

Machine Learning in Microsoft Azure

Presented by Suchit Majumdar
Data Science Evangelist



Boot Camp Structure

Intro.to Azure ML Studio

Simple use cases using
modules in Azure studio

Unsupervised
Learning

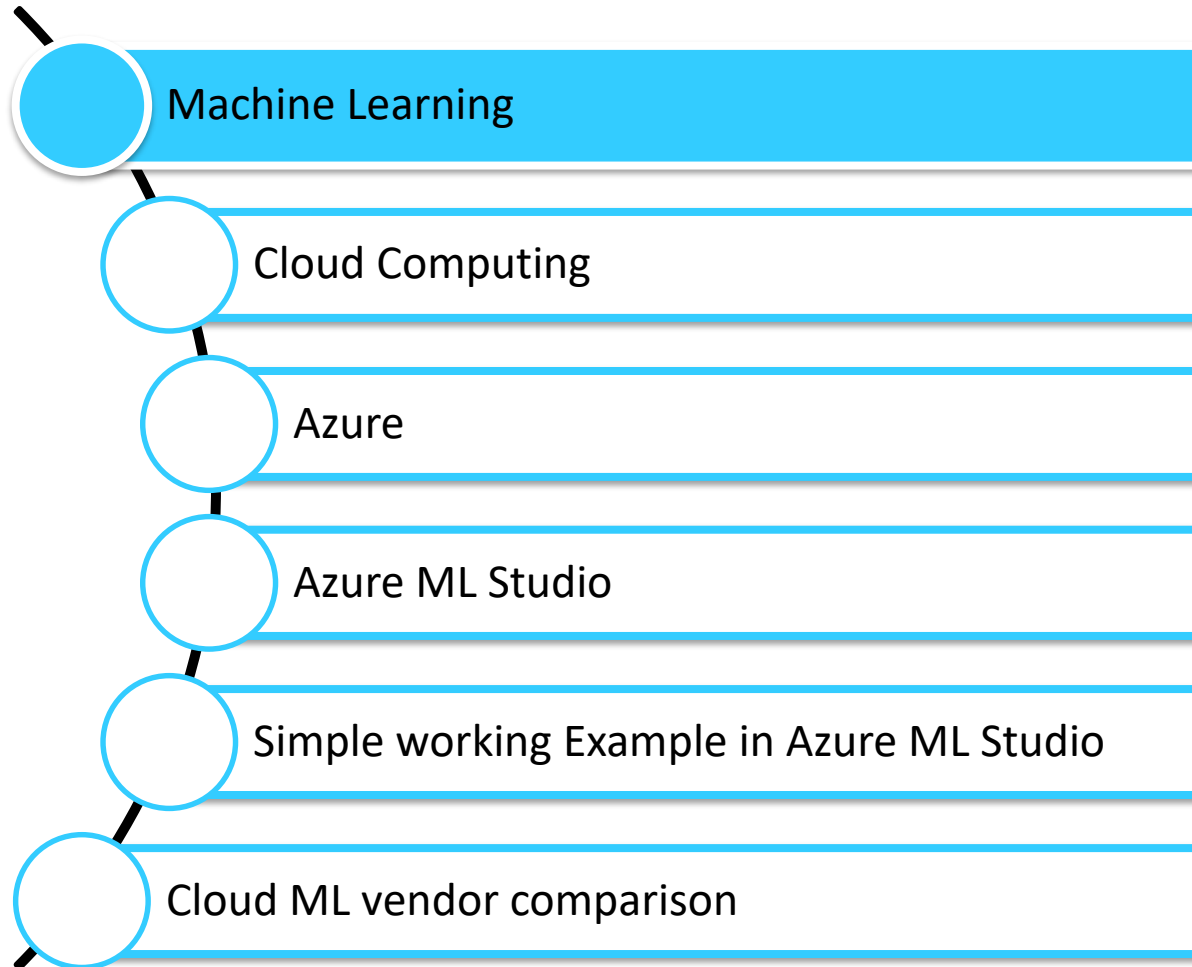
Supervised Learning I

Supervised Learning II

Recap & Conclusion

Boot Camp Expectation

- Introduction to Azure ML Studio
- Simple use cases using modules in Azure studio
- Cluster Analysis on Crime data
- Classification Analysis on Breast Cancer data
- Regression Analysis on Air Quality data
- Recap and conclusion



1. Machine Learning

MACHINE LEARNING



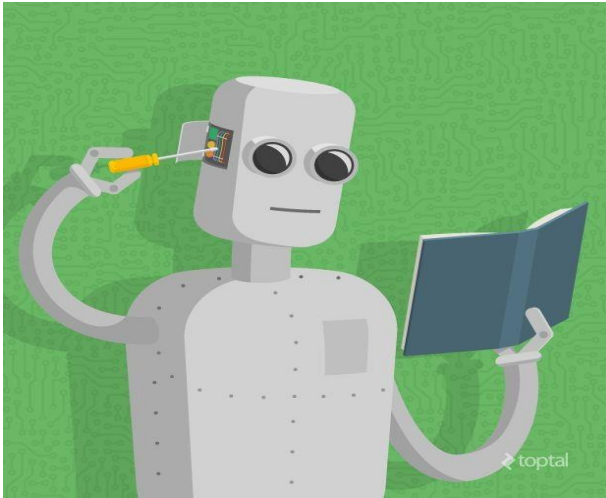
What is Learning



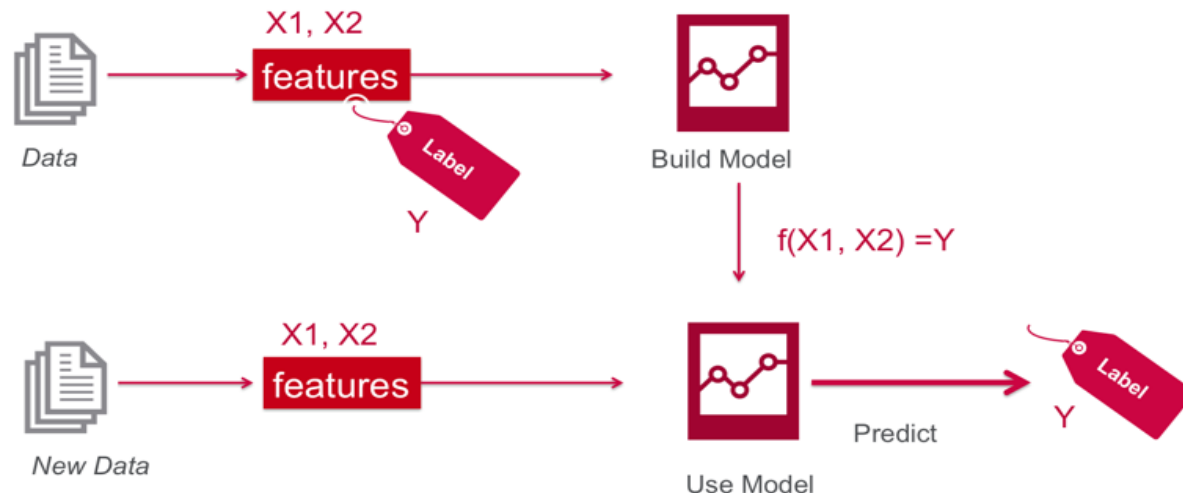
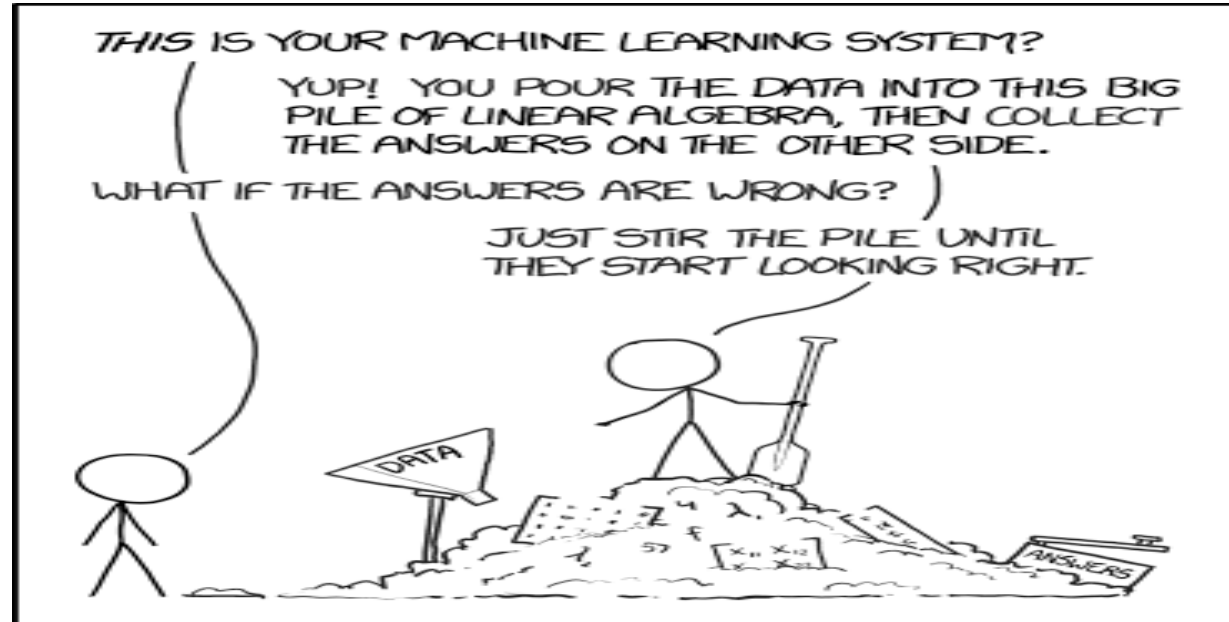
“Learning involves strengthening correct responses and weakening incorrect responses. Learning involves adding new information to your memory. Learning involves making sense of the presented material by attending to relevant information, mentally reorganizing it, and connecting it with what you already know.”

From eLearning and the Science of Instruction by Ruth C. Clark and Richard E. Mayer

What is Machine Learning ?



Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed.



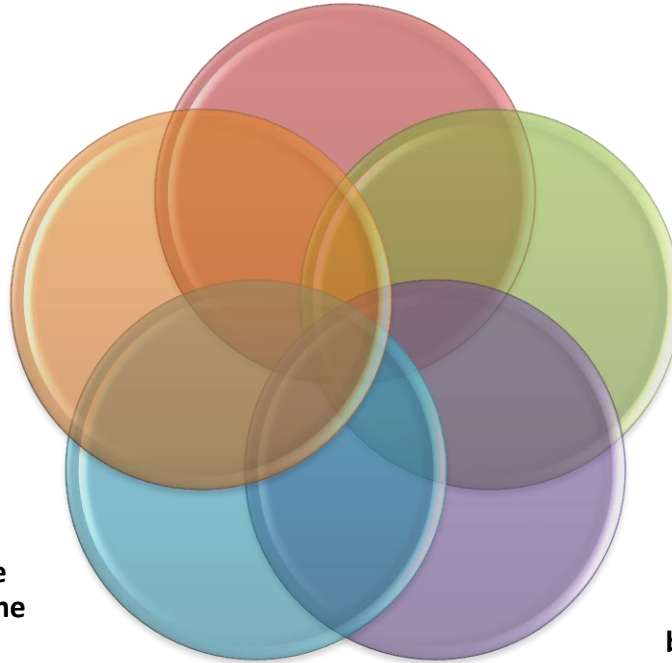
Why Study Machine Learning: A Few Quotes



“A breakthrough in machine learning would be worth ten Microsofts” - (Bill Gates, Microsoft)



“Machine learning is going to result in a real revolution” - (Greg Papadopoulos, CTO, Sun)



“Machine learning is the next Internet” - (Tony Tether, Former Director, DARPA)



“Web rankings today are mostly a matter of machine learning” - (Prabhakar Raghavan, Dir. Research, Yahoo)



“Software Is Eating the World, but AI Is Going to Eat Software” - (Jensen Huang, CEO, NVidia)

ML Terminologies

Features

- The number of features or distinct traits that can be used to describe each item in a quantitative manner.

Samples

- A sample is an item to process (e.g. classify). It can be a document, a picture, a sound, a video, a row in database or CSV file, or whatever you can describe with a fixed set of quantitative traits.

Feature vector

- Is an n-dimensional vector of numerical features that represent some object.

Feature extraction

- Preparation of feature vector
- Transforms the data in the high-dimensional space to a space of fewer dimensions.

Training/Evolution set

- Set of data to discover potentially predictive relationships.

Test/Validate set

- Set of data to validate the predictive relationship

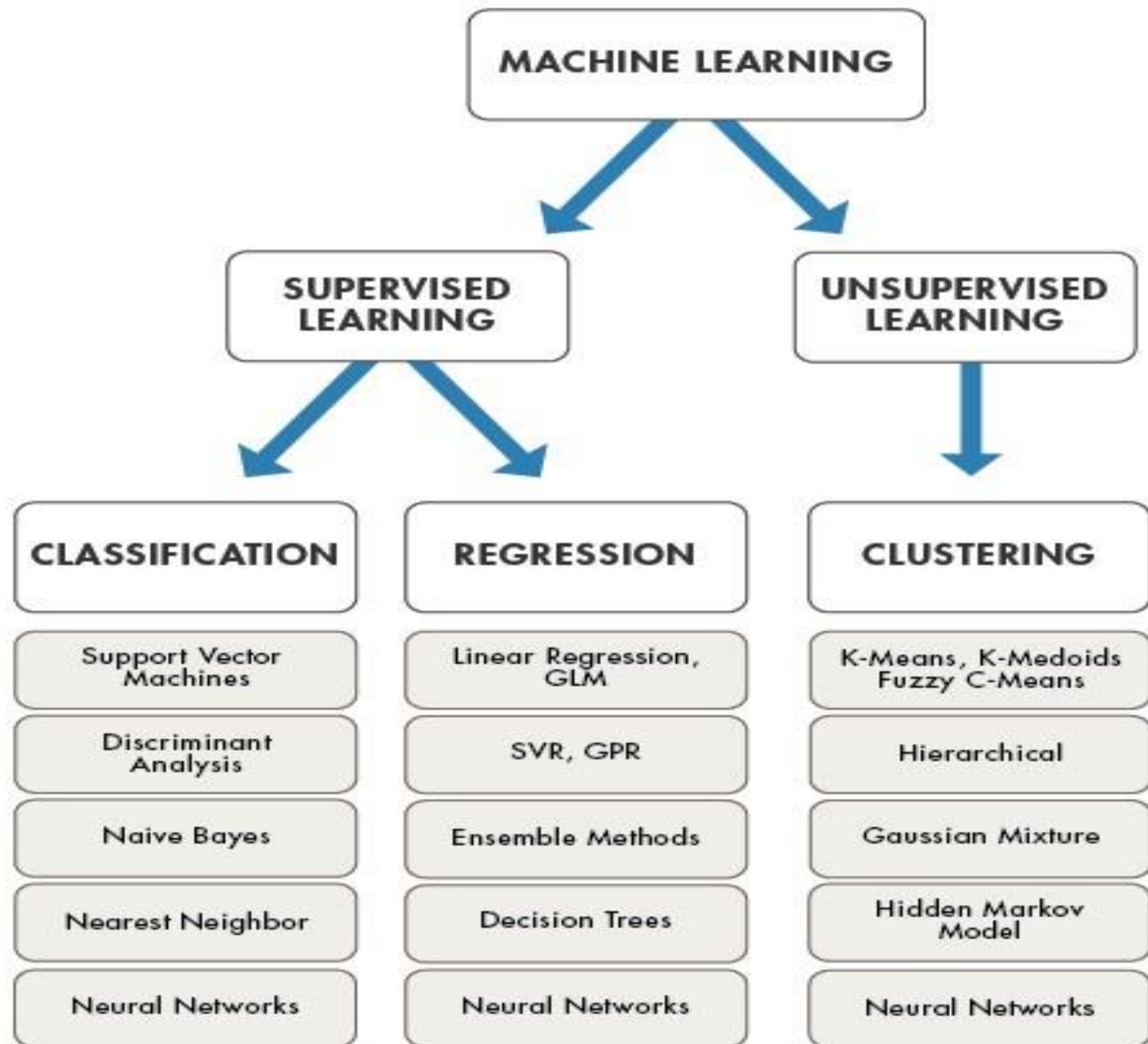
Scoring

- Evaluating the performance based on statistical metric

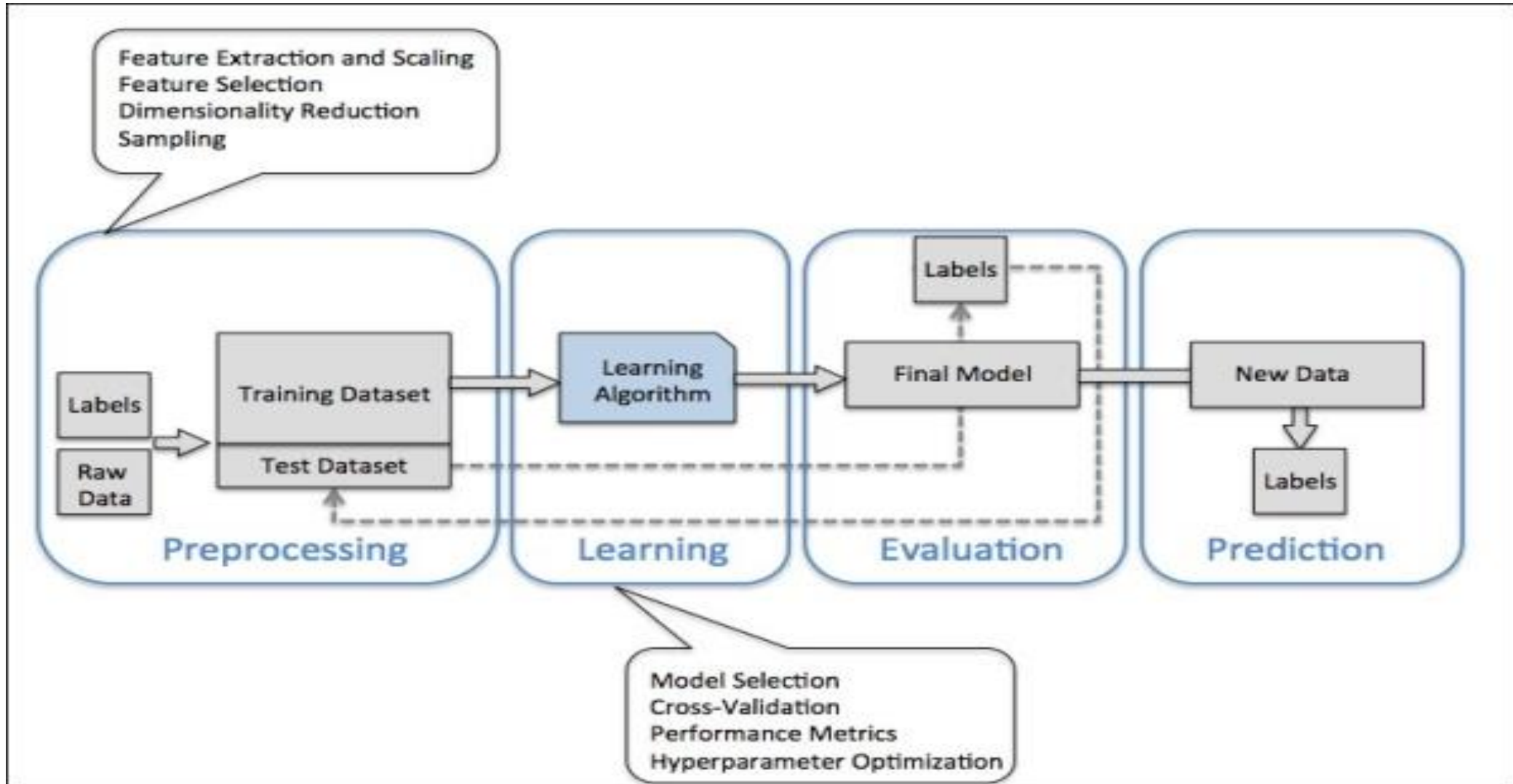
Did you know?

1. *In machine learning, a target is called a label.*
2. *In statistics, a target is called a dependent variable.*
3. *A variable in statistics is called a feature in machine learning.*
4. *A transformation in statistics is called feature creation in machine learning.*

Types of Machine Learning



Machine Learning workflow



Who is using Machine Learning?

Top 10 Use Cases for Data Science & Machine Learning



HEALTHCARE:
Patient Diagnosis



FINANCE:
Fraud Detection



MANUFACTURING:
Anomaly Detection



RETAIL:
Inventory Optimization



GOVERNMENT:
Smarter Services



TRANSPORTATION:
Demand Forecasting



NETWORKS:
Intrusion Detection



E-COMMERCE:
Recommender Systems

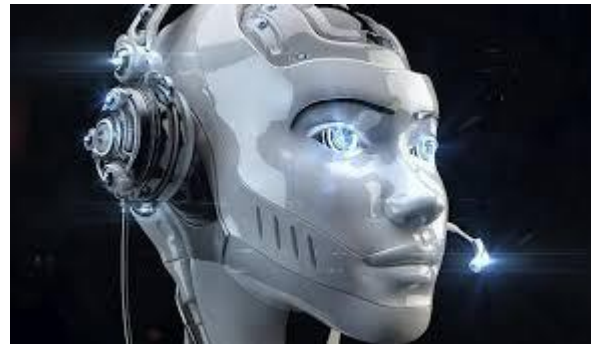


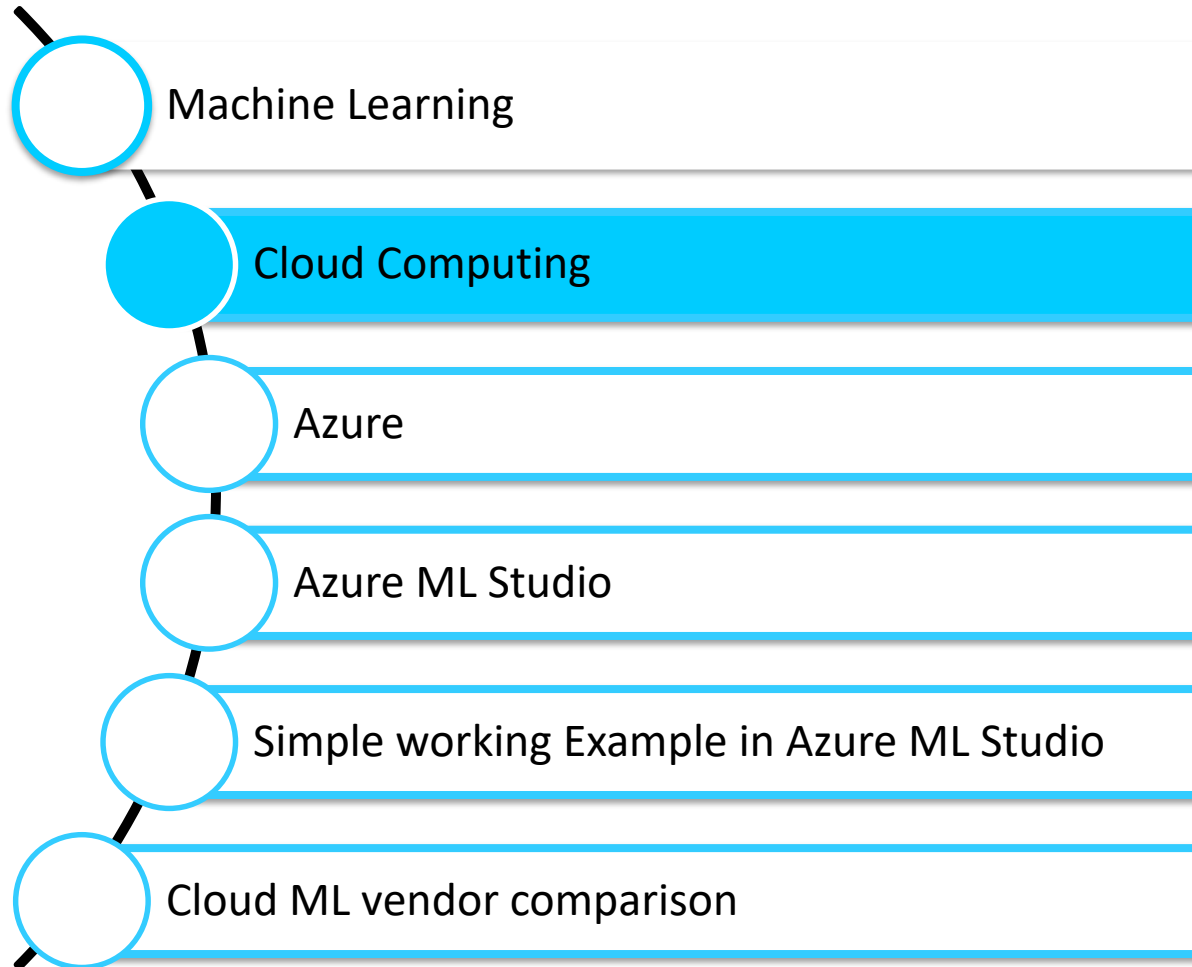
MEDIA:
Interaction & Speed



EDUCATION:
Research Insight

ML/AI going to transform & create new Industries





2. What is Cloud?

The term **Cloud** refers to a **Network** or **Internet**. In other words, we can say that Cloud is something, which is present at remote location.

Cloud can provide services over network, i.e., on public networks or on private networks, i.e., WAN, LAN or VPN.

Applications such as **e-mail**, **web conferencing**, **customer relationship management (CRM)**, all run in cloud.

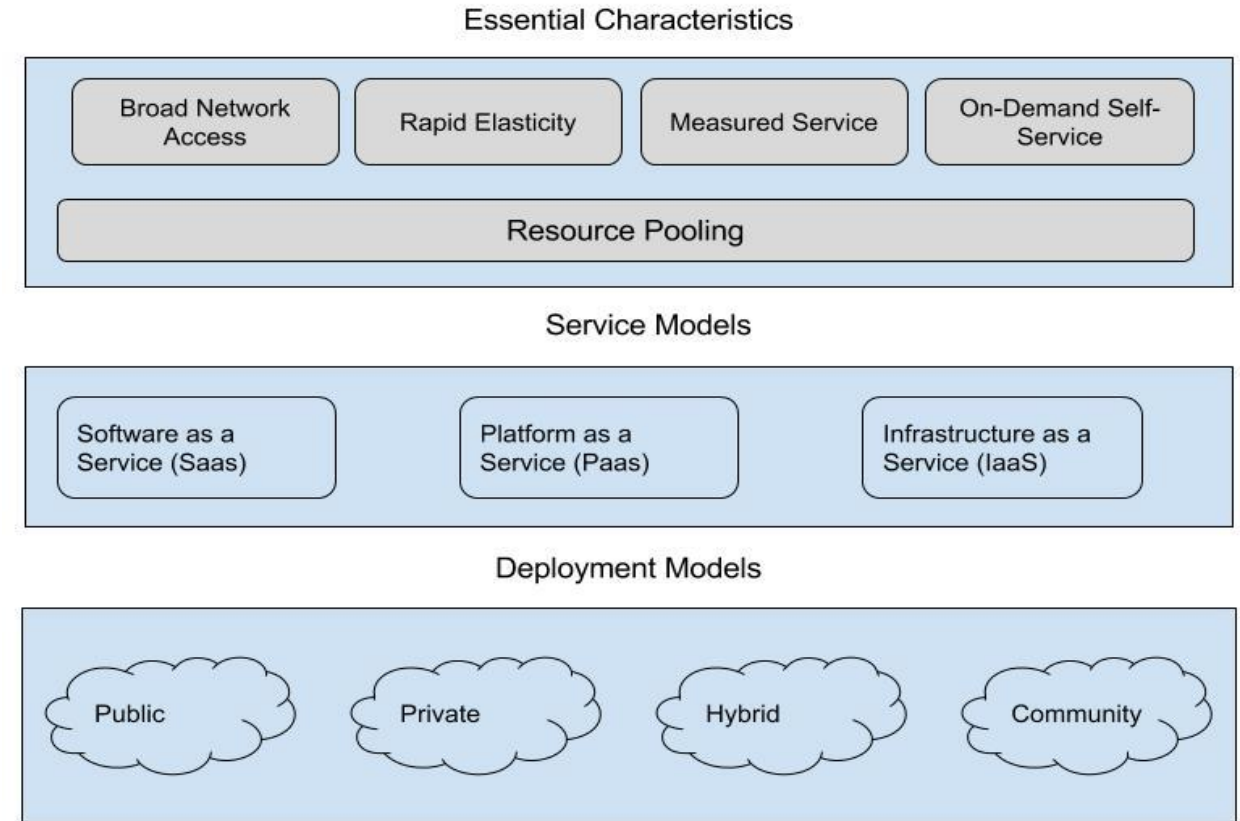


Figure 1 - NIST Visual Model of Cloud Computing Definition [CSA11]

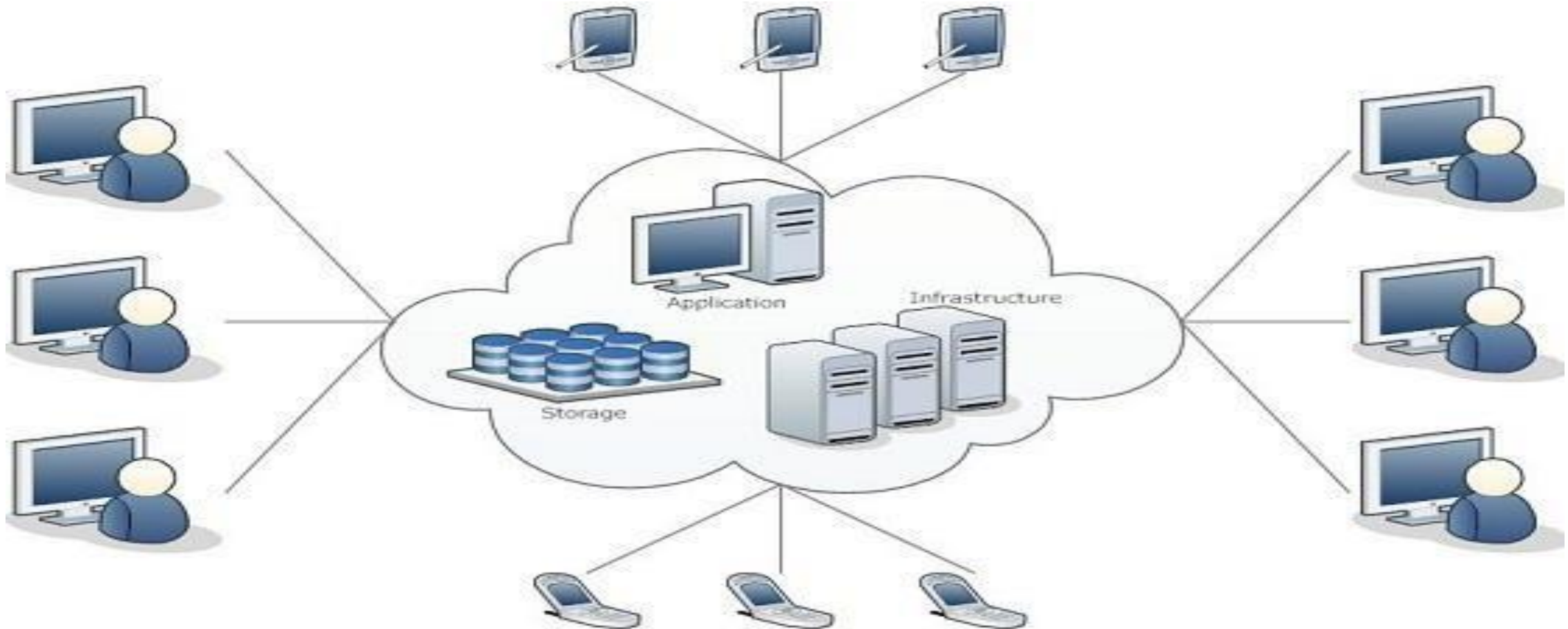
What is Cloud Computing?

Cloud Computing refers to **manipulating, configuring, and accessing** the applications online.

It offers online data storage, infrastructure and application.

Cloud Computing is both a combination of software and hardware based computing resources delivered as a network service.

Cloud Computing Architecture



Service Models & Types

Service Models are the reference models on which the Cloud Computing is based. These can be categorized into three basic service models as listed below:

IaaS is the delivery of technology infrastructure as an on demand scalable service.



PaaS provides the runtime environment for applications, development & deployment tools, etc.



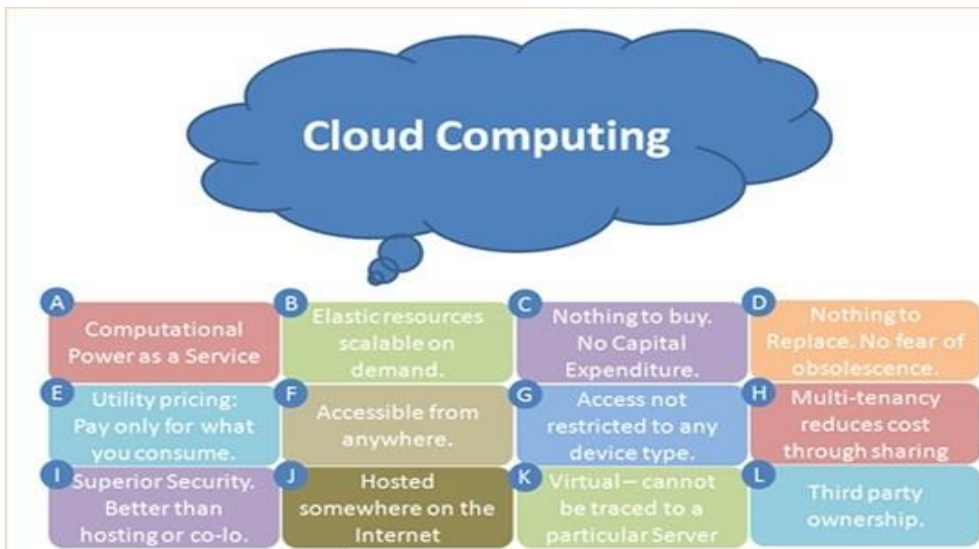
SaaS model allows to use software applications as a service to end users.



Increased Demand for Cloud



- Standing alone, cloud is on its way to becoming an essential computing commodity in many fields. But integration of machine learning will increase need for intelligent clouds in market.
- With all capabilities provided by intelligent cloud, it is definitely the most disruptive technological change in market.
- With ever-increasing competition, the intelligent cloud will become a core necessity in managing big companies and help them stay on top of the competition.



Advantages & Disadvantages of Cloud

Advantages

- Lower computer costs
- Improved performance
- Reduced software costs
- Instant software updates
- Improved document format compatibility
- Unlimited storage capacity
- Increased data reliability
- Universal document access
- Latest version availability
- Easier group collaboration
- Device independence

Disadvantages

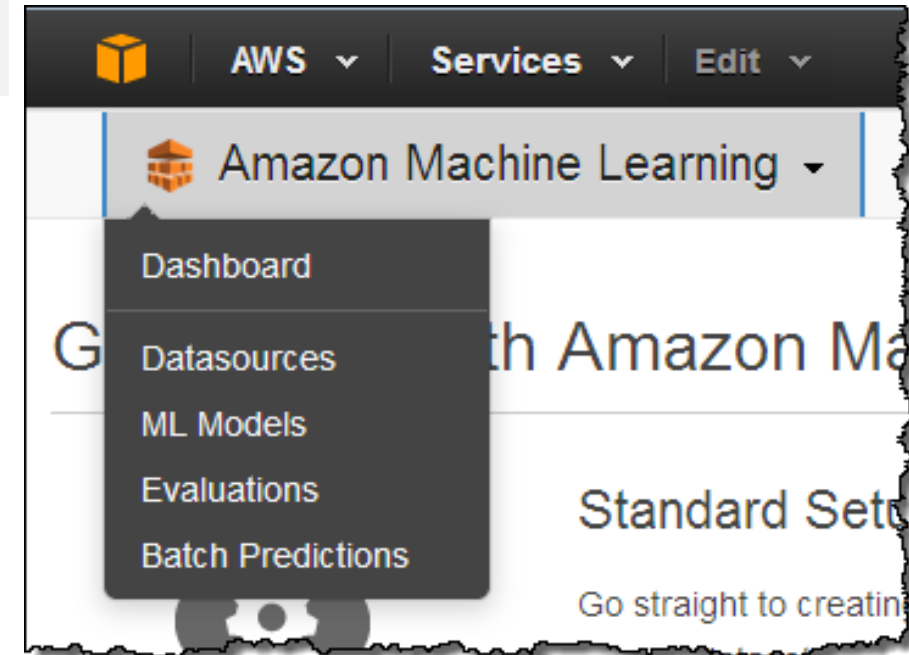
- Requires a constant Internet connection
- Does not work well with low-speed connections
- Features might be limited
- Can be slow
- Stored data can be lost
- Stored data might not be secure

MLaaS

Machine Learning as a Service

Machine Learning as-a-Service (MLaaS)

- All major cloud service providers now have some ML offering
- Startup costs are low-to-no
- Seamless leverage of cloud resources for scale-ups = \$'s
- Open source ML options are now common
- Very large models now possible
- Open data sets proliferating

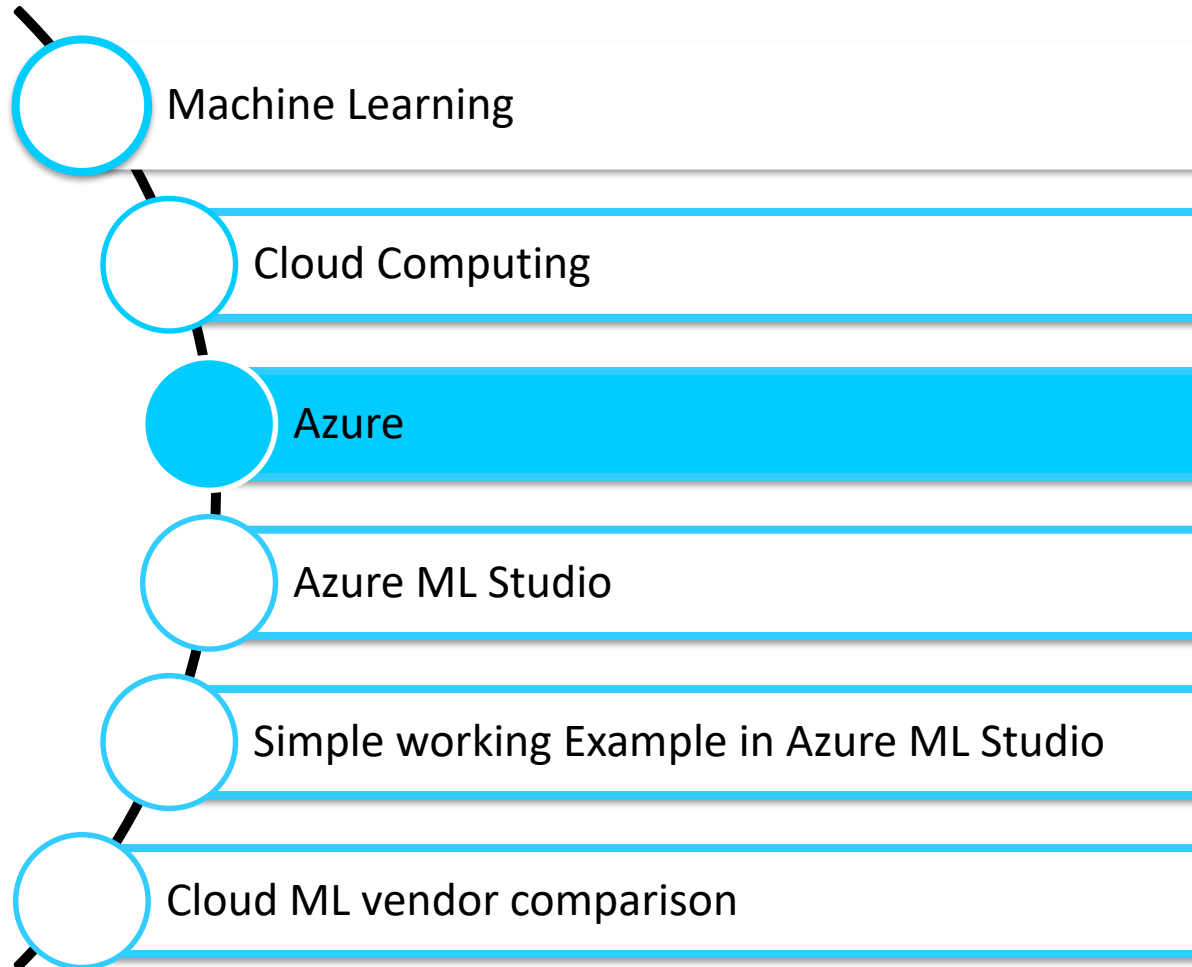


ML as a Service - The celebrities:

- ◎ *Microsoft **Azure ML***
- ◎ *Google **Prediction APIs***
- ◎ *Amazon **AWS ML***

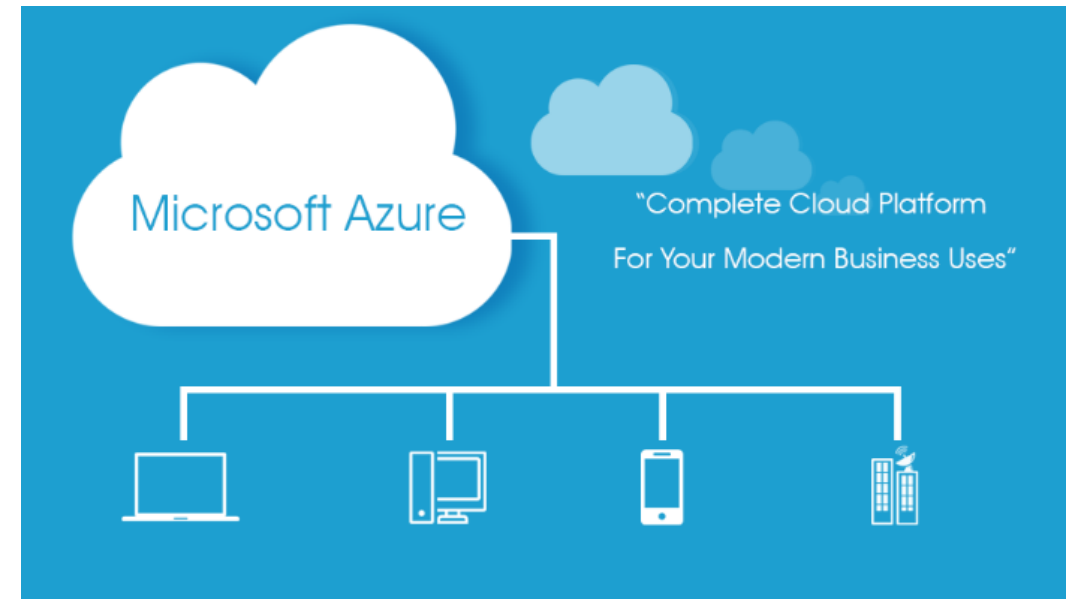


- Allows users to create and train models, then turn them into ready-to-be-consumed APIs. All through a beautifully intuitive web interface.

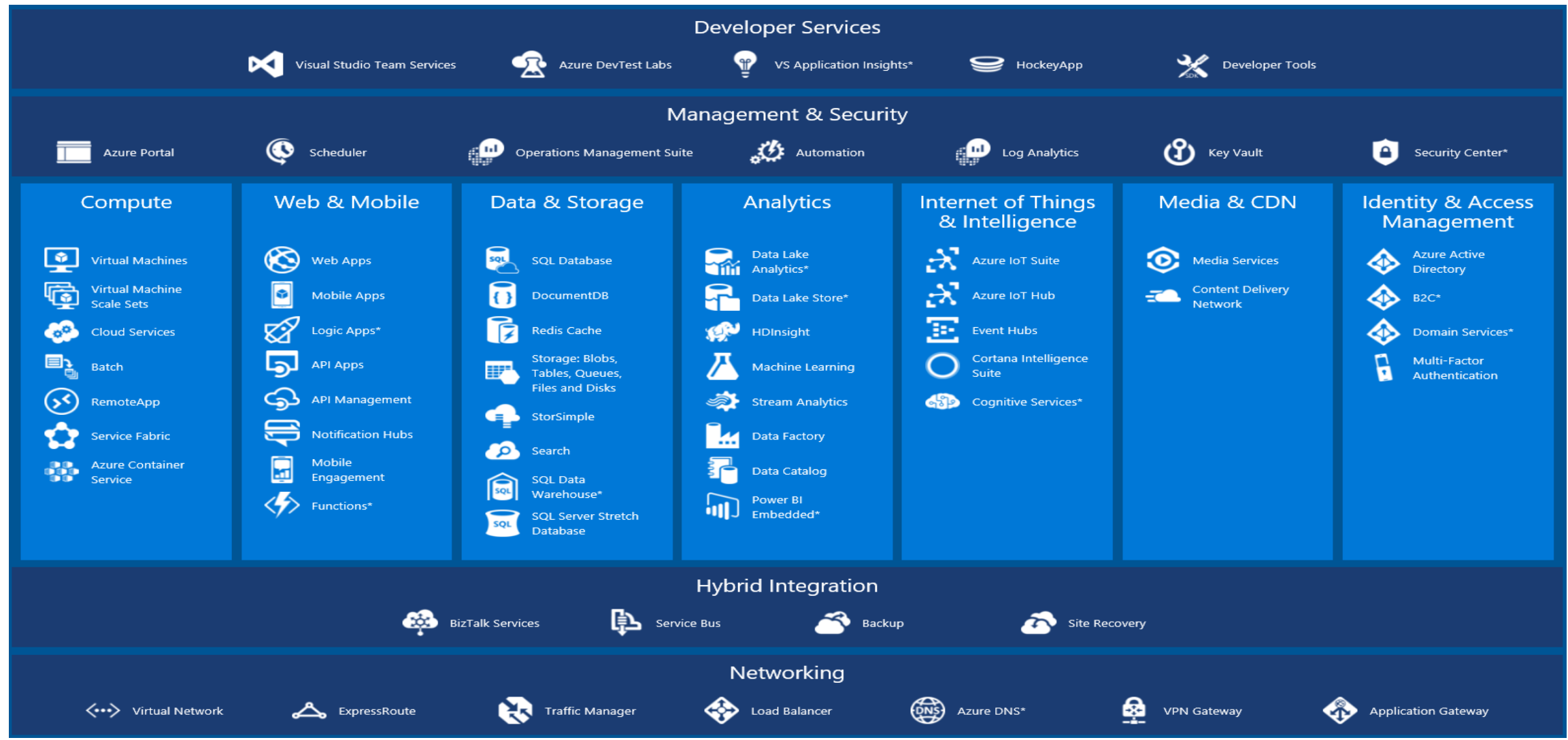


3. What is Azure?

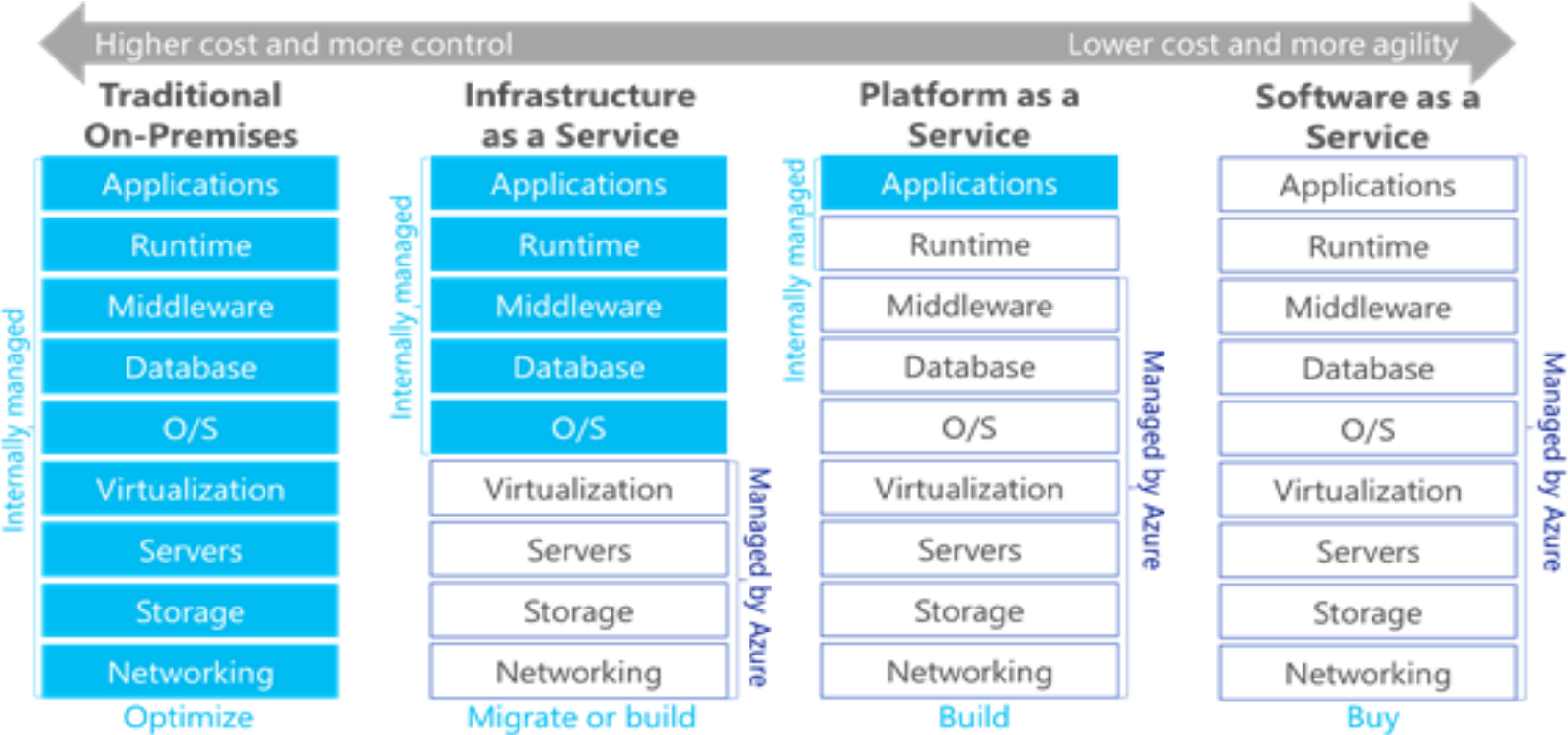
- Microsoft Azure, formerly known as Windows Azure, is Microsoft's public cloud computing platform.
- It provides a range of cloud services, including those for compute, analytics, storage and networking.
- Users can pick and choose from these services to develop and scale new applications, or run existing applications, in the public cloud.



Cloud Services Offered by Microsoft Azure



Azure at Different Stages of Service



Why Azure



Read on

Why Use the Azure?



Run App Anywhere
99.99% Up time



Extend your existing IT
Infrastructure



Protect your Data
Back ups &
Recovery

Why Use the Azure?



Speed

- Faster than Traditional Application Development



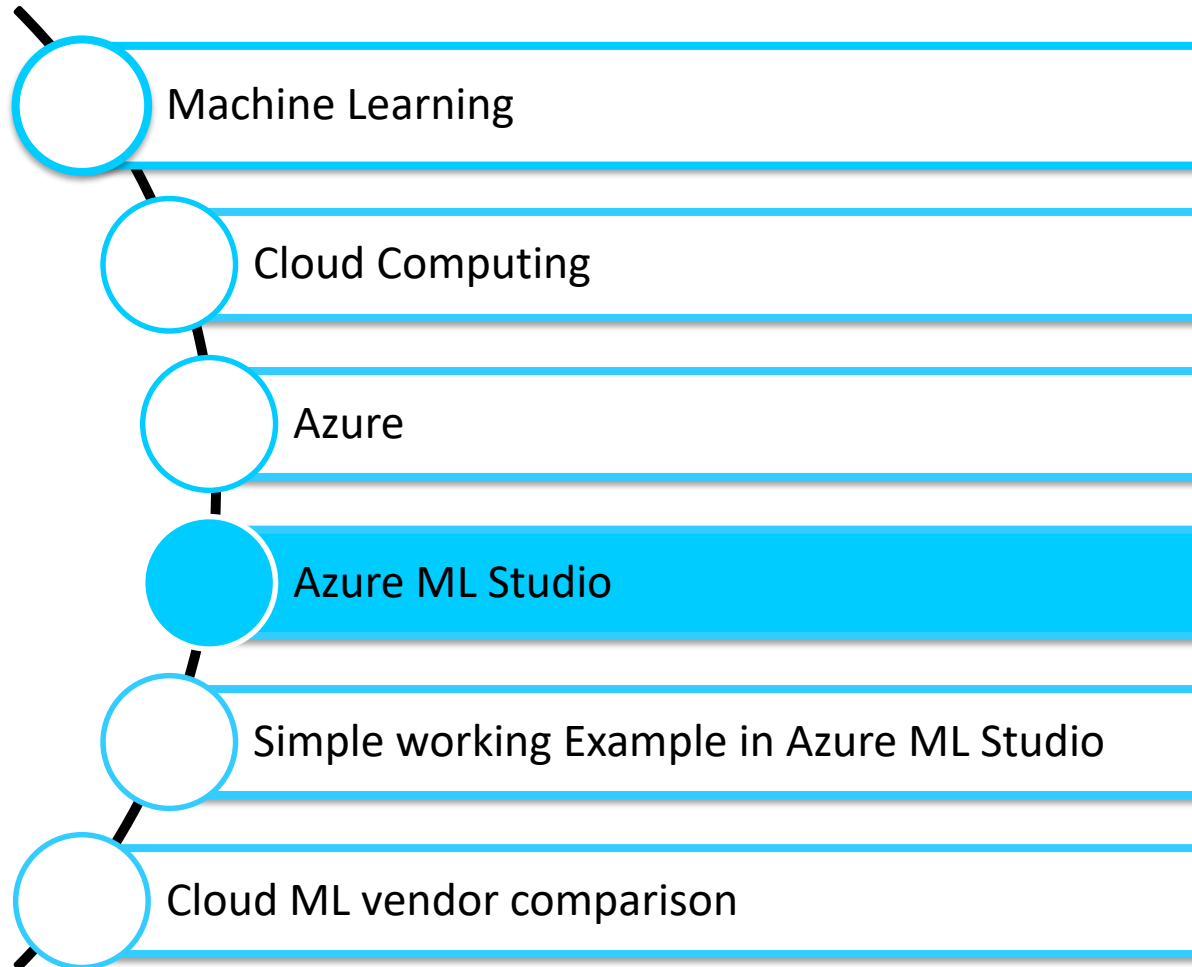
Scale

- Scale out Quickly
- Provide Global Scale



Economics

- Lower Cost



4. Azure Machine Learning Studio



1. Azure Machine Learning Studio is a cloud based workspace for data analysis
2. It's a simple drag & drop tool that enables non-programmers to use it
3. It's a collaborative environment where cloud resource, data science meet.

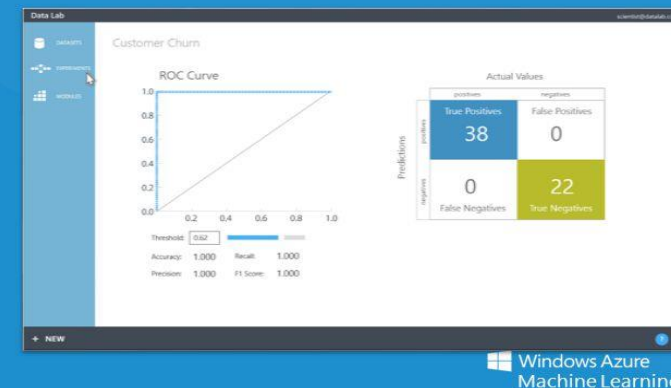
Predictive Analytical solutions prepared in Azure ML Studio are

“Easy to Build”.
“Easy to Deploy”.
“Easy to share”.

Microsoft Azure Machine Learning Features and Benefits

Rapid experimentation to create a better model

- Immutable library of models, search discover and reuse;
- Rapidly try a range of features, ML algorithms and modeling strategies;
- Quickly deploy model as Azure web service to our ML API service.



Azure ML Studio

Quick Recap

- ❖ Machine Learning Introduction
- ❖ Machine Learning types
- ❖ ML Workflow
- ❖ Usage of ML

- ❖ Cloud Computing
- ❖ Cloud services
- ❖ Merit & Demerits of Cloud Computing
- ❖ ML in Cloud
- ❖ Mlaas tools
- ❖ Azure
- ❖ Why Azure

Getting Started With ML Studio

All you need is a **web browser**! Go to Azure ML [website](https://studio.azureml.net/)

<https://studio.azureml.net/>

& Choose:

Free workspace: start using **all the features** of Studio immediately, **no credit card** required!

Enterprise workspace: add extra storage and few additional web services features (\$10/month).

Then, start working on your data from **anywhere!**



Welcome to Azure Machine Learning

Try it for free

No Azure subscription? No credit card? No problem! Choose anonymous Guest Access, or sign in with your work or school account, or a Microsoft account.

[Sign In](#) 

Not an Azure ML user?

[Sign up here](#)

[Pricing & FAQ](#)

By using this free version, you agree to be bound by the Microsoft Azure Website Terms of Use.

Getting Started With ML Studio



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Sign In ➔

Sign in with your Microsoft Account

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Create a Microsoft Account

[Pricing & FAQ](#)

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Machine Learning Studio

Once You have logged in With your Microsoft Account, this window will open up

Project: It enables you to create your own project

Experiment: It enables you to work in the data science environment where you can build predictive models using

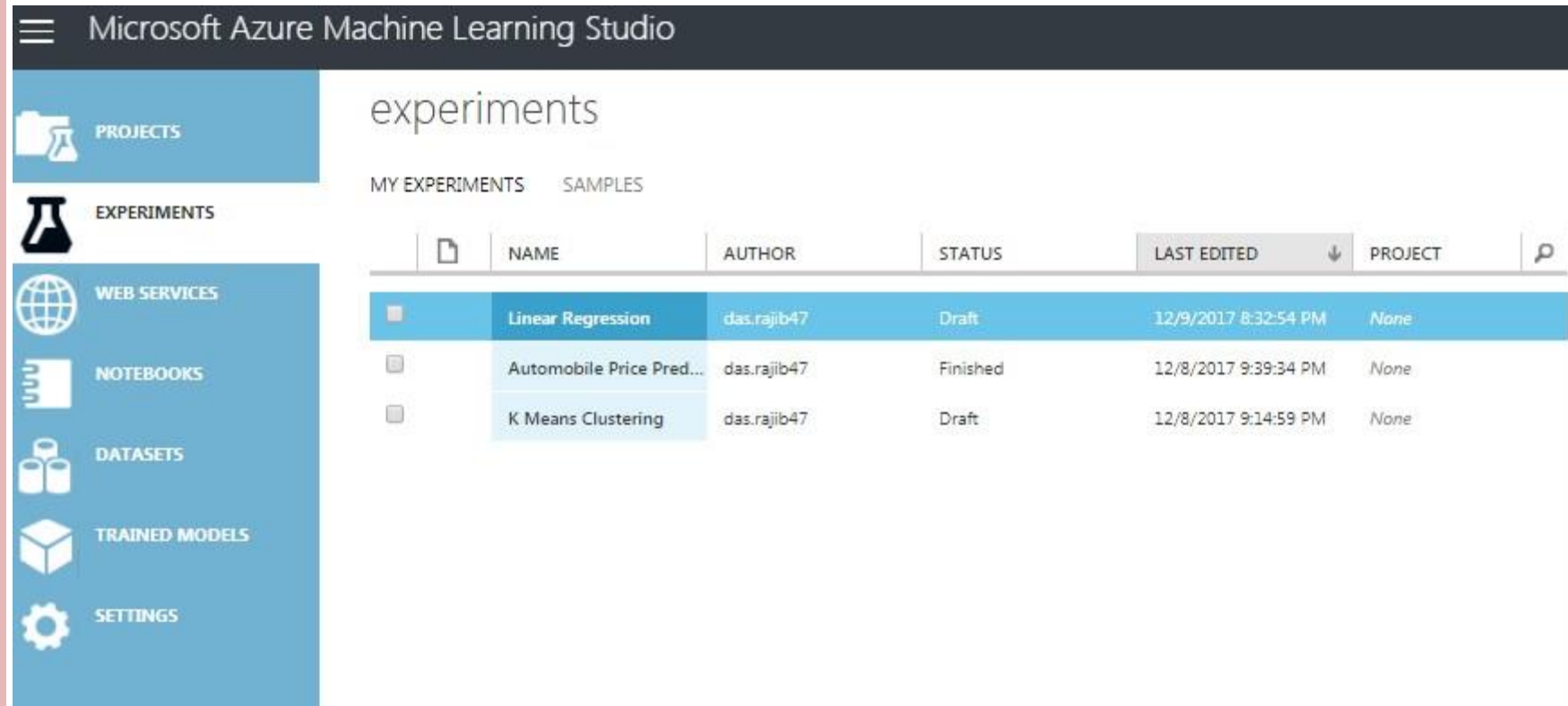
Sample data of Azure

Web Service : Here you can see a list of web services you've created

Notebook: Here you can create notebook ,for example R Notebook , Python Notebook

Datasets : You can import datasets from your repository

Trained Model : Trained models can be kept here for predicting new data



The screenshot shows the Microsoft Azure Machine Learning Studio interface. On the left is a navigation pane with icons and labels for PROJECTS, EXPERIMENTS (selected), WEB SERVICES, NOTEBOOKS, DATASETS, TRAINED MODELS, and SETTINGS. The main area is titled 'experiments' and contains a tabbed interface with 'MY EXPERIMENTS' and 'SAMPLES'. Below the tabs is a table of experiments.

	NAME	AUTHOR	STATUS	LAST EDITED	PROJECT
<input checked="" type="checkbox"/>	Linear Regression	das.rajib47	Draft	12/9/2017 8:32:54 PM	None
<input type="checkbox"/>	Automobile Price Pred...	das.rajib47	Finished	12/8/2017 9:39:34 PM	None
<input type="checkbox"/>	K Means Clustering	das.rajib47	Draft	12/8/2017 9:14:59 PM	None

Azure ML Studio: Project

PROJECTS

EXPERIMENTS

WEB SERVICES

NOTEBOOKS

DATASETS

TRAINED MODELS

SETTINGS

projects preview

NAME	AUTHOR	CONTENTS	LAST USED
Bootcamp	Rajib Das	3 1 4 1	12/18/2017 9:41:35 PM

+ NEW

DELETE

Click on Project Name to find the assets of the project

To Create New Project

Azure ML Studio: Project

PROJECTS

EXPERIMENTS

projects preview

NAME	AUTHOR	CONTENTS	LAST USED
Bootcamp	Rajib Das	3 1 4 1	12/18/2017 9:41:35 PM

Change Project Configuration

NAME

Bootcamp

DESCRIPTION

The Boot camp includes predictive Data Analysis in Azure ML Studio with Supervised ML & Unsupervised ML on the data imported from my repository.

ALL ASSETS

All Types

Search Assets

Datasets

abalone.csv

Results dataset (saved from Conv

diabetes.csv

text.preprocessing.zip

fraudTemplateUtil.zip

Sample Named Entity Recognitio

Breast cancer data

Forest fires data

Iris Two Class Data

Adult Census Income Binary Clas

Steel Annealing multi-class datas

MPG data for various automobile

Add Assets to the Project

PROJECT ASSETS

Datasets

train_loan (1).csv

diabetes1.csv

crime_data.csv

Automobile price data (Raw)

Experiments

Loan Status

K Means Clustering(Crime data)

diabetes1

Trained Models

Car Prediction [trained model]

Transforms

Car Prediction [Clean Missing Da

Web Services

Car Prediction [Predictive Exp.]

Project Assets

Project consists of Datasets

Project consists of Experiments

Project consists of saved Trained_model

Project consists of Web service where model is deployed

Azure ML Studio: Experiment

Enables to find experiments created by users.

PROJECTS

EXPERIMENTS

WEB SERVICES

NOTEBOOKS

DATASETS

TRAINED MODELS

SETTINGS

experiments

MY EXPERIMENTS SAMPLES

	NAME	AUTHOR	STATUS	LAST EDITED	PROJECT
<input checked="" type="checkbox"/>	K Means Clusterin...	das.rajib47	Draft	12/18/2017 8:43:28...	Bootcamp
<input type="checkbox"/>	Loan Status	das.rajib47	Finished	12/17/2017 12:22:2...	Bootcamp
<input type="checkbox"/>	diabetes2	das.rajib47	Draft	12/16/2017 11:12:0...	None
<input type="checkbox"/>	Car Prediction [Pre...	das.rajib47	Finished	12/15/2017 10:33:0...	None
<input type="checkbox"/>	diabetes1	das.rajib47	Draft	12/15/2017 8:46:56...	Bootcamp
<input type="checkbox"/>	K Means Clustering	das.rajib47	Finished	12/15/2017 11:56:2...	None
<input type="checkbox"/>	Car Prediction	das.rajib47	Finished	12/14/2017 7:52:32...	None
<input type="checkbox"/>	svm on diabetes	das.rajib47	Draft	12/14/2017 7:50:19...	None
<input type="checkbox"/>	Car Price Prediction	das.rajib47	Finished	12/10/2017 1:08:39...	None
<input type="checkbox"/>	Classification	das.rajib47	Finished	12/9/2017 10:08:07...	None
<input type="checkbox"/>	Linear Regression	das.rajib47	Draft	12/9/2017 8:32:54 ...	None
<input type="checkbox"/>	Automobile Price ...	das.rajib47	Finished	12/8/2017 9:39:34 ...	None

+ NEW

DELETE

ADD TO PROJECT

Azure ML Studio: Experiment

PROJECTS

EXPERIMENTS

WEB SERVICES

NOTEBOOKS

DATASETS

TRAINED MODELS

SETTINGS

experiments

MY EXPERIMENTS SAMPLES

	NAME	AUTHOR	STATUS	LAST EDITED	PROJECT
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<input type="checkbox"/>	Loan Status	das.rajib47	Finished	12/17/2017 12:22:2...	Bootcamp
<input type="checkbox"/>	diabetes2	das.rajib47	Draft	12/16/2017 11:12:0...	None
<input type="checkbox"/>	Car Prediction [Pre...	das.rajib47	Finished	12/15/2017 10:33:0...	None
<input type="checkbox"/>	diabetes1	das.rajib47	Draft	12/15/2017 8:46:56...	Bootcamp
<input type="checkbox"/>	K Means Clustering	das.rajib47	Finished	12/15/2017 11:56:2...	None
<input type="checkbox"/>	Car Prediction	das.rajib47	Finished	12/14/2017 7:52:32...	None
<input type="checkbox"/>	svm on diabetes	das.rajib47	Draft	12/14/2017 7:50:19...	None
<input type="checkbox"/>	Car Price Prediction	das.rajib47	Finished	12/10/2017 1:08:39...	None
<input type="checkbox"/>	Classification	das.rajib47	Finished	12/9/2017 10:08:07...	None
<input type="checkbox"/>	Linear Regression	das.rajib47	Draft	12/9/2017 8:32:54 ...	None
<input type="checkbox"/>	Automobile Price ...	das.rajib47	Finished	12/8/2017 9:39:34 ...	None

+ NEW

DELETE

ADD TO PROJECT

Click on the Experiment Name to find the model

This Experiments have been added to Bootcamp Project

Azure ML Studio: Experiment

PROJECTS

EXPERIMENTS

WEB SERVICES

NOTEBOOKS

DATASETS













TRAINED MODELS

SETTINGS

experiments

MY EXPERIMENTS

SAMPLES

	NAME	AUTHOR	STATUS	LAST EDITED	PROJECT
	K Means Clusterin...	das.rajib47	Draft	12/18/2017 8:43:28...	Bootcamp
	Loan Status	das.rajib47	Finished	12/17/2017 12:22:2...	Bootcamp
	diabetes2	das.rajib47	Draft	12/16/2017 11:12:0...	None
	Car Prediction [Pre...	das.rajib47	Finished	12/15/2017 10:33:0...	None
	diabetes1	das.rajib47	Draft	12/15/2017 8:46:56...	Bootcamp
	K Means Clustering	das.rajib47	Finished	12/15/2017 11:56:2...	None
	Car Prediction	das.rajib47	Finished	12/14/2017 7:52:32...	None
	svm on diabetes	das.rajib47	Draft	12/14/2017 7:50:19...	None
	Car Price Prediction	das.rajib47	Finished	12/10/2017 1:08:39...	None
	Classification	das.rajib47	Finished	12/9/2017 10:08:07...	None
	Linear Regression	das.rajib47	Draft	12/9/2017 8:32:54 ...	None
	Automobile Price ...	das.rajib47	Finished	12/8/2017 9:39:34 ...	None

+

NEW

DELETE

ADD TO PROJECT

Embedded Azure
Sample
experiments

Azure ML Studio: Experiment

PROJECTS

EXPERIMENTS

WEB SERVICES

NOTEBOOKS

DATASETS

TRAINED MODELS

SETTINGS

experiments

MY EXPERIMENTS SAMPLES

	NAME	AUTHOR	STATUS	LAST EDITED	PROJECT
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	diabetes1	das.rajib47	Draft	12/15/2017 8:46:56...	Bootcamp
	K Means Clustering	das.rajib47	Finished	12/15/2017 11:56:2...	None
	Car Prediction	das.rajib47	Finished	12/14/2017 7:52:32...	None
	svm on diabetes	das.rajib47	Draft	12/14/2017 7:50:19...	None
	Car Price Prediction	das.rajib47	Finished	12/10/2017 1:08:39...	None
	Classification	das.rajib47	Finished	12/9/2017 10:08:07...	None
	Linear Regression	das.rajib47	Draft	12/9/2017 8:32:54 ...	None
	Automobile Price ...	das.rajib47	Finished	12/8/2017 9:39:34 ...	None

+ NEW

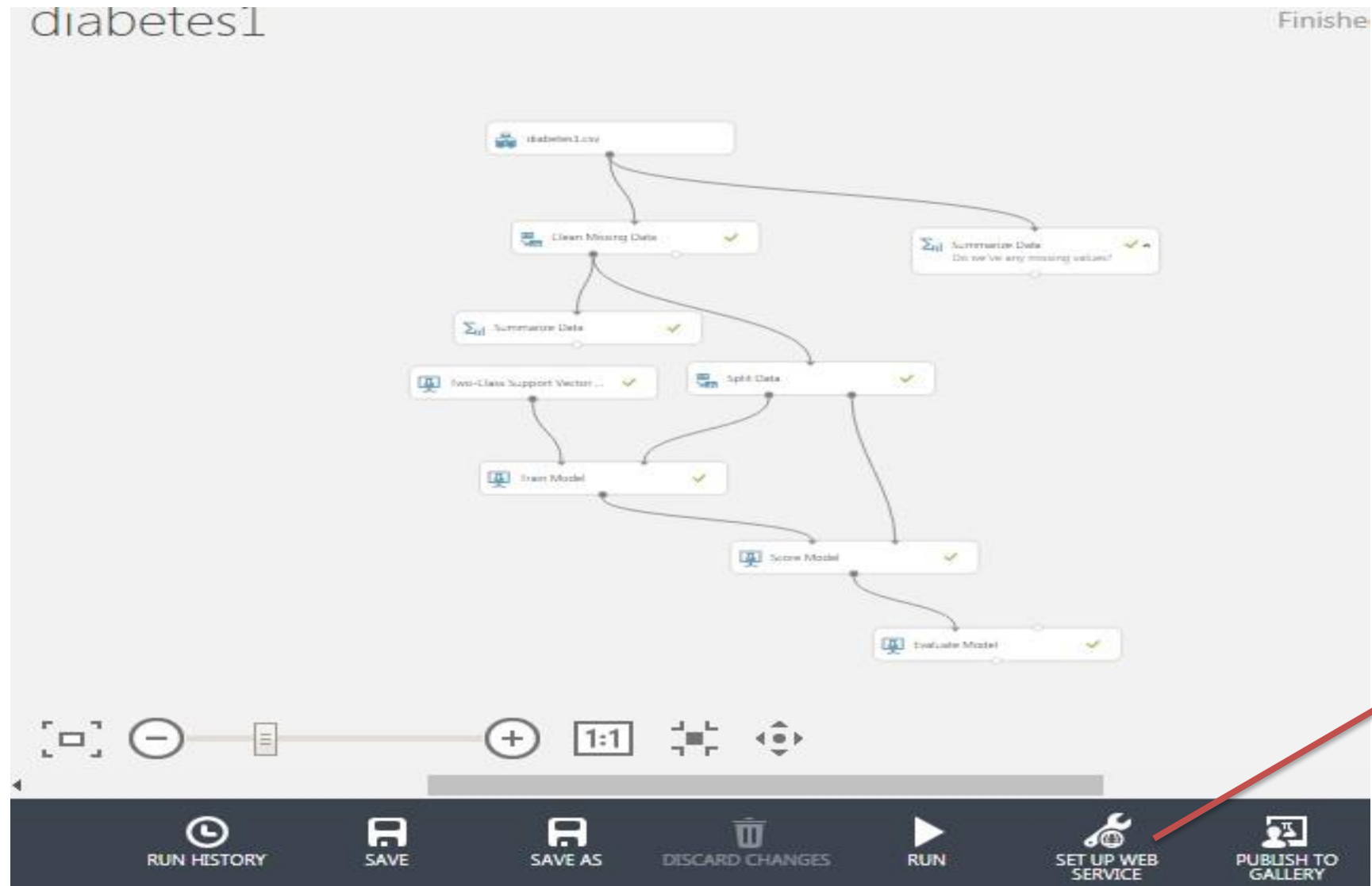
DELETE

ADD TO PROJECT



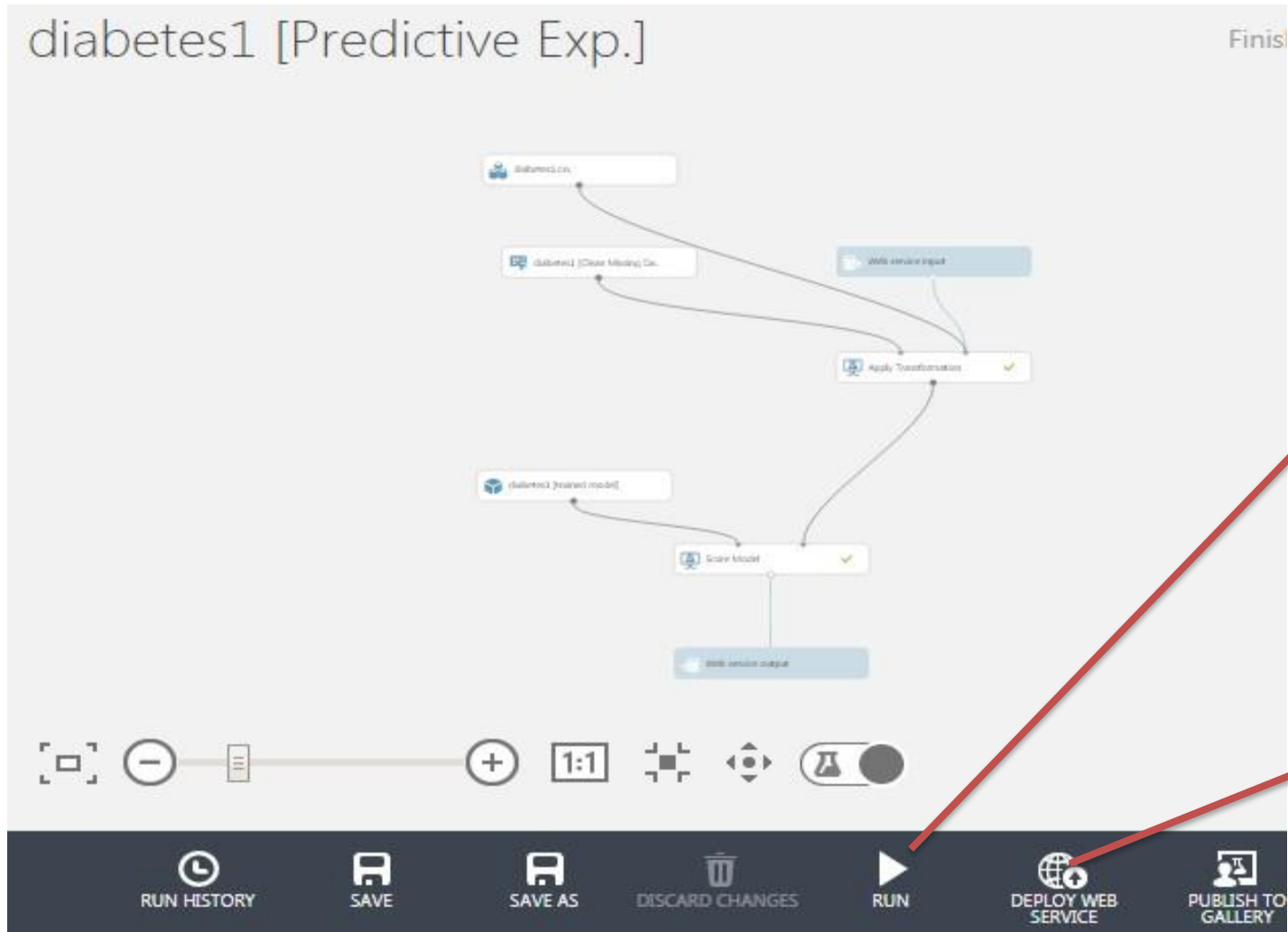
To Create New Experiment in ML studio workspace , click on NEW

Azure ML Studio: Web Services



This enables to get the model deployed on Web for making prediction with the same features

Azure ML Studio: Web Services



1. Run all the modules before deploying on web service

2. Deploy web service enables to get the model(diabetes1) available on web as Predictive Experiment

Azure ML Studio: Web Services

diabetes1 [predictive exp.]

DASHBOARD CONFIGURATION

General New Web Services Experience preview

Published experiment

[View snapshot](#) [View latest](#)

Description

No description provided for this web service.

API key

UemzgWj2QwtgTXY2dMqvfizP3+jrwinR9sK1Au8jOlPNb6USWr/ssB9+wrxDOLLA2uFG8ogYOLWb1GEclw1N6Q==

Default Endpoint

API HELP PAGE	TEST	APPS	LAST UPDATED
REQUEST/RESPONSE	Test Test <small>preview</small>	 Excel 2013 or later  Excel 2010 or earlier workbook	12/18/2017 11:53:34 PM
BATCH EXECUTION	Test <small>preview</small>	 Excel 2013 or later workbook	12/18/2017 11:53:34 PM

Enables to predict the class of unlabelled data with the same features


Azure ML Studio: Web Services


web services


NAME	CREATED ON	PROJECT
 diabetes1 [Predictive Exp.]	12/18/2017 11:53:29 PM	None
 Car Prediction [Predictive Exp.]	12/14/2017 7:56:04 PM	Bootcamp


The Predictive Experiment(diabetes1) is now available on web services


Azure ML Studio: Notebook


PROJECTS


EXPERIMENTS

WEB SERVICES


NOTEBOOKS


DATASETS


TRAINED MODELS


SETTINGS


notebooks preview

NAME	LANGUAGE	LAST MODIFIED	PROJECT
 R Notebook	R	12/19/2017 12:35:08 AM	None

NEW

DELETE


RENAME

ADD TO PROJECT

Clicking on New will open up a window in next slide


Azure ML Studio: Notebook


notebooks preview


 FROM LOCAL FILE

Upload a Notebook from(R or python) from your repository

Search notebooks


Python 3
Blank Notebook


Python 2
Blank Notebook


R
Blank Notebook

[OPEN NOTEBOOK](#)

[View in Gallery](#)

This notebooks aims to give data scientists a complete walkthrough on using Jupyter notebook within Azure Machine Studio.

Create a Notebook in any scripting Language(R or Python)

Azure ML Studio: Notebook

notebooks preview

	NAME	LANGUAGE	LAST MODIFIED	PROJECT
	Market Basket Analysis	R	12/19/2017 12:44:50 AM	None



The above R Notebook of Market Basket Analysis has been uploaded

Azure ML Studio: Datasets

Helps to find inbuilt & uploaded datasets

PROJECTS

EXPERIMENTS

WEB SERVICES

NOTEBOOKS

DATASETS

TRAINED MODELS

SETTINGS

datasets

MY DATASETS SAMPLES

	NAME	SUBMITTED BY	DESCRIPTION	DATA TYPE	CREATED	SIZE	PROJECT
<input type="checkbox"/>	crime_data1.csv	das.rajib47		GenericCSV	5/11/2018 3:49:48 PM	1.27 KB	None
<input type="checkbox"/>	Supermarket Purchase.csv	das.rajib47		GenericCSV	1/18/2018 1:55:38 AM	18.76 KB	None
<input type="checkbox"/>	Filtered dataset (saved fro...	das.rajib47		Dataset	1/9/2018 1:53:49 PM	89.13 KB	None
<input type="checkbox"/>	R Device (saved from Execu...	das.rajib47		Dataset	1/9/2018 2:22:57 AM	113.7 KB	None
<input type="checkbox"/>	BreastCancer.csv	das.rajib47		GenericCSV	1/9/2018 12:57:06 AM	122.87 KB	None
<input type="checkbox"/>	R Device (saved from Execu...	das.rajib47		Dataset	1/8/2018 5:29:51 PM	948 B	None
<input type="checkbox"/>	Breast cancer data.csv	das.rajib47		GenericCSV	1/4/2018 5:02:04 PM	122.02 KB	None
<input type="checkbox"/>	RetailChurnTemplateUtility....	AzureML Team		Zip	12/28/2017 2:38:11 PM	4.35 KB	None
<input type="checkbox"/>	Breast cancer 2.csv	das.rajib47		GenericCSV	12/27/2017 11:42:45 PM	29.04 KB	None
<input type="checkbox"/>	cancer data.csv	das.rajib47		GenericCSV	12/27/2017 12:16:49 AM	122.07 KB	None
<input type="checkbox"/>	winequality-red.csv	das.rajib47		GenericCSV	12/21/2017 11:54:32 AM	82.23 KB	None
<input type="checkbox"/>	AirQualityUCI.csv	das.rajib47		GenericCSV	12/21/2017 12:34:25 AM	733.45 KB	None
<input type="checkbox"/>	train_loan (1).csv	das.rajib47		GenericCSV	12/15/2017 11:12:04 PM	37.07 KB	Bootcamp

Azure ML Studio: Datasets

Enables import of datasets from local file

These datasets have been imported from Local repository

datasets

MY DATASETS SAMPLES

	NAME	SUBMITTED BY	DESCRIPTION	DATA TYPE	CREATED	SIZE	PROJECT
<input type="checkbox"/>	train_loan (1).csv	das.rajib47		GenericCSV	12/15/2017 11:12:04 PM	37.07 KB	Bootcamp
<input type="checkbox"/>	diabetes1.csv	das.rajib47		GenericCSV	12/15/2017 7:04:27 PM	23.29 KB	Bootcamp
<input type="checkbox"/>	diabetes.csv	das.rajib47		GenericCSV	12/14/2017 6:01:21 PM	23.31 KB	None
<input type="checkbox"/>	Results dataset (saved fro...	das.rajib47		GenericCSV	12/14/2017 3:25:09 PM	7.62 KB	None
<input type="checkbox"/>	crime_data.csv	das.rajib47		GenericCSV	12/8/2017 8:51:04 PM	1.3 KB	Bootcamp
<input type="checkbox"/>	abalone.csv	das.rajib47		GenericCSV	12/8/2017 5:47:19 PM	191.55 KB	None

Azure ML Studio: Datasets

PROJECTS

EXPERIMENTS

WEB SERVICES

NOTEBOOKS

DATASETS

TRAINED MODELS

SETTINGS

datasets

MY DATASETS SAMPLES

NAME	SUBMITTED BY	DESCRIPTION	DATA TYPE	CREATED	SIZE	PROJECT
text.preprocessing.zip	Microsoft Corporation	Utility R script for text prep...	Zip	4/9/2015 4:04:53 AM	2.72 KB	None
fraudTemplateUtil.zip	Microsoft Corporation	Utility R script to use with ...	Zip	4/9/2015 4:04:43 AM	3.39 KB	None
MNIST Train 60k 28x28 den...	Microsoft Corporation	MNIST Training data	GenericTSV	4/9/2015 4:03:28 AM	104.56 MB	None
MNIST Test 10k 28x28 dense	Microsoft Corporation	MNIST Test data	GenericTSV	4/9/2015 4:01:20 AM	17.46 MB	None
Book Reviews from Amazon	Microsoft Corporation	Book Reviews from Amazon	GenericTSVNoHeader	4/9/2015 4:00:27 AM	9.28 MB	None
Named Entity Recognition ...	Microsoft Corporation	Named Entity Recognition ...	GenericTSVNoHeader	4/9/2015 3:59:57 AM	236 B	None
Breast Cancer Features	Microsoft Corporation	Breast Cancer Features	GenericTSVNoHeader	4/9/2015 3:58:50 AM	194.23 MB	None
Breast Cancer Info	Microsoft Corporation	Breast Cancer Info	GenericTSVNoHeader	4/9/2015 3:55:41 AM	18.44 MB	None

Inbuilt datasets of Azure ML Studio

Some of the sample datasets of Azure ML Studio

Azure ML Studio: Trained Model

trained models

	NAME	SUBMITTED BY	DESCRIPTION	DATA TYPE	CREATED	PROJECT
<input type="checkbox"/>	diabetes1 [trained model]	das.rajib47		ILearnerDotNet	12/18/2017 11:46:14 PM	Bootcamp
<input type="checkbox"/>	diabetes1 [trained model]	das.rajib47		ILearnerDotNet	12/18/2017 11:15:49 PM	Bootcamp
<input type="checkbox"/>	Car Prediction [trained model]	das.rajib47		ILearnerDotNet	12/14/2017 7:53:25 PM	Bootcamp

Trained Models enables us to find the models that are deployed on Web service

How Azure ML Works

Creating a predictive model with Azure ML is as easy as...

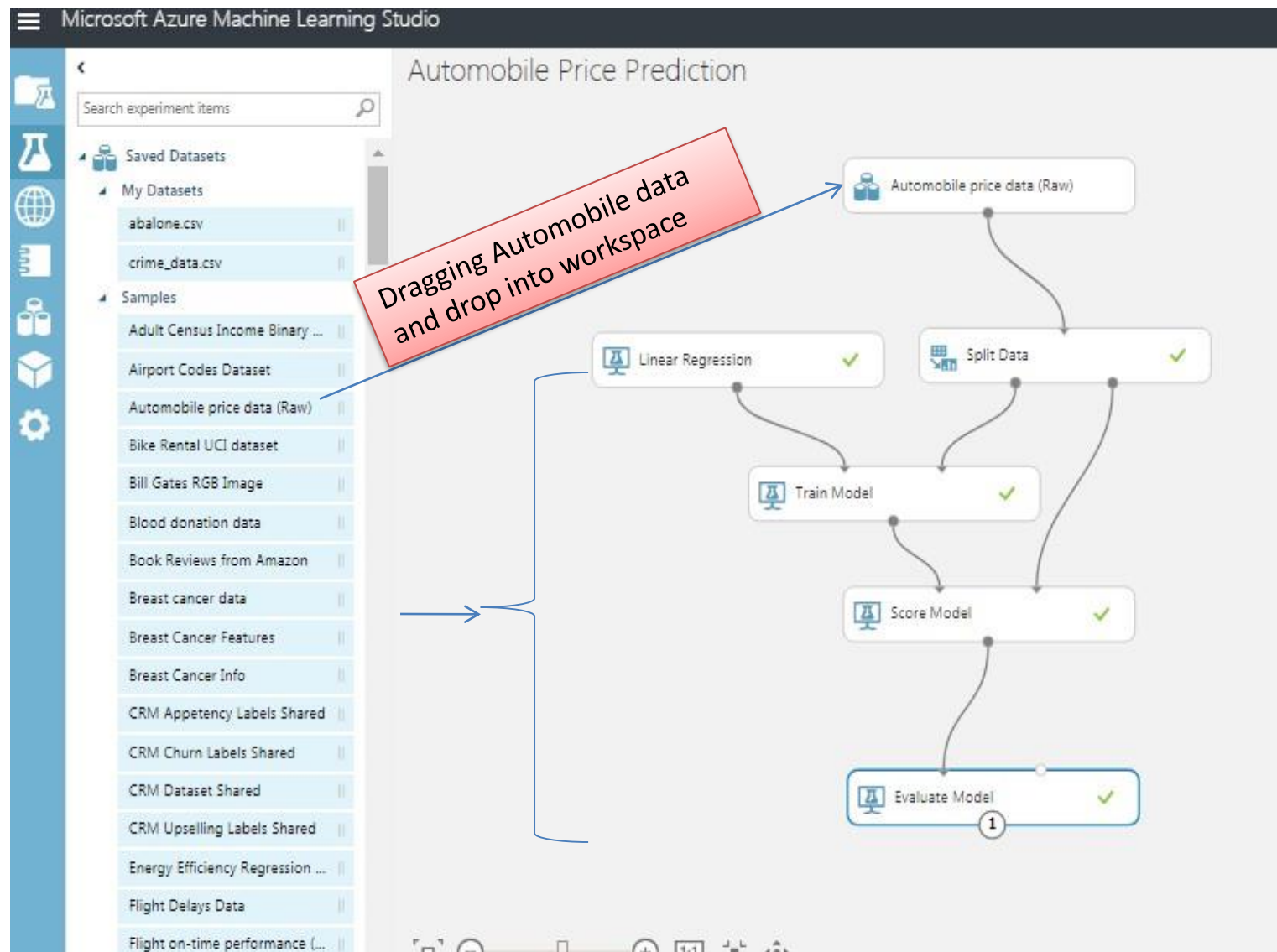


... playing with LEGO®!

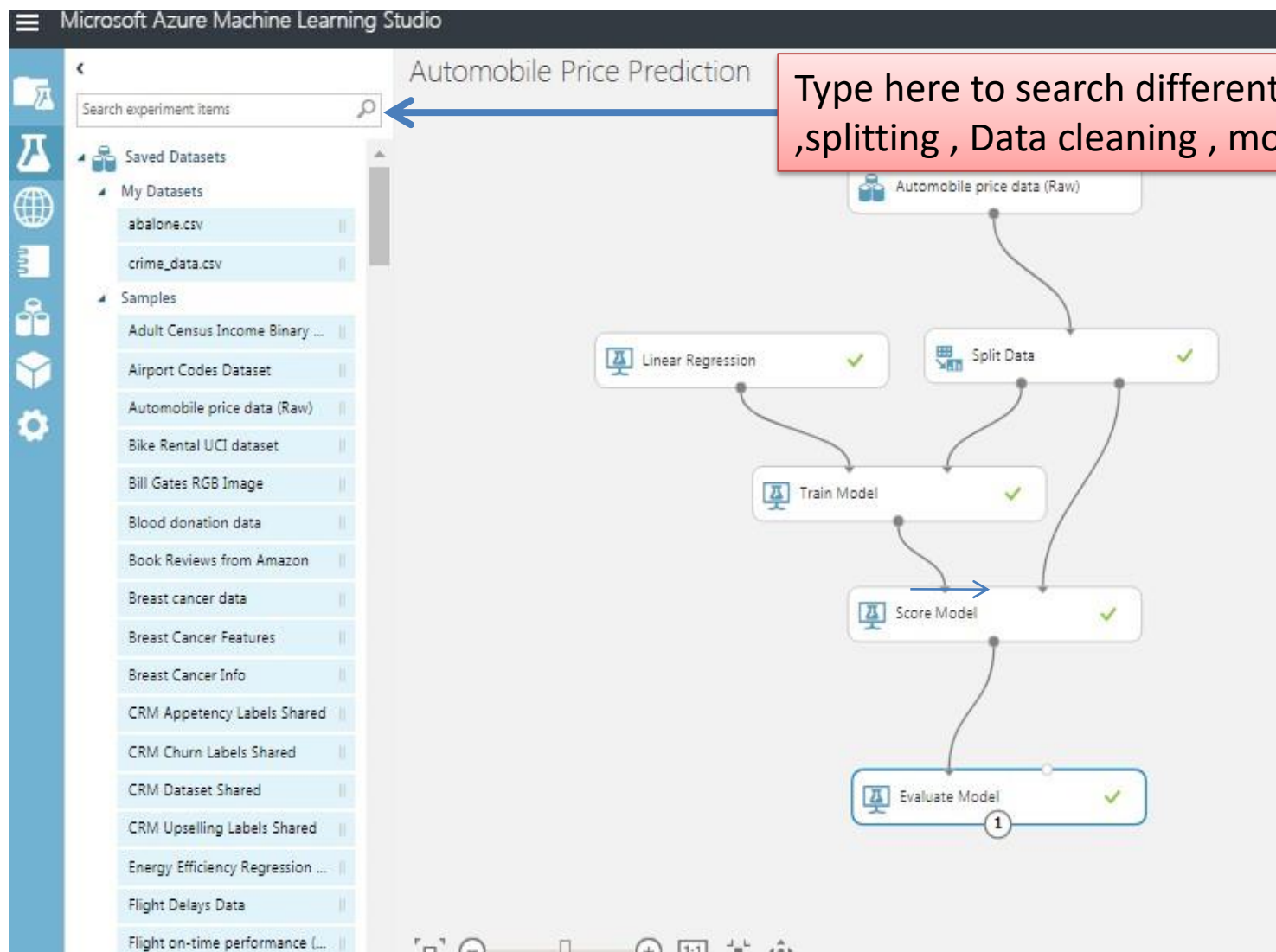
Build - main features

To help you building your **training experiment** (model) from scratch, Studio provides:

- 🕒 Interactive, intuitive visual workspace.
- 🕒 Drag-and-drop interaction to connect modules with each other. For instance:
 - ready-to-use **datasets**.
 - ready-to-use standard **ML algorithms**.
 - your special sauce (cooked in **Python** or **R**).
 - ...
- 🕒 Huge set of **samples** and **templates**.

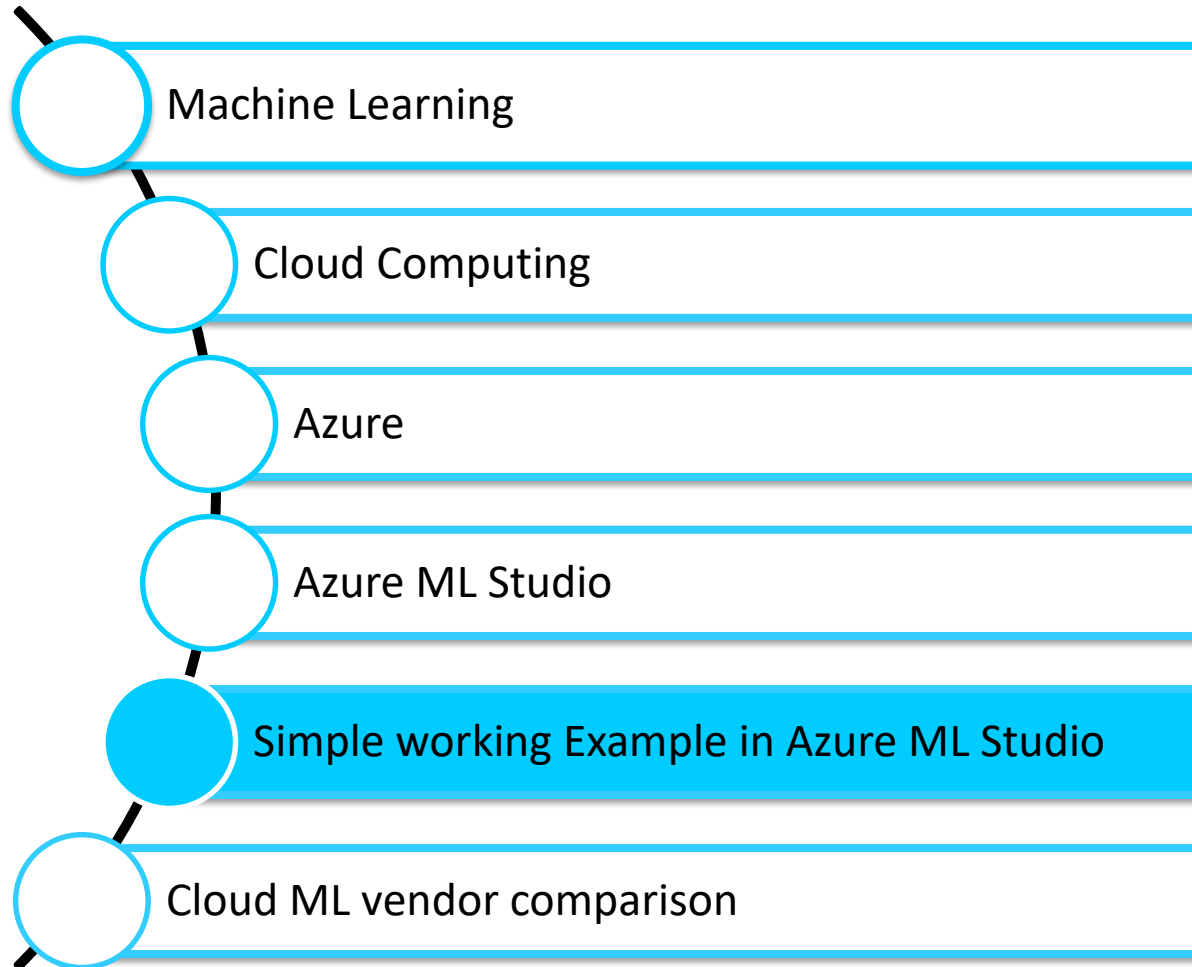


Build - main features

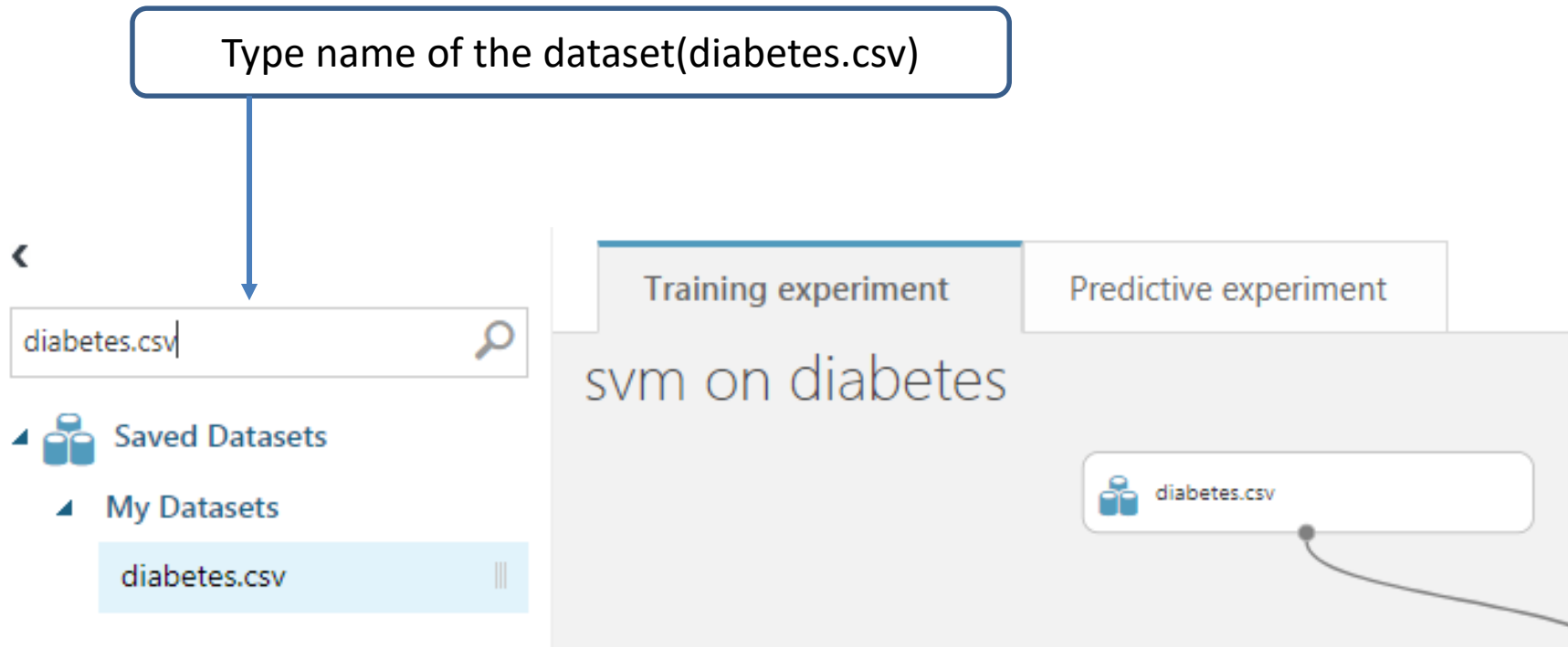


Quick Recap

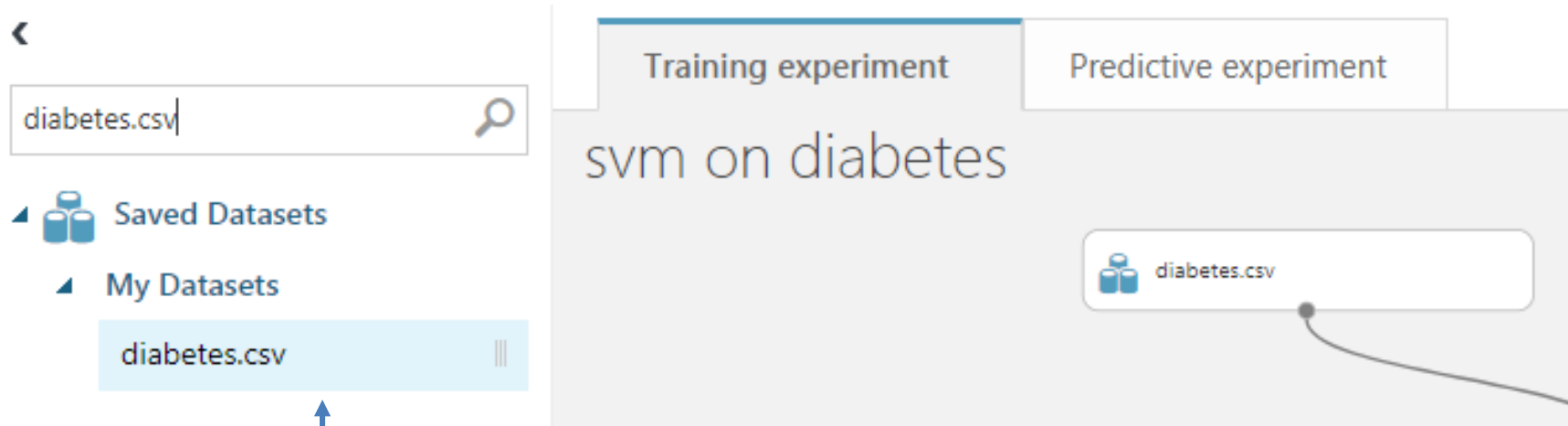
- ❖ Getting Started With Azure ML Studio(Login/ Signup)
- ❖ Components of Azure ML Studio(Project , Experiments , Web Services, Datasets, Notebook, Trained Models)
- ❖ How Azure ML Studio Works



Let's Start with a Simple Model In Azure ML Studio: Data import

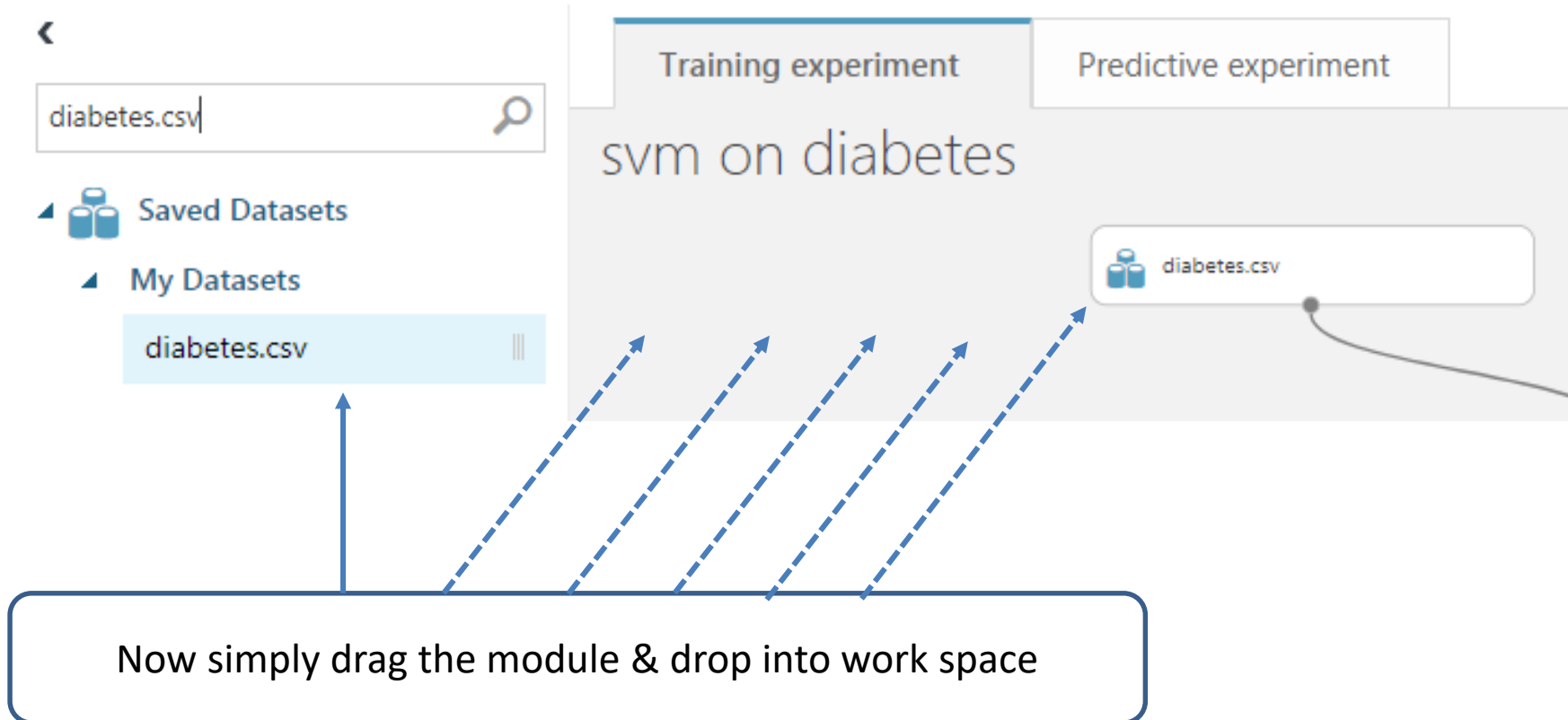


Data import

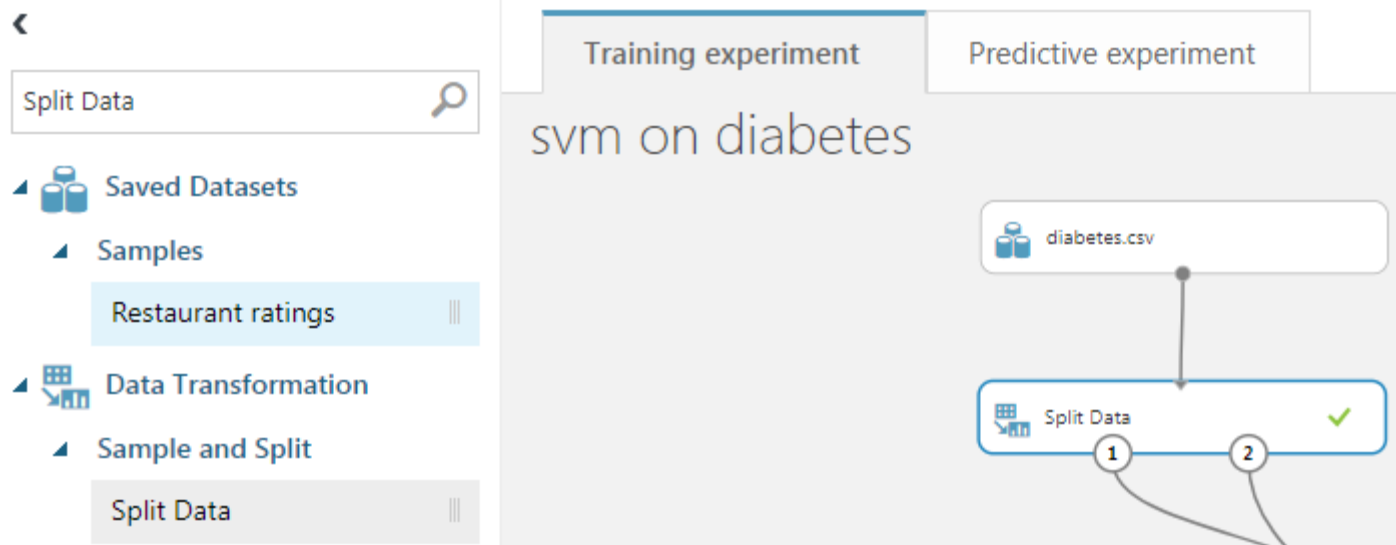


If the dataset is stored in Azure cloud will pop up here

Data import: Drag & Drop

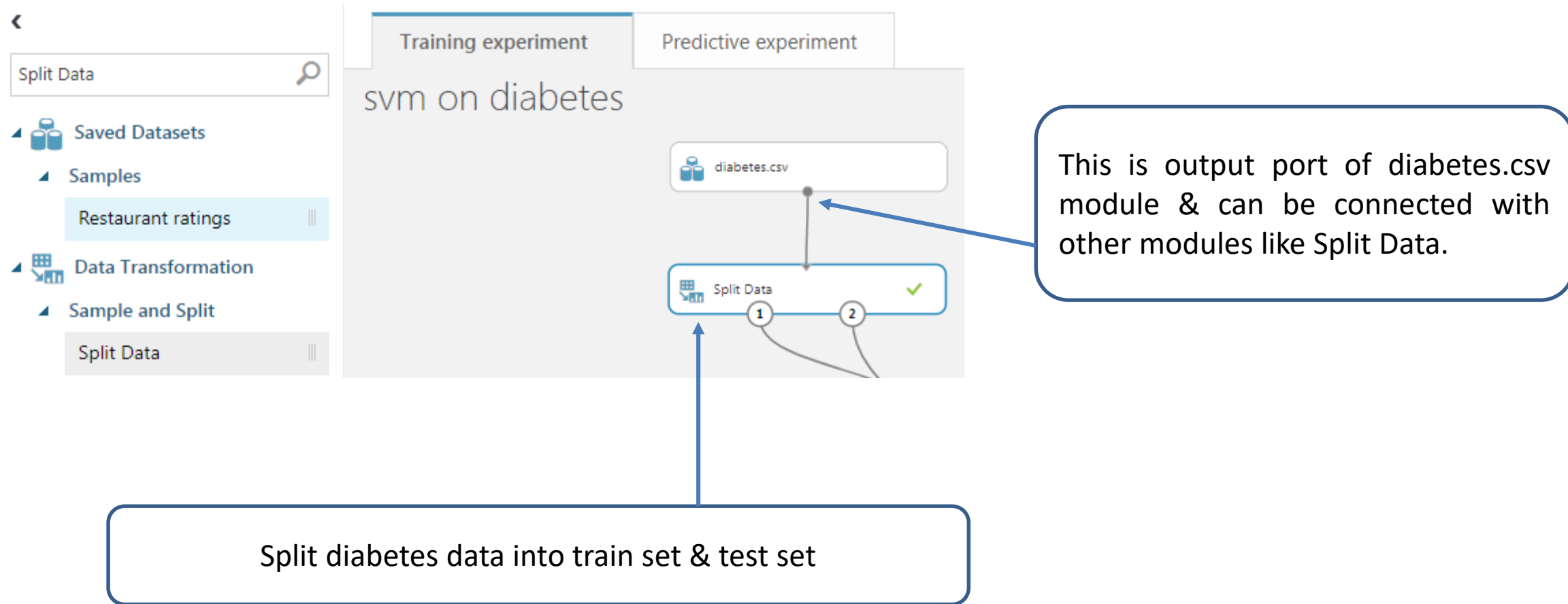


Data Transformation: Split Data

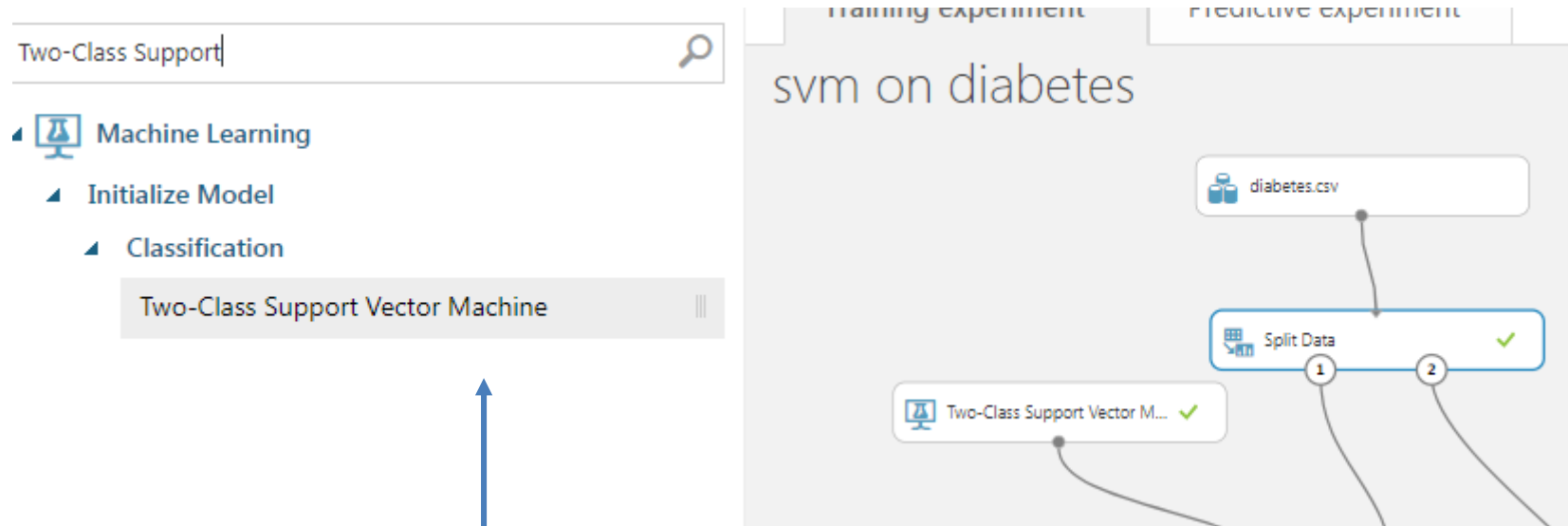


Type Split Data in the search box get the module pop up here

Data Transformation: Split Data

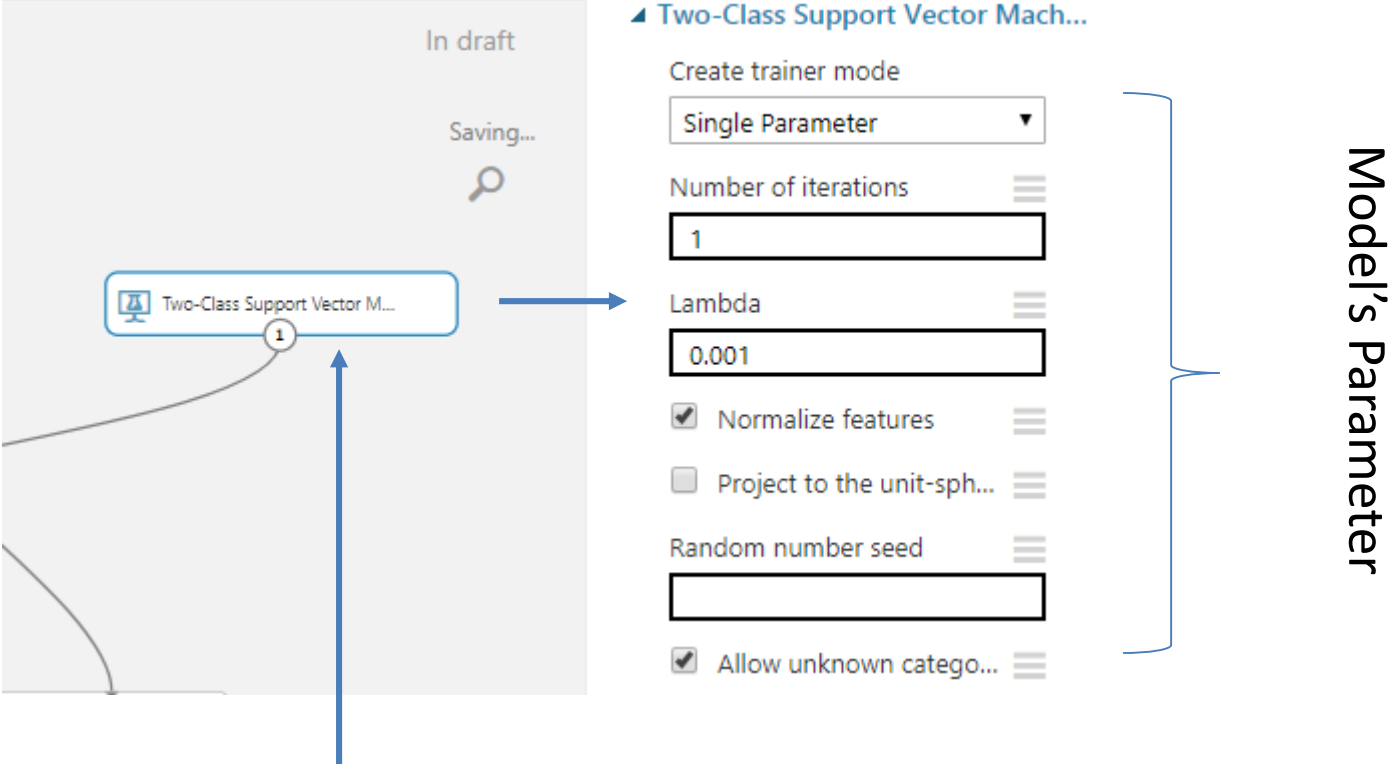


Algorithm: Two-Class Support Vector Machine



Two-Class Support Vector Machine classifier pops up after typing in the search box.
This is the algorithm we'll use to model our data

Algorithm: Two-Class Support Vector Machine



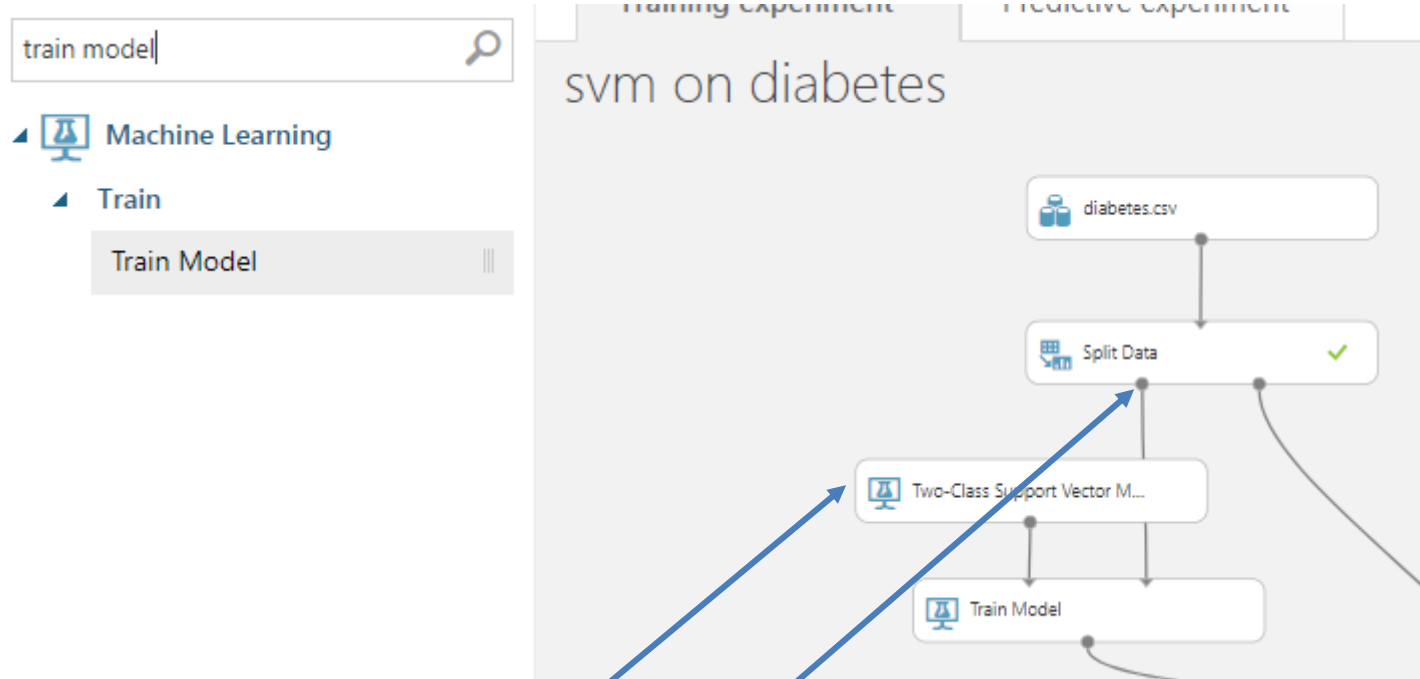
The image shows a software interface with a workflow canvas on the left and a configuration panel on the right. In the workflow, a module labeled 'Two-Class Support Vector M...' is highlighted with a blue box and a circled '1'. A blue arrow points from this module to the configuration panel. The configuration panel is titled 'Two-Class Support Vector Mach...' and contains the following settings:

- Create trainer mode: Single Parameter (dropdown)
- Number of iterations: 1 (text input)
- Lambda: 0.001 (text input)
- ☒ Normalize features (checkbox)
- ☐ Project to the unit-sph... (checkbox)
- Random number seed: (empty text input)
- ☒ Allow unknown catego... (checkbox)

A large blue bracket on the right side of the configuration panel groups the settings under the label 'Model's Parameter'.

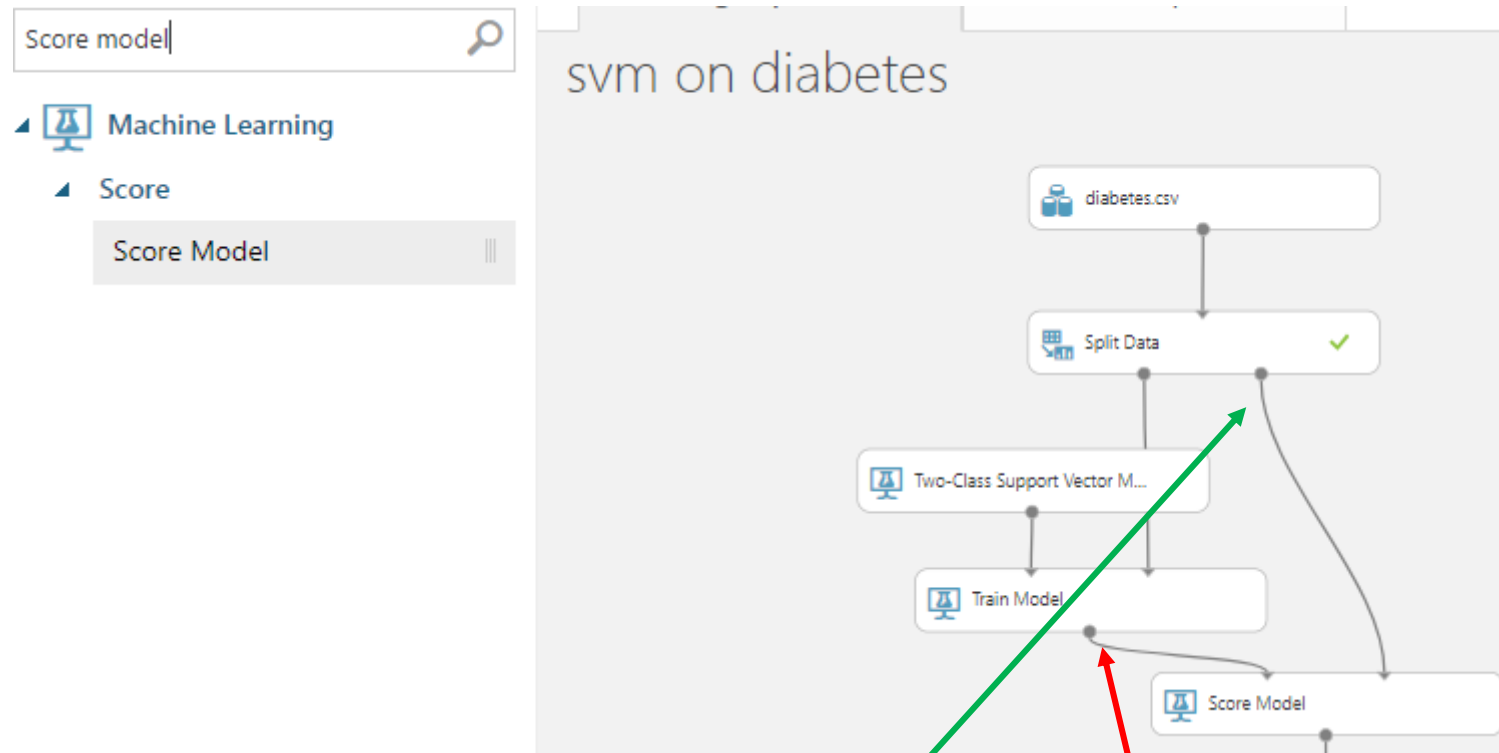
Clicking on module opens up a window beside.

Train Model



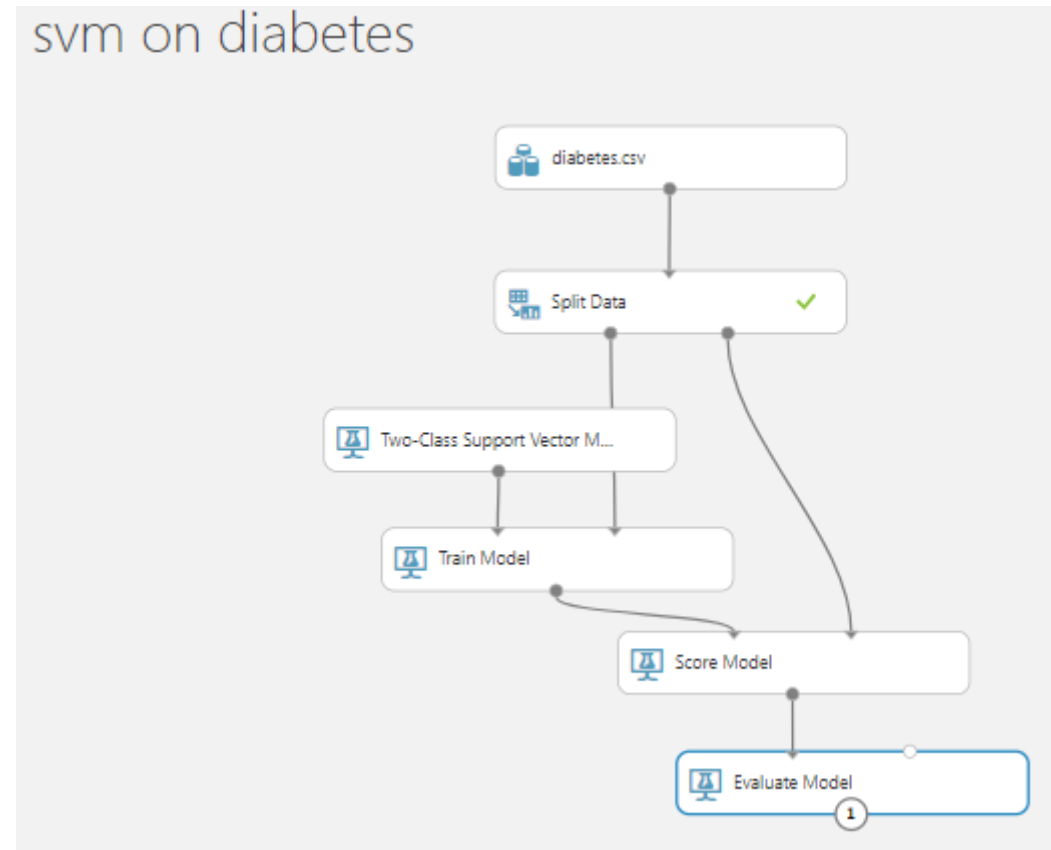
Train model with the Classifier & 70% of training data

Prediction: Score Model



Score model module enables us to predict 30% data with trained model

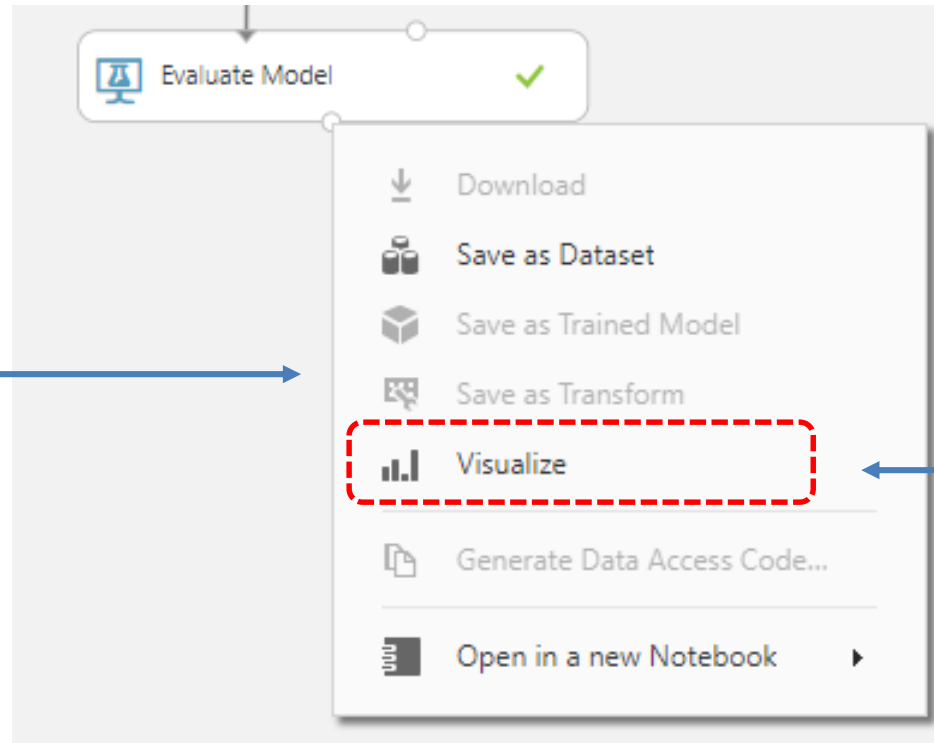
Measure model's performance: Evaluate model



Evaluate model enables to find the **performance of the classifier** on unseen or test data

Measure model's performance: Evaluate model

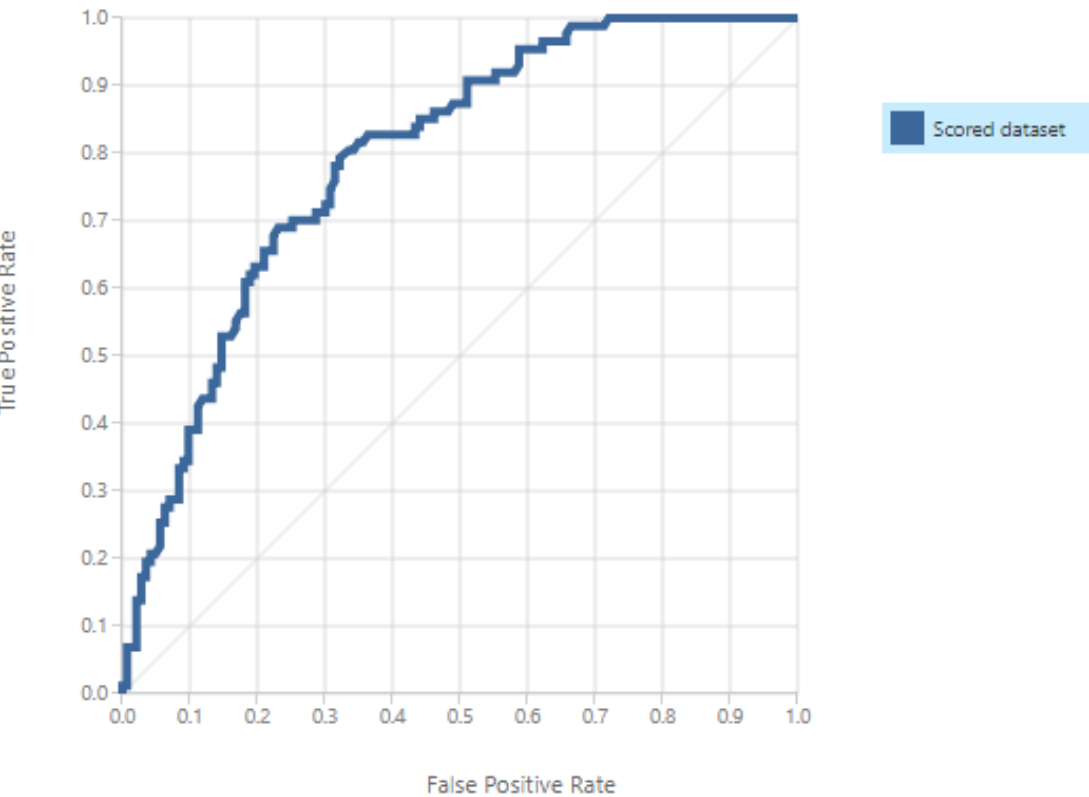
Clicking on output port enables this window to pop up.



Clicking on this opens up evaluation report window

Classification Report

ROC-AUC Curve

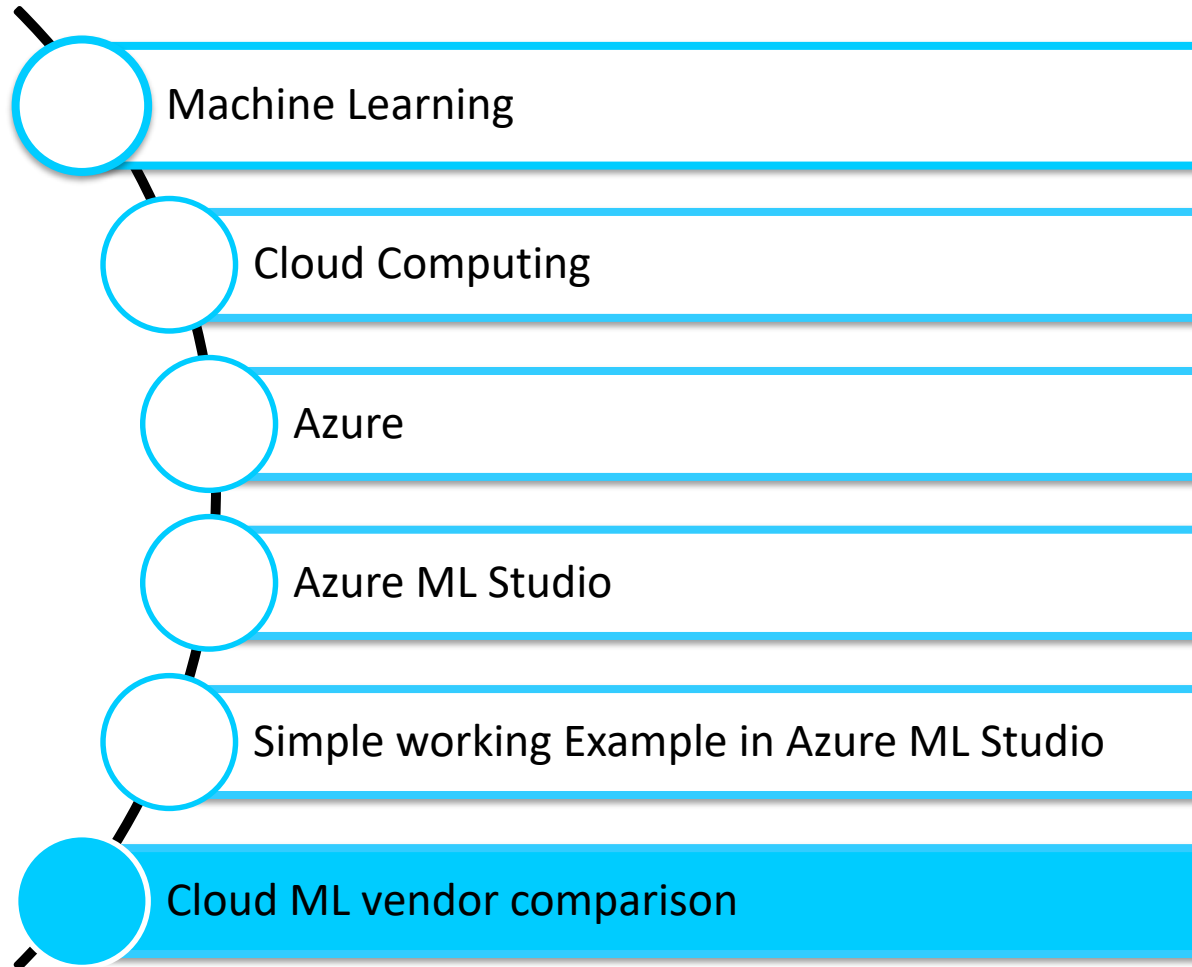


Confusion Matrix

True Positive	False Negative	Accuracy	Precision	Threshold	AUC
38	49	0.704	0.667	0.5	0.794
False Positive	True Negative	Recall	F1 Score		
19	124	0.437	0.528		
Positive Label	Negative Label				
1	0				

Summary

- I. Machine Learning
- II. Cloud Computing
- III. ML in Cloud
- IV. Azure ML Studio
- V. Machine Learning in ML Studio
- VI. Differences among different Cloud platforms



5.Cloud Machine Learning Vendor Comparison

	Google cloud ML	Microsoft Azure ML	Amazon ML	IBM Watson ML
Overview	Gives users access to state-of-art algos. Used b Google in search & other industry leading applications . Users can also build their own model	Offers long list of predefined algorithms that users can apply to their data, less automated than other options	Largely automated platform that applies ML algos to data stored in Amazon Web services platform	Most focused on getting models into production through REST API connectors
Interface	Command Line interface using gcloud ml-engine to control TensorFlow process	<ol style="list-style-type: none"> 1. Azure ML studio drag & drop environment 2. Packages for R & Python coding 	<ol style="list-style-type: none"> 1.Amazon ML console 2.Amazon Command Line Interface 	<ol style="list-style-type: none"> 1. SPSS can be used as a front end 2. API connectors enable users to build models in 3rd party data science applications
Algorithm & Modeling method	<ol style="list-style-type: none"> 1. Video analysis 2. Text Analysis 3. Speech Recognition 4. Translation 5. Image Analysis 	<ol style="list-style-type: none"> 1. Boosted Decision Tree 2. Bayesian Recommendation system 3. Decision jungle 4. Deep Neural Network 5. Regression ,classification(binary ,multiclass) 6. Clustering 	<ol style="list-style-type: none"> 1. Regression 2. Binary Classification 3. Multi class classification 	Users can build their own algorithms in any language through REST API connector. Links Apcahe Spark's Mlib Library are planned via IBM Data Science Experience workbench platform.
Data Location Requirement	Data must be stored & models must be staged in Google storage	Sample data are in Azure ML studio as well as data can be imported from other sources	Data must be in Amazon web service before use in Machine Learning	Data must be stored & models must be staged in IBM Bluemix

Thanks!

Any questions?

