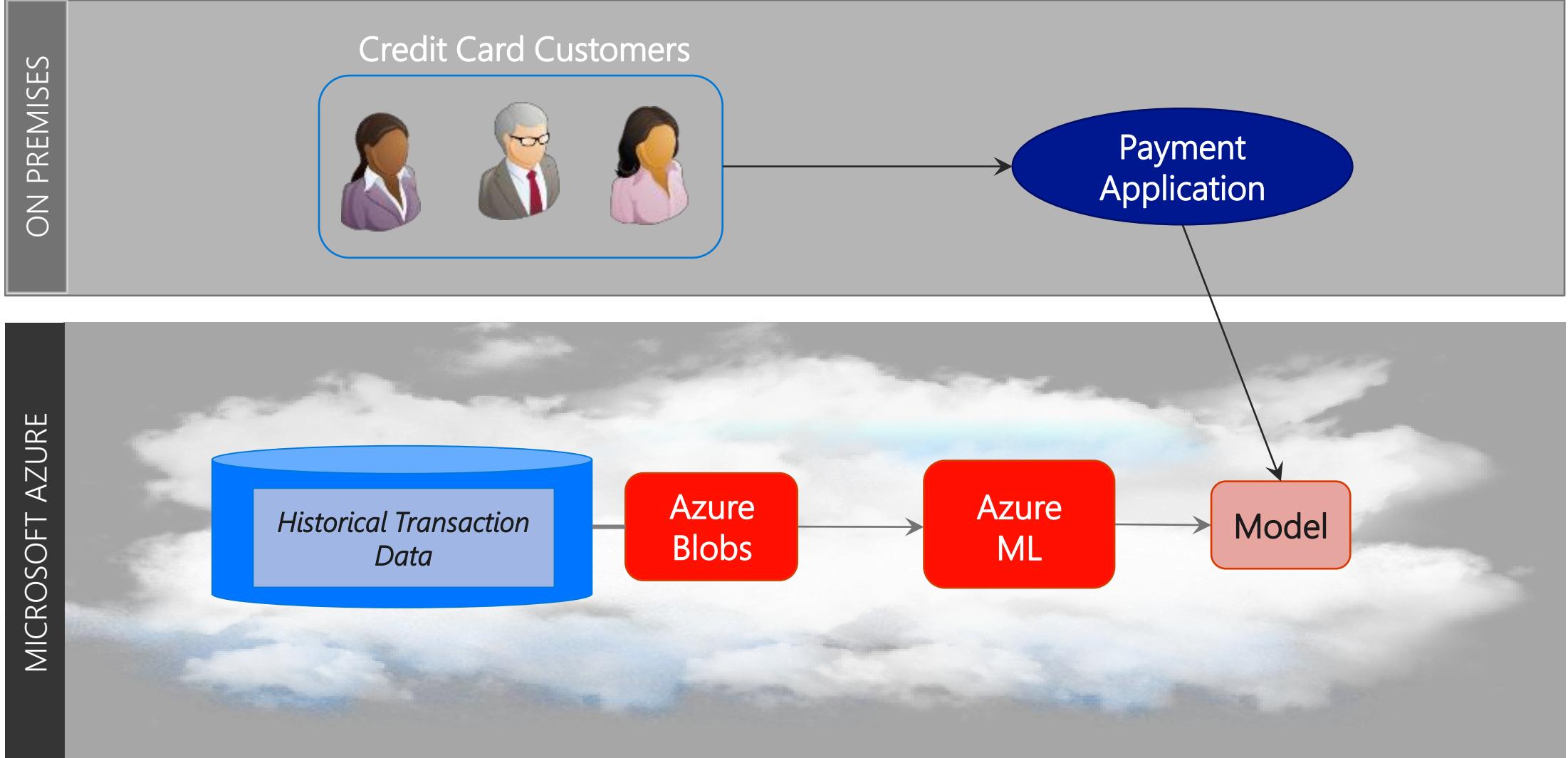
2) Call model with
values for features the
model requires

3) Get back value
predicted by the model
using those features



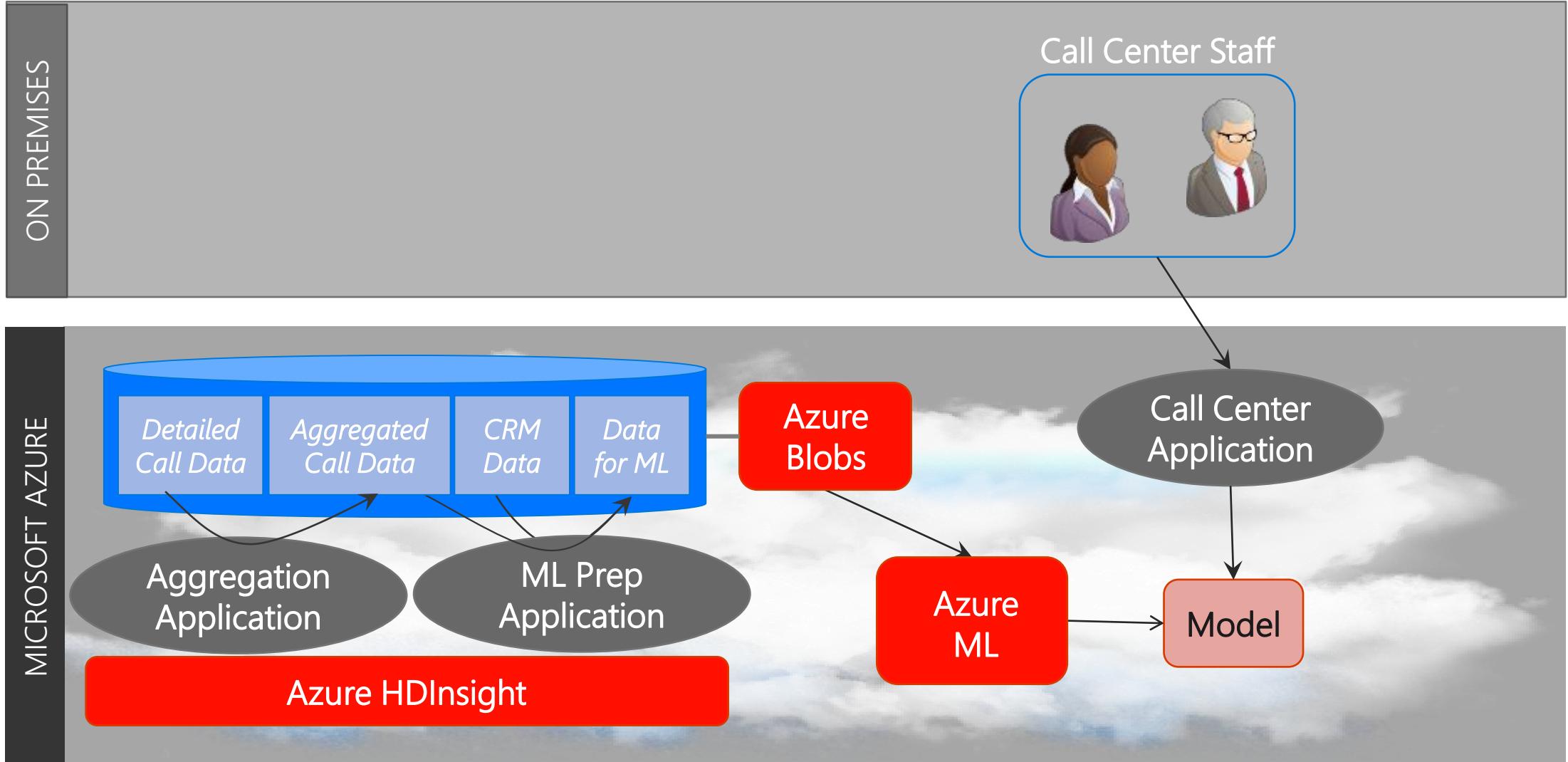
Scenario

Detecting credit card fraud



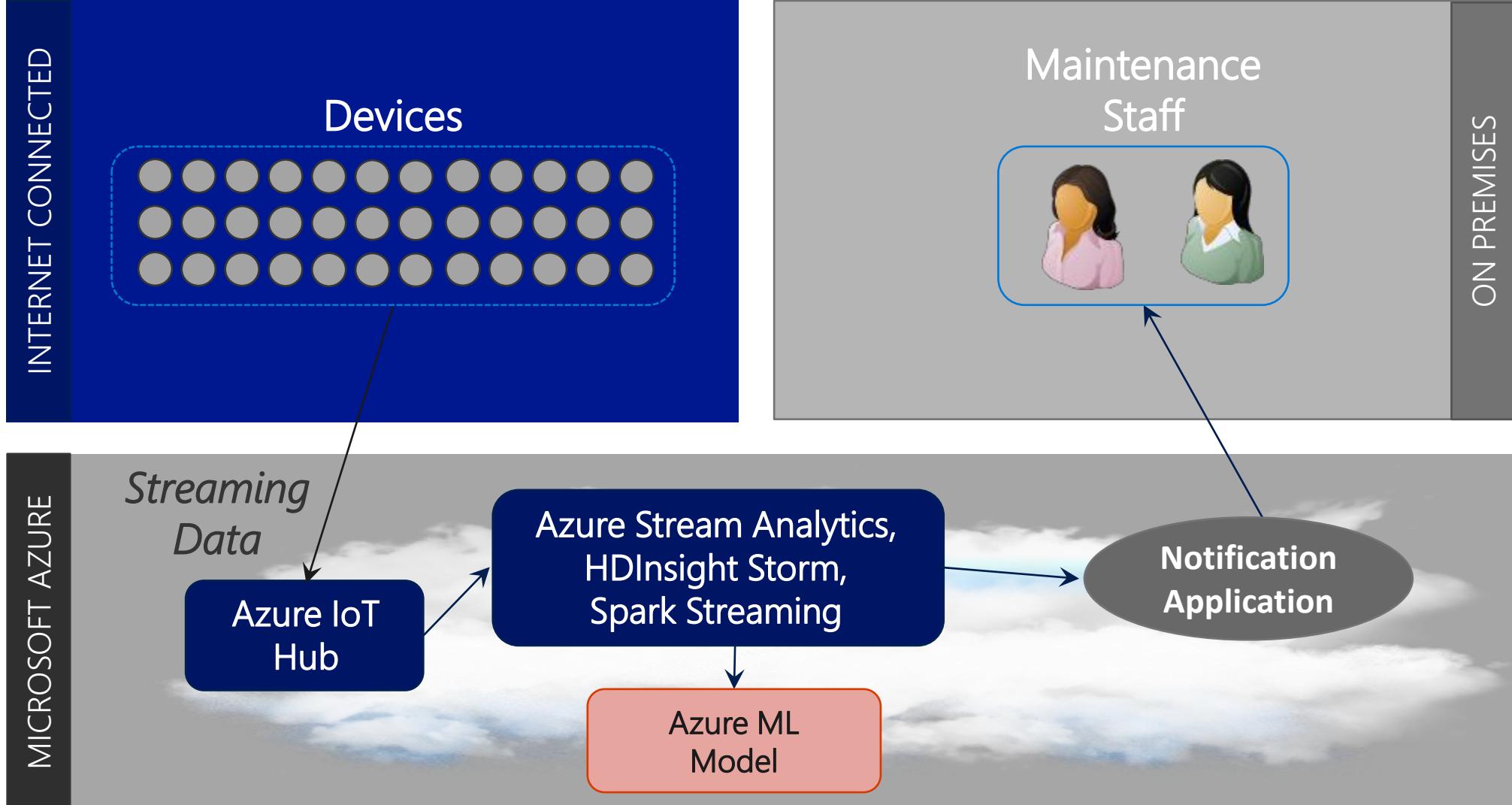
Scenario

Predicting customer churn



Scenario

Predicting equipment failure





Your PC ran into a problem and needs to restart. We're just collecting some error info, and then we'll restart for you. (0% complete)

If you'd like to know more, you can search online later for this error: HAL_INITIALIZATION_FAILED

<https://microsoft.github.io/techcasestudies/>

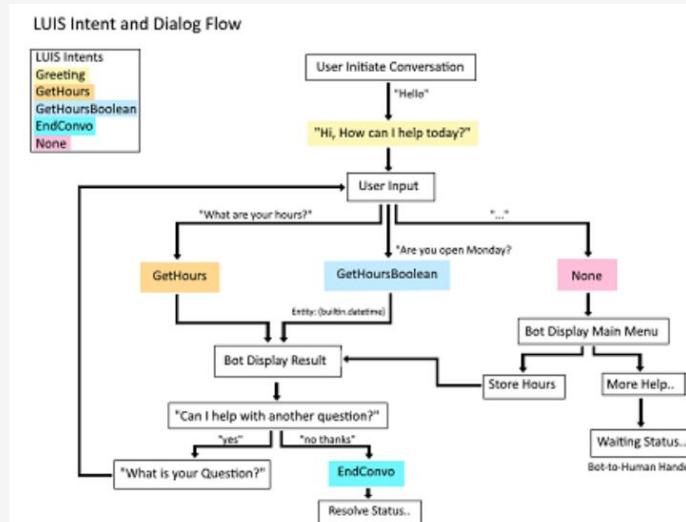
2 Selected Select Select Select

Sort By: Featured

Reset Apply Filter



Using Cognitive Services to
Improve Accessibility



Azure Machine Learning

Productive, Scale-out, Full-lifecycle AI Development



Workbench

*Wrangle Data, Build
models, Deploy & Manage*



Experimentation

*Boost productivity with Spark,
GPUs and agile development.*



Model Management

*Deploy, Version, Manage &
Monitor Models*

Announcing

Azure Databricks

Microsoft Azure PORTAL

Azure Databricks

Home

Workspace

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Clusters

Jobs

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Azure Databricks

Featured Notebooks

 Introduction to Apache Spark on Databricks

 Databricks for Data Scientists

 Introduction to Structured Streaming

New

-  Notebook
-  Job
-  Cluster
-  Table
-  Library

Documentation

- Databricks Guide
- Python, R, Scala, SQL
- Importing Data

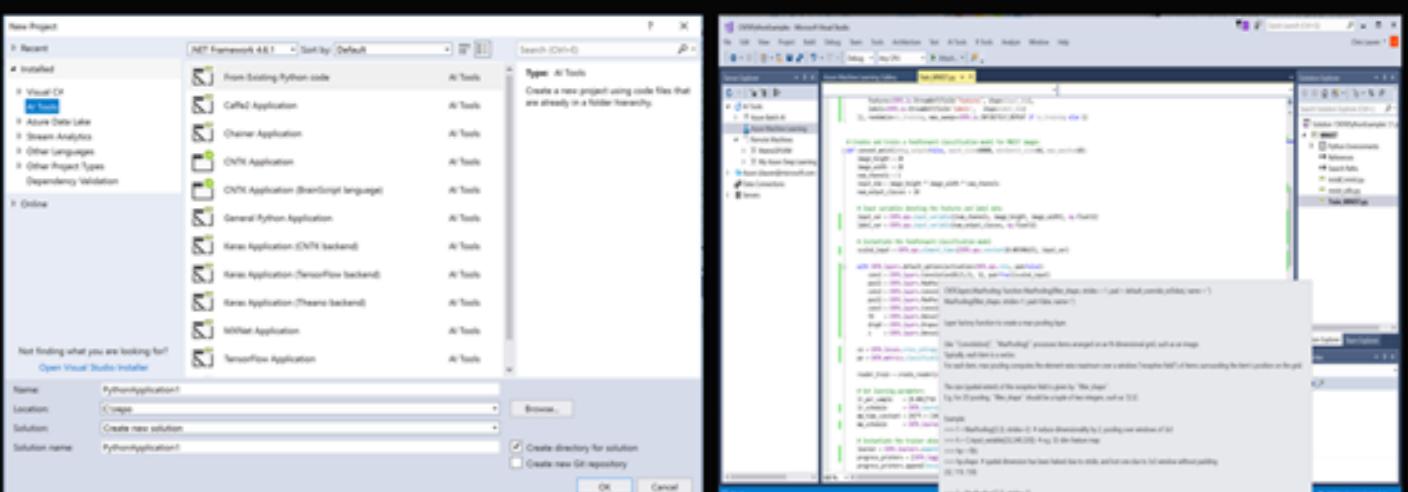
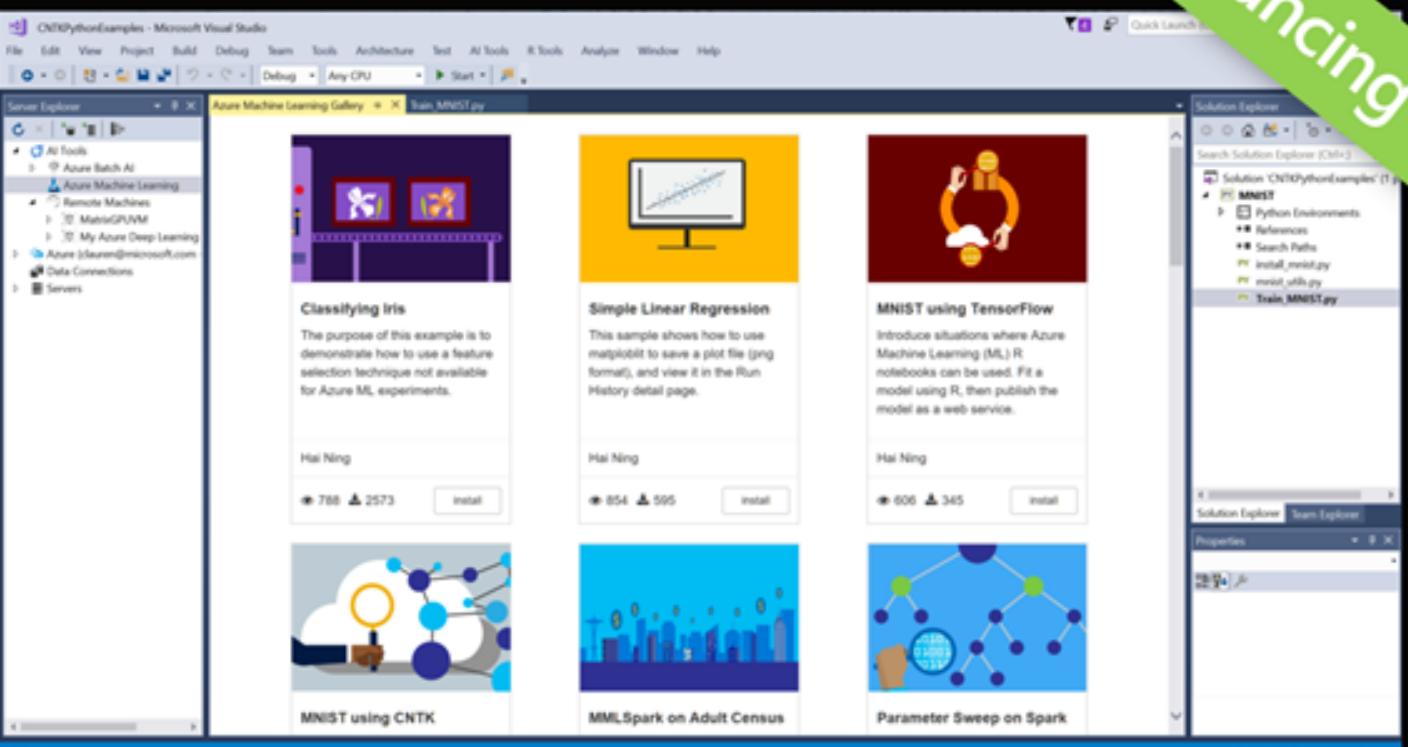
Open Recent

-  Data Engineering
-  Streaming Dashboards
-  ML
-  Data Engineering
-  Data Science
-  Introduction to Apache Spark on Databricks
-  Databricks for Data Scientists

Announcing

Visual Studio Tools for AI

- Integrated with Azure Machine Learning
- Create new deep learning projects easily
- Scale Out with Azure Batch
- Monitor model training progress & GPU utilization
- Storage Browser to upload data, copy model & view logs
- Infuse AI into your apps today



The Microsoft AI platform

Cloud-powered AI for every developer

Services

CUSTOM AI

Azure Machine Learning

PRE-BUILT AI

Cognitive Services

CONVERSATIONAL AI

Bot Framework

Tools

CODING & MANAGEMENT TOOLS

VS Tools
for AI

Azure ML
Studio

Azure ML
Workbench

Others (PyCharm, Jupyter Notebooks...)

Infrastructure

AI ON DATA

Cosmos
DB

SQL
DB

SQL
DW

Data
Lake

Spark

DSVM

AI COMPUTE

Batch
AI

ACS

Edge

CPU, FPGA, GPU

DEEP LEARNING FRAMEWORKS

3rd Party

Cognitive
Toolkit

TensorFlow

Caffe

Others (Scikit-learn, MXNet, Keras,
Chainer, Gluon...)

Artificial Intelligence



Machine Learning services

Powerful cloud-based predictive analytics tool to enable predictive maintenance



Azure Bot Service

Intelligent, serverless bot service that scales on demand

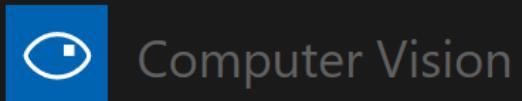


Azure Batch AI

Easily experiment and train your deep learning and AI models in parallel, at scale

Cognitive Services

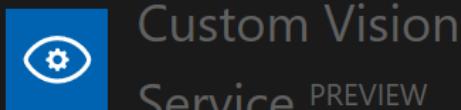
Vision



Computer Vision



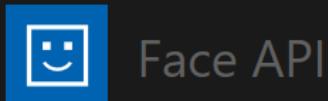
Content Moderator



Custom Vision
Service PREVIEW



Emotion API PREVIEW



Face API



Video Indexer PREVIEW

Speech



Bing Speech Service



Custom Speech
Service PREVIEW



Speaker
Recognition PREVIEW



Translator Speech

Language



Bing Spell Check



Language Understanding
Intelligent Services
(LUIS) PREVIEW



Linguistic Analysis PREVIEW



Text Analytics



Translator Text



Web Language
Model PREVIEW

Knowledge



Custom Decision Service PREVIEW



Entity Linking PREVIEW



Knowledge Exploration Service (KES) PREVIEW



QnAMaker PREVIEW



Recommendations PREVIEW



Academic Knowledge PREVIEW

Search



Bing News



Bing Video Search



Bing Web Search



Bing Autosuggest



Bing Custom Search



Bing Entity Search PREVIEW



Bing Image Search

Challenges for Machine Learning

- Skilled Data Scientists ❖ Unicorns
- Infrastructure ✓ Cloud
- Time ✓ Cloud
- Global Scalable ✓ Cloud

Who can be interested in ML?



Business Leaders

Want solutions to
business problems



Software Developers

Want to create better
applications



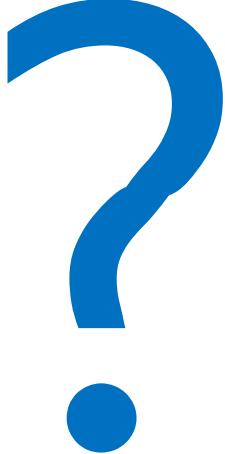
Data Scientists

Want powerful, easy-
to-use tools

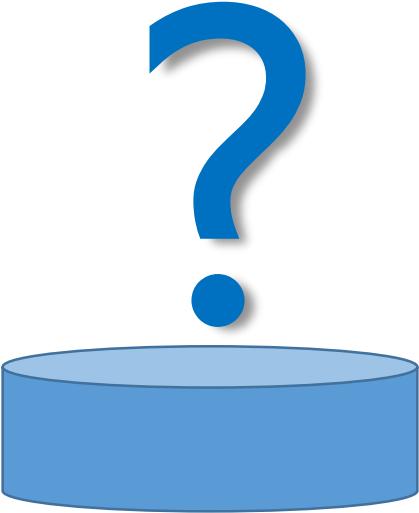
Finds patterns
in data.

- Lots od data
- Lots of computer power
- Effective algorithms.

Very well defined question.



- Choosing what question to ask is the most important part of the process

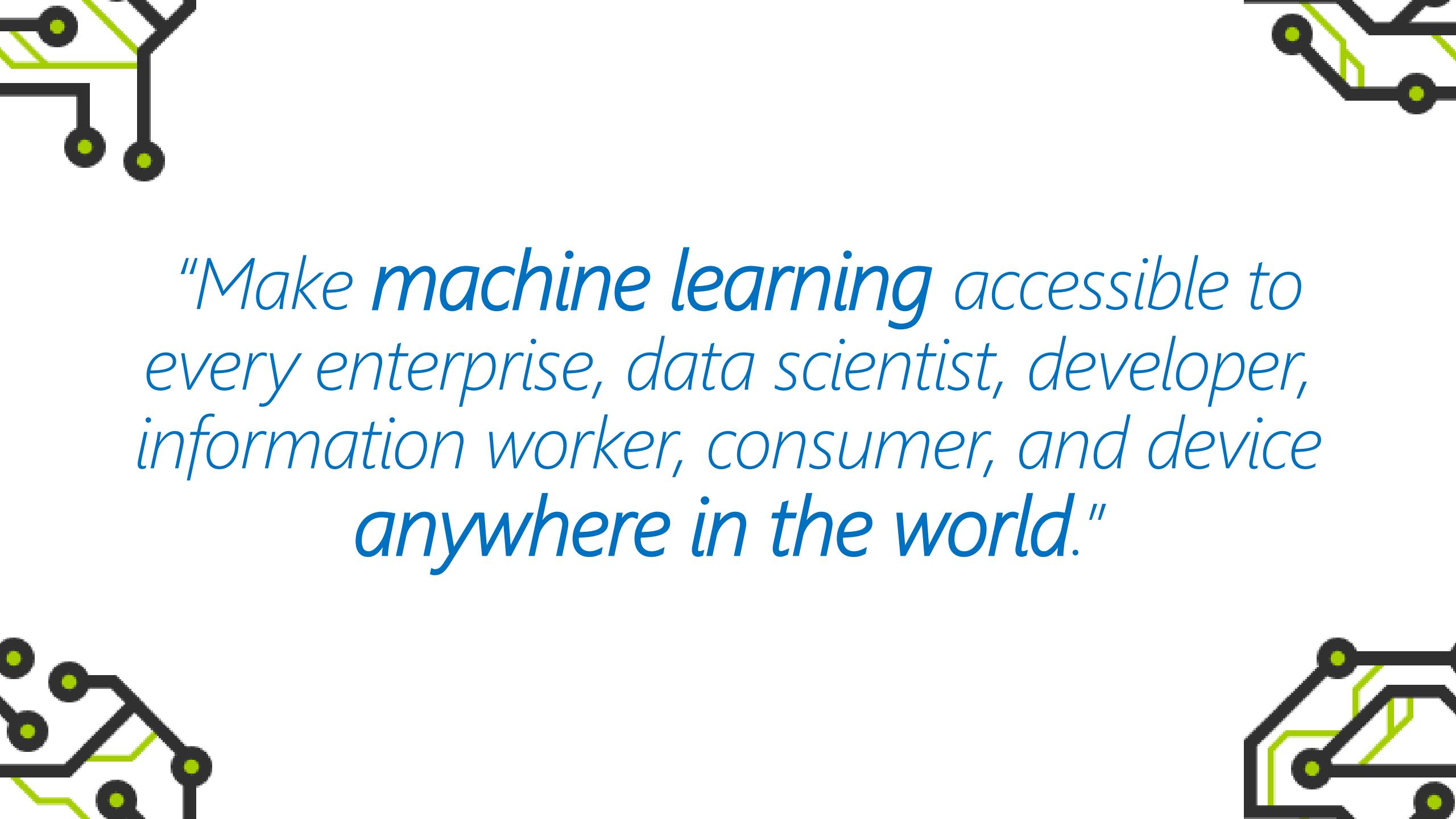


- ***Ask yourself:*** Do you have the right data to answer this question?

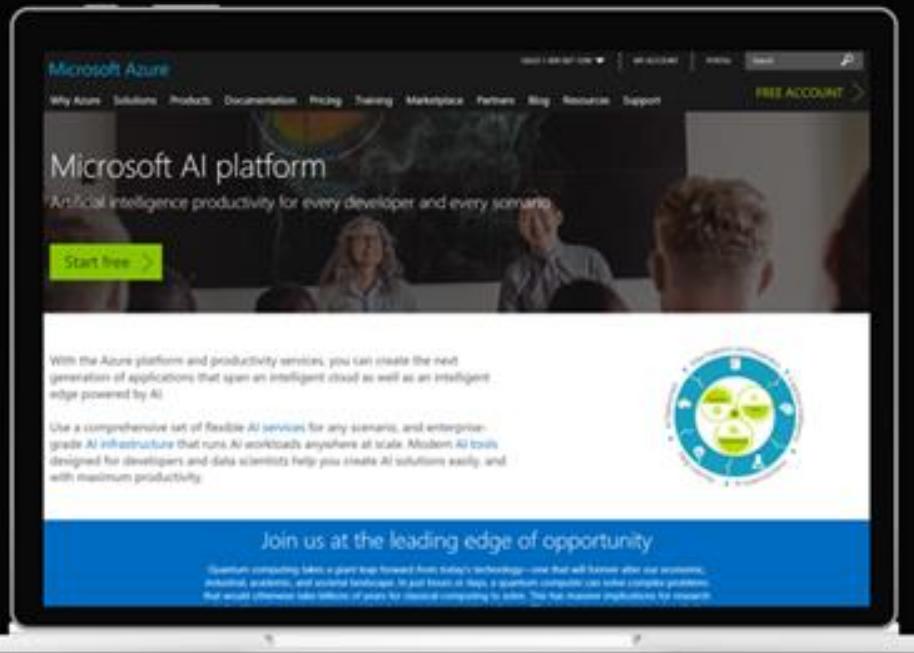


- ***Ask yourself:*** Do you know how you'll measure success?

Iterate until you have a model that makes good predictions.



*"Make machine learning accessible to
every enterprise, data scientist, developer,
information worker, consumer, and device
anywhere in the world."*



azure.com/ai

The screenshot shows the AI School landing page. The title 'AI School' is at the top. Below it, a brief description states: 'Dive in and learn how to start building intelligence into your solutions with the Microsoft AI platform, including pre-trained AI services like Cognitive Services and Bot Framework, as well as deep learning tools like Azure Machine Learning, Visual Studio Code Tools for AI, and Cognitive Toolkit. Our platform enables any developer to code in any language and infuse AI into your apps. Whether your solutions are existing or new, this is the intelligence platform to build on.' The page is organized into a grid of cards. Some visible cards include: 'Building Your Azure Skills Toolkit' (with 1 module, 1 hour), 'Get Started with Bot Framework' (with 1 module, 1 hour), 'Bot Framework with AI.NET' (with 2 modules, 2 hours), 'Learn Analytics Materials' (with 2 modules, 2 hours), 'Python Data Science Notebook' (with 1 module, 1 hour), and 'Introduction to Machine Learning with Azure ML' (with 2 modules, 2 hours).

aischool.microsoft.com

- <http://aka.ms/ml>
- <http://aka.ms/cntk>

*"We stand on the threshold of a brave new world.
It is an exciting, if precarious place to be,
and you are the pioneers."*

~ Stephen Hawking,
Web Summit 2017

Thank you! 😊

