



Azure Machine Learning

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Email: miprasad@Microsoft.com

WHAT YOU WILL BE ABLE TO DO AFTER THIS TRAINING

Build a Data Science experiment using ML studio.

Gain familiarity with Data Science components of the studio.

Customize Data Science components in the studio.

MACHINE LEARNING 101

The first way of thinking about ML is by the type of information or input given to a system.

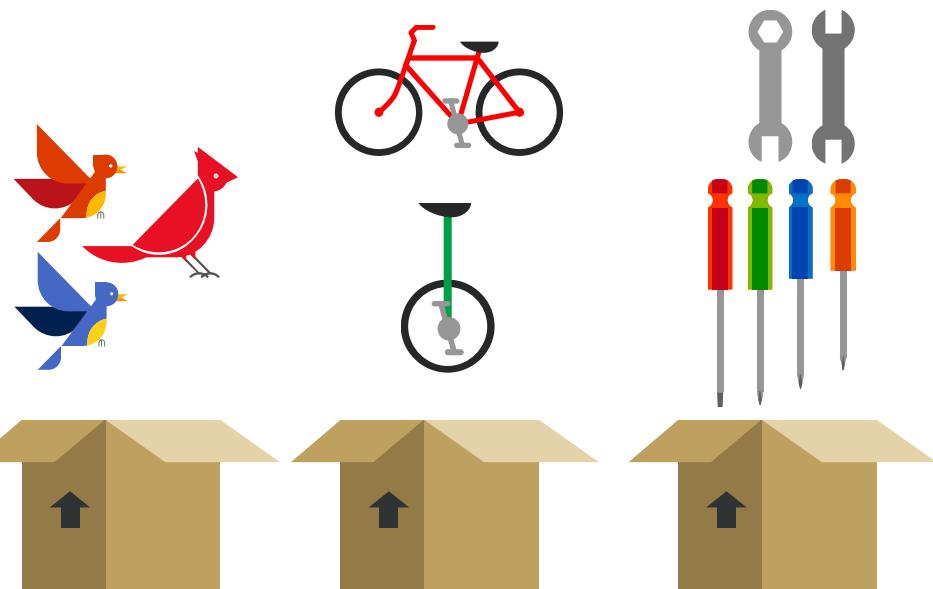
- 1. Supervised learning** – we get the data and the labels e.g. linear regression
- 2. Unsupervised learning** – only get the data (no labels) e.g. clustering
- 3. Reinforcement learning** – reward/penalty based information (feedback)

Another way of categorizing ML approaches, is to the desired output:

- 1. Classification** (e.g. decision tree)
- 2. Regression** (e.g. linear regression)
- 3. Clustering** (e.g. k-means)
- 4. Density estimation** (e.g. histograms)
- 5. Dimensionality reduction** (e.g. principal component analysis)

MACHINE LEARNING CAPABILITIES

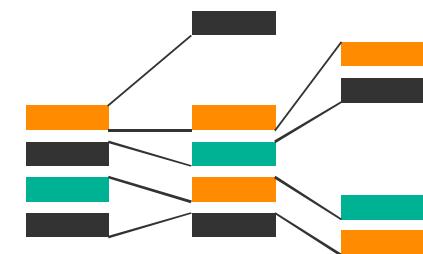
Which category
(Classification)



How much/many
(Regression)



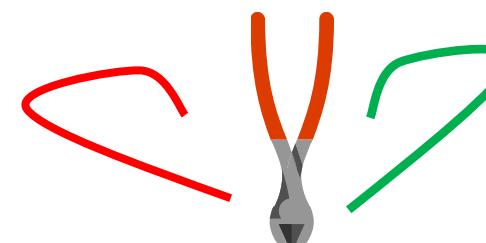
Which group
*(Clustering,
Recommender)*



Is it odd
(Anomaly)



Which action
*(Reinforcement
Learning)*



MACHINE LEARNING VISION

Make Machine Learning accessible to every enterprise, data scientist, developer, information worker, consumer, and device anywhere in the world

No need to be an expert

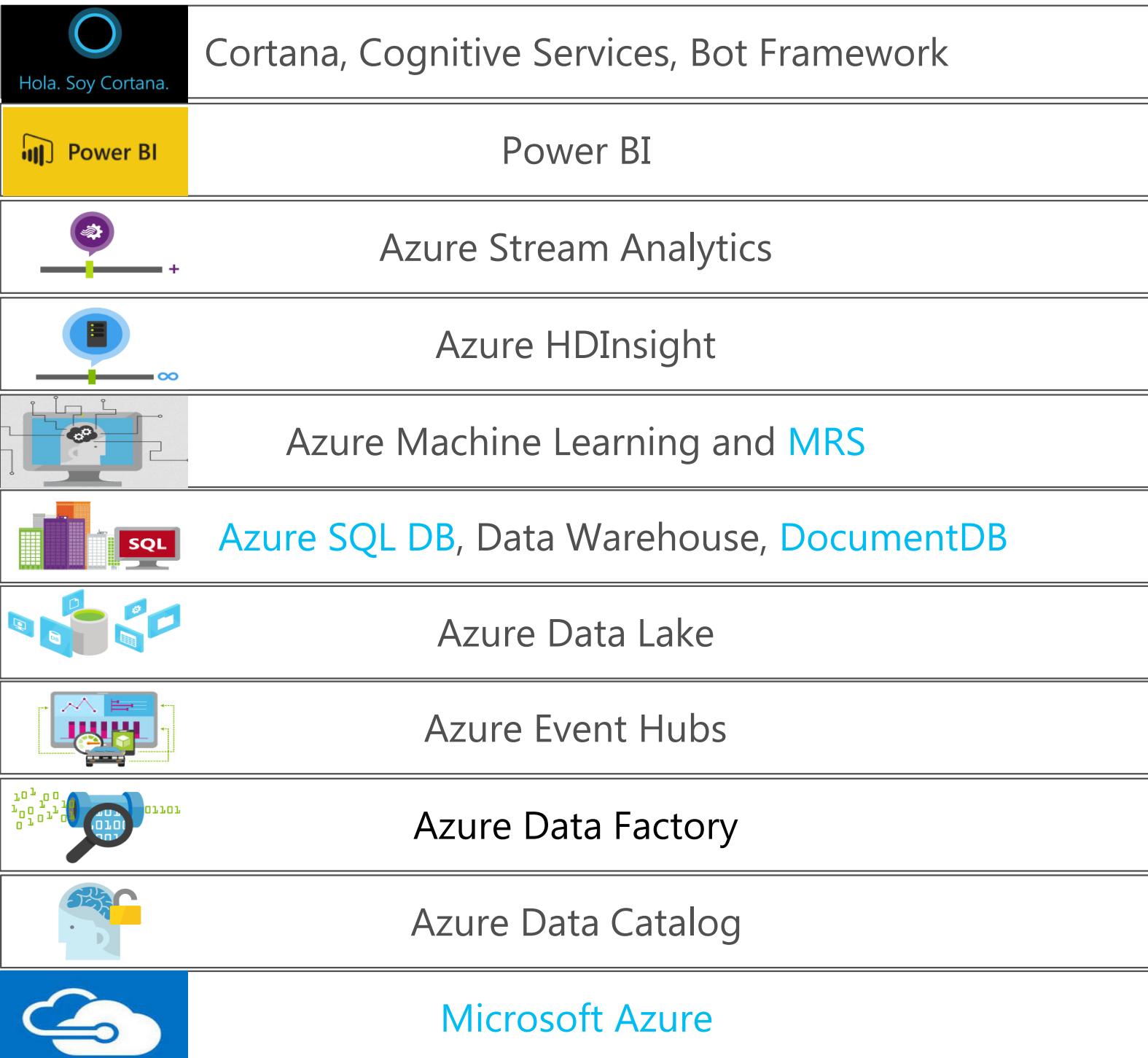
MACHINE LEARNING TERMINOLOGY

| Term | Definition |
|---------------------|--|
| Training set | set of data used to learn a model |
| Test set | set of data used to test a model |
| Feature | a variable (continuous, discrete, categorical, etc.) aka column |
| Target | Label (associated with dependent variable, what we predict) |
| Learner | Model or algorithm |
| Fit, Train | Learn a model with an ML algorithm using a training set |
| Predict | w/ supervised learning, give a label to an unknown datum(data). w/unsupervised decide if new data is weird, in which group, or what to do next with the new data |
| Accuracy | percentage of correct predictions $((TP + TN) / \text{total})$ |
| Precision | Percentage of correct positive predictions $(TP / (FP + TP))$ |
| Recall | Percentage of positive cases caught $(TP / (FN + TP))$ |

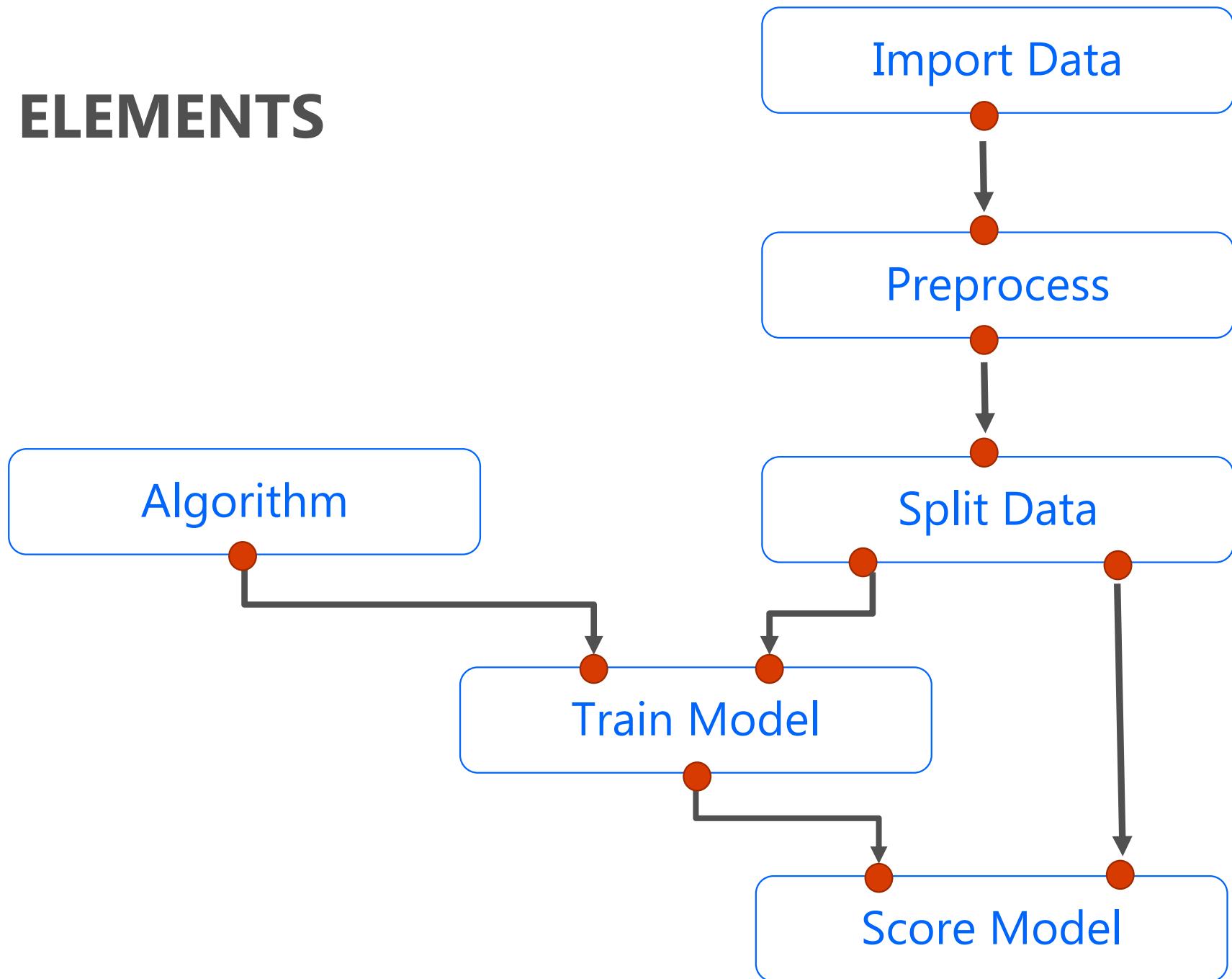
CORTANA INTELIGENCE IN A SENTENCE

Cortana Intelligence is a **Platform** and a **Process** to perform advanced analytics from start to finish

THE CORTANA INTELLIGENCE PLATFORM



AZURE ML ELEMENTS



KEY AZURE ML CONCEPTS

- **Workspace**

Roughly equivalent to an account. Cloud-based container for data, experiments, notebooks. Units for sharing.

- **Studio**

Web-based GUI for authoring experiments in a workspace.

- **Experiment**

A job, containing a data flow graph (DAG)

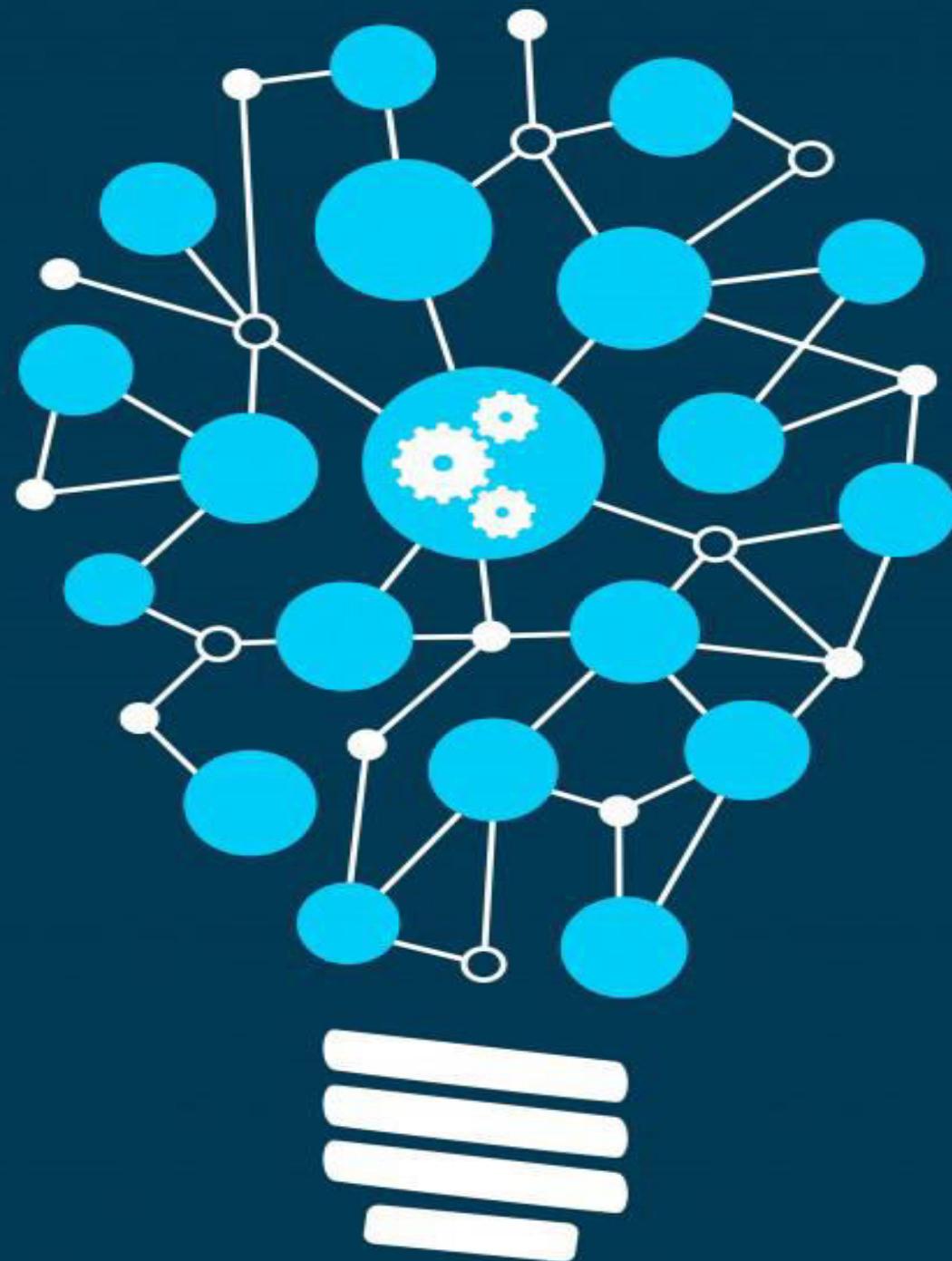
- **DataSet**

Rectangular data structure, similar to database table.

- **Module**

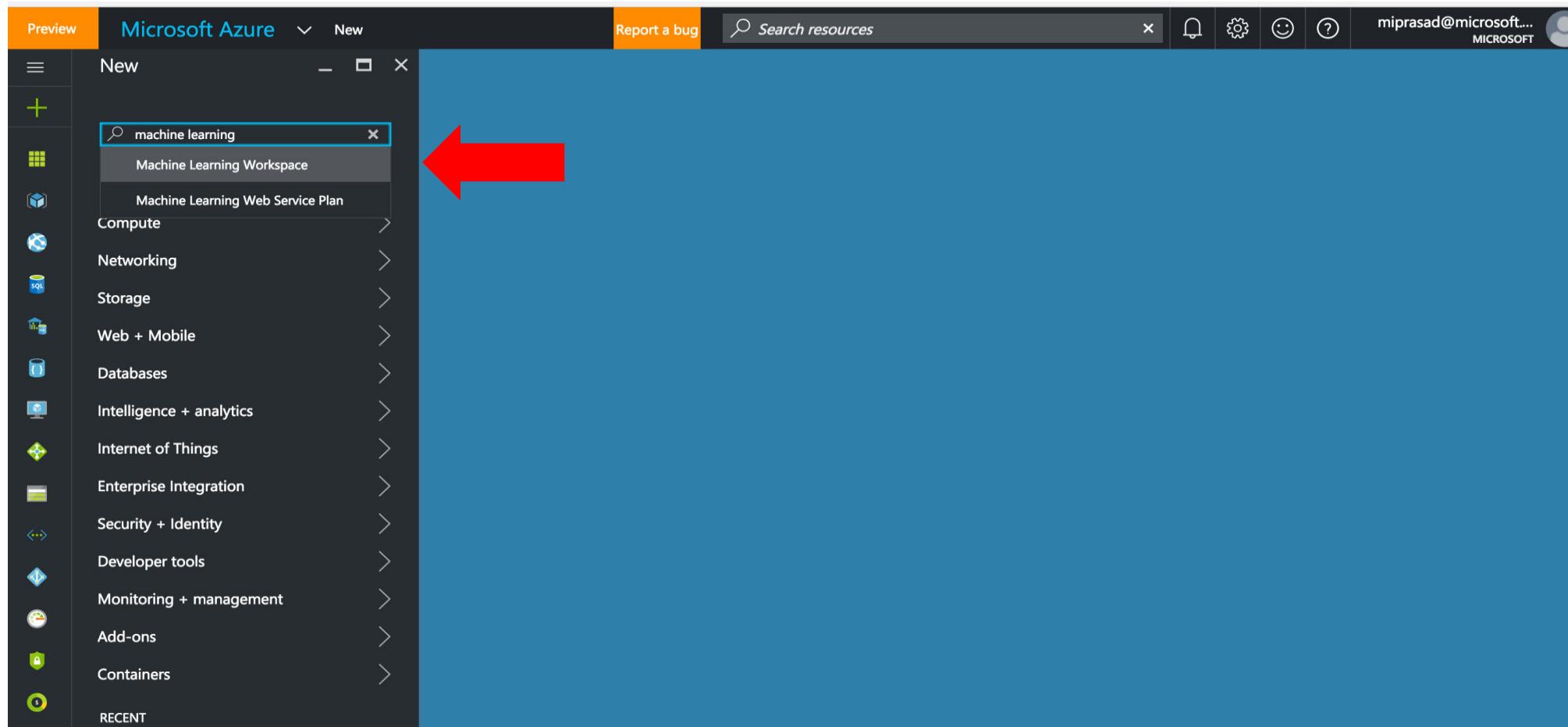
Units of work within a graph

AZURE ML STUDIO AND THE TEAM DATA SCIENCE PROCESS



WORKSPACE

portal.azure.com



WORKSPACE

The screenshot shows the Microsoft Azure portal interface for creating a new Machine Learning Workspace. The top navigation bar includes 'Preview' (highlighted in orange), 'Microsoft Azure' (with a dropdown arrow), 'Machine Learning Workspace' (the current page), 'Report a bug', a search bar ('Search resources'), and user account information ('miprasad@microsoft... MICROSOFT').

The main content area displays a configuration dialog for 'Machine Learning Wor...' (partial view). The dialog fields include:

- Workspace name:** A text input field with placeholder text 'Enter the workspace name'.
- Subscription:** A dropdown menu showing 'Azure Pass'.
- Resource group:** A section with radio buttons for 'Create new' (selected) and 'Use existing'. Below it is a dropdown menu labeled 'Select a resource group' with a red exclamation mark icon.
- Location:** A dropdown menu set to 'South Central US'.
- Storage account:** A section with radio buttons for 'Create new' (selected) and 'Use existing'. Below it is a text input field 'Enter the storage account name'.
- Workspace pricing tier:** A dropdown menu set to 'Standard'.
- Web service plan:** A section with radio buttons for 'Create new' (selected) and 'Use existing'. Below it is a text input field 'Enter the plan name'.
- Pin to dashboard:** A checkbox.

At the bottom of the dialog are two buttons: 'Create' (in blue) and 'Automation options'.

AZURE ML STUDIO - SIGN UP

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

The screenshot shows the Microsoft Azure Machine Learning Studio interface. At the top, there's a navigation bar with the title "Microsoft Azure Machine Learning Studio". On the right side of the bar are icons for help, user profile, and sign-in, along with a close button. Below the bar, a promotional banner says "Introducing: Competitions" and features icons of a test tube and a trophy, with a "Learn More" link. The main content area has a large video thumbnail showing four people working in an office environment. Below the video, there's a "Quick Tour of Azure ML" section with a play button and several small preview images. To the right of the video, the text "Welcome to Azure Machine Learning" and "Try it for free" is displayed, followed by a "Sign Up" button and links for existing users.



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 Up](#)

Already an Azure ML User?

[Sign in here](#)

[Pricing & FAQ](#)

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

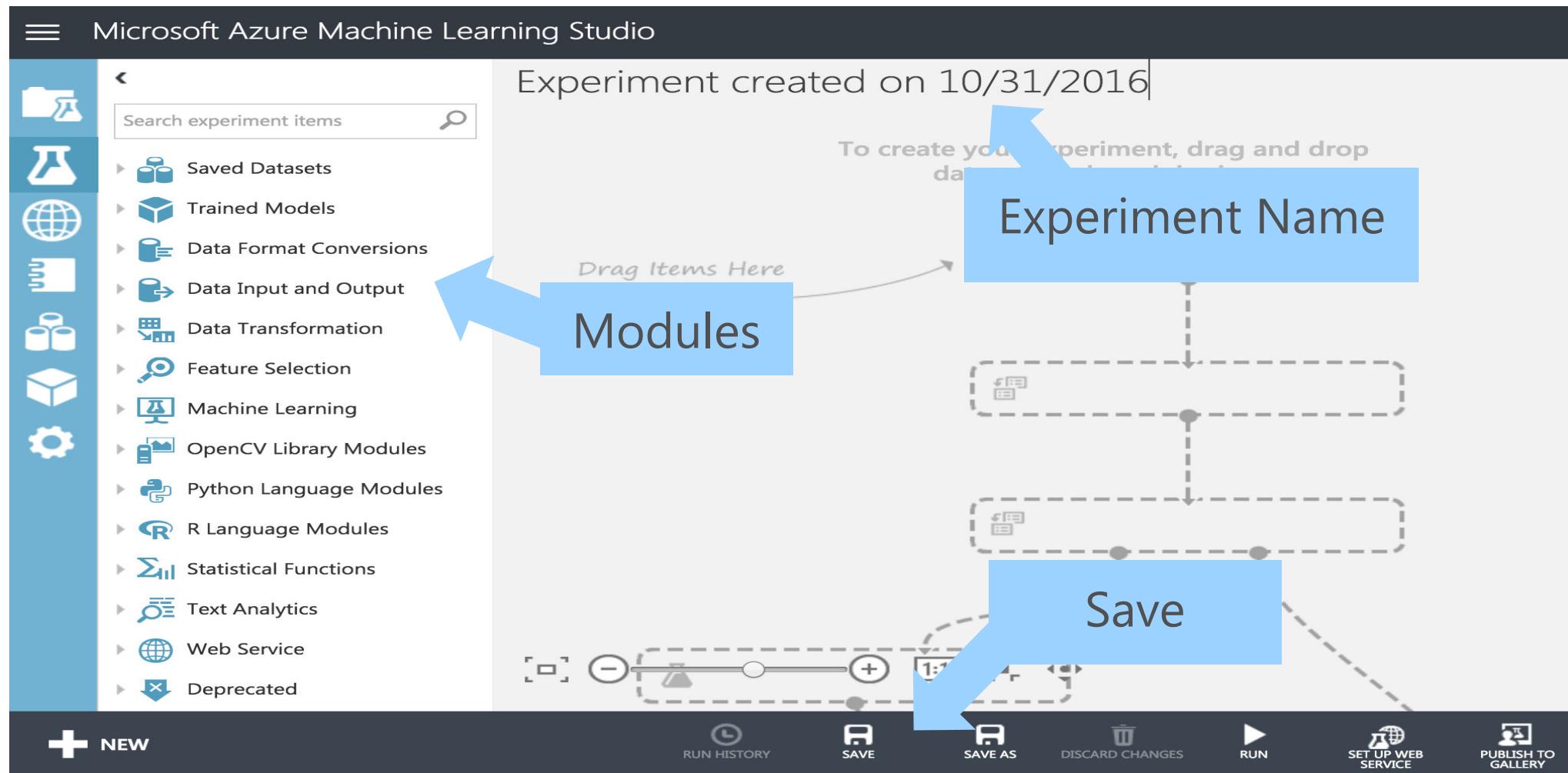
TIERS

| Microsoft Azure | | |
|---|-----------------------|--|
| Why Azure | Solutions | Products |
| Documentation | Pricing | Partners |
| Blog | Resources | Support |
| FREE ACCOUNT > | | |
| Region: | South Central US | Currency: |
| | Indian Rupee (₹) | |
| | | |
| | FREE | STANDARD |
| Price | Free | ₹600.27 per Seat per month ₹60.09 per Studio Experimentation Hour |
| Azure Subscription | Not Required | Required |
| Max Number of Modules per Experiment | 100 | Unlimited |
| Max Experiment Duration | 1 hour per experiment | Up to 7 days per experiment with a maximum of 24 hours per module |
| Max Storage Space | 10 GB | Unlimited - BYO |
| Read Data from On-Premises SQL <small>Preview</small> | No | Yes |
| Execution / Performance | Single Node | Multiple Nodes |
| Production Web API | No | Yes |
| SLA | No | Yes |

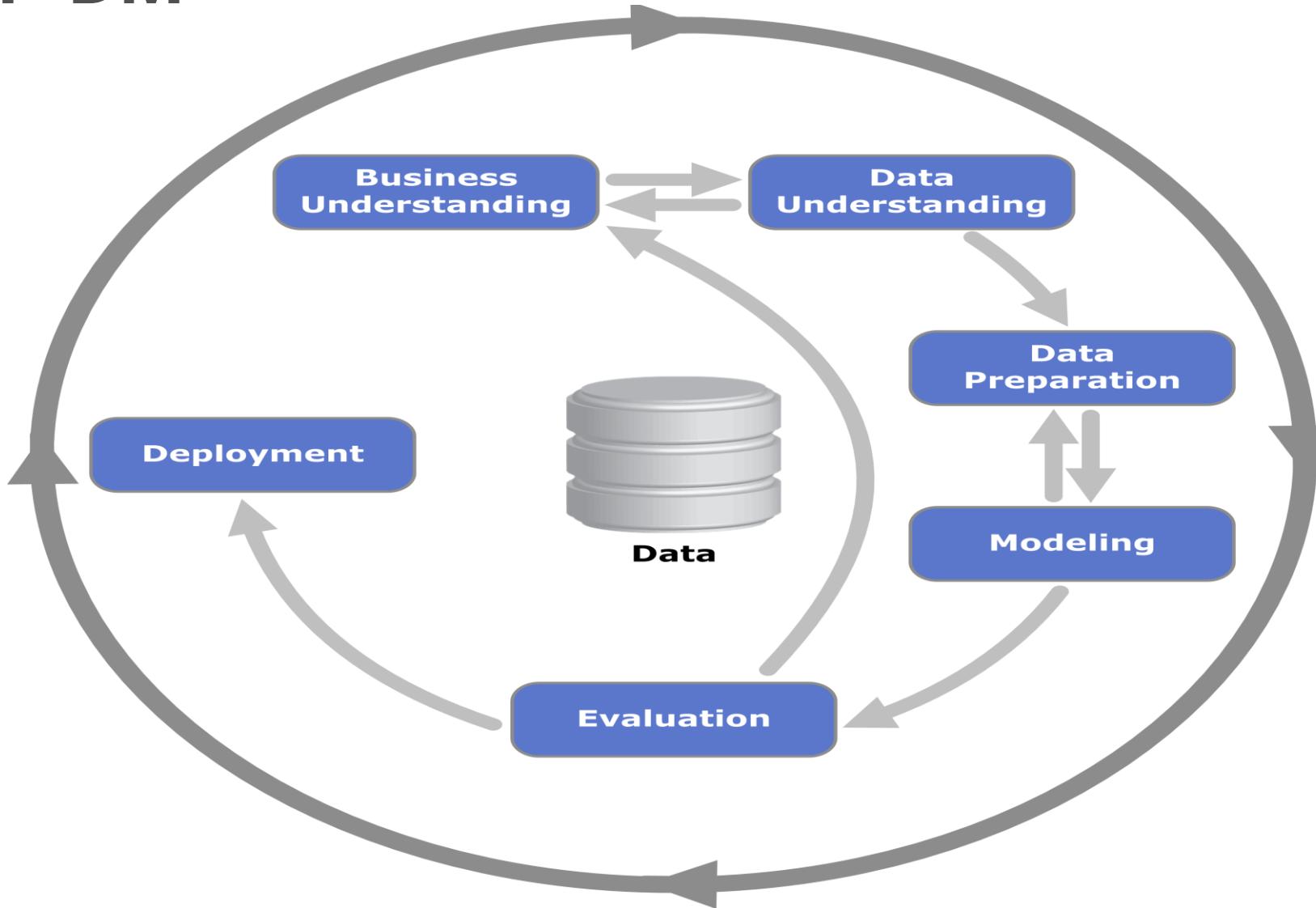
Hourly charges only apply to active use of the service. Where multiple meters are present they are applied concurrently.



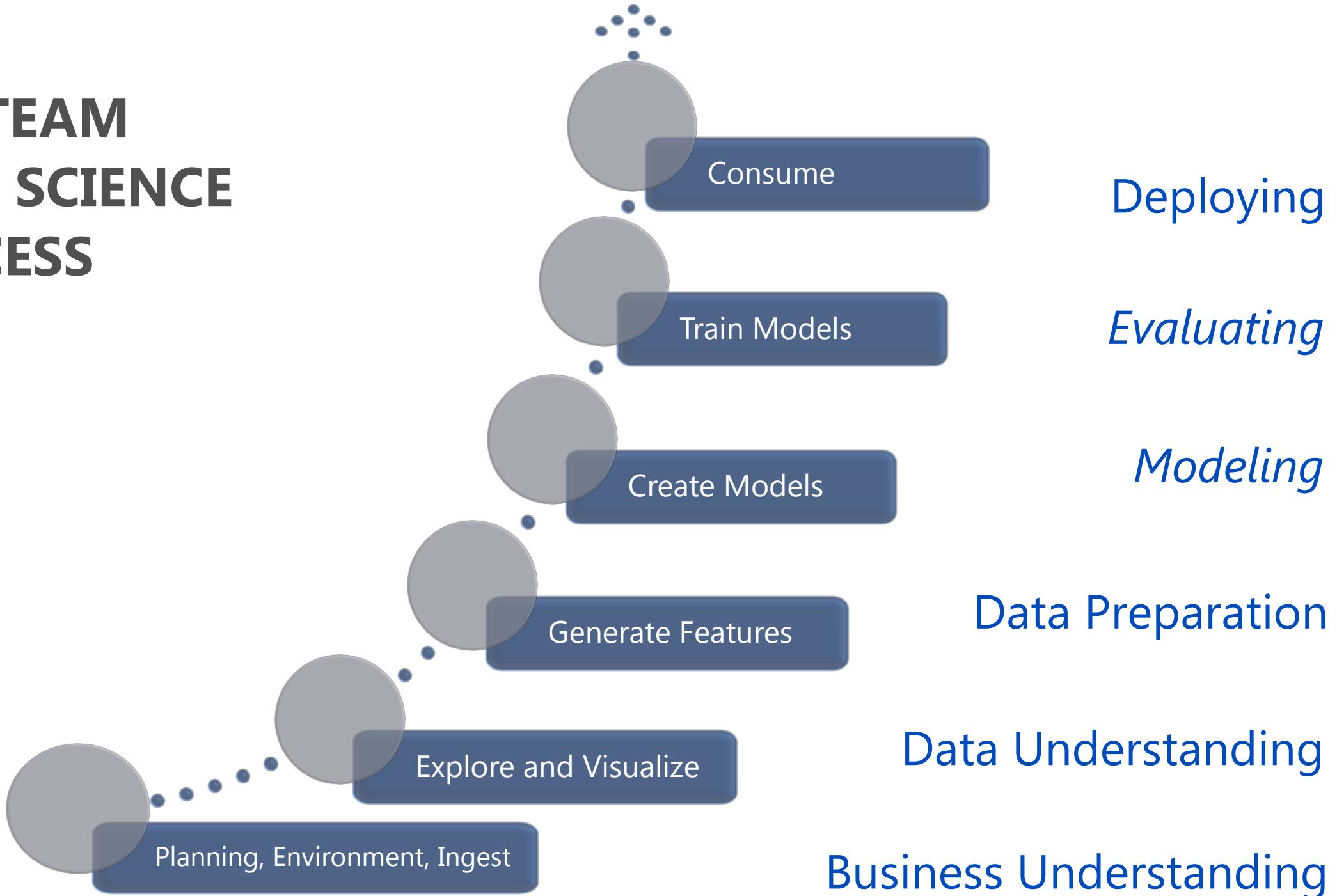
AZURE ML STUDIO - NAVIGATION



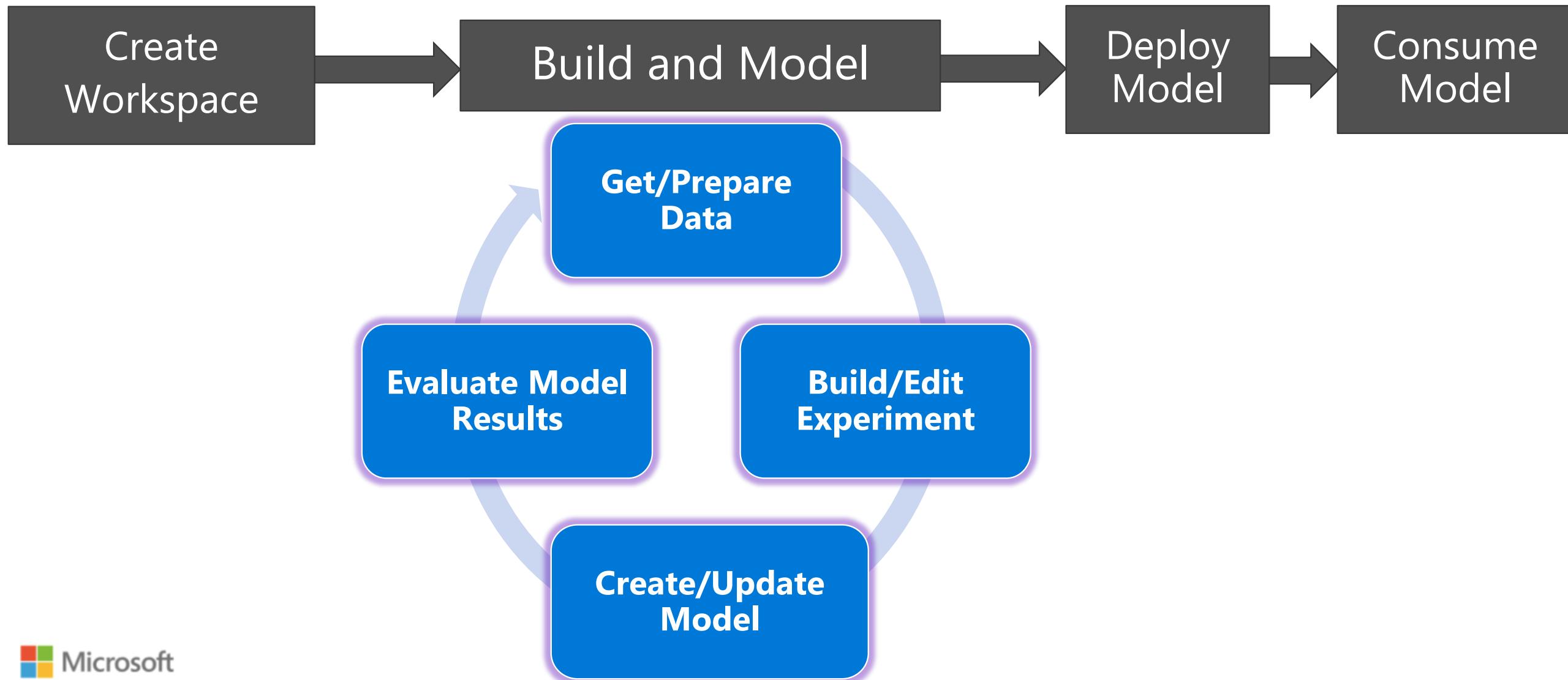
CRISP-DM



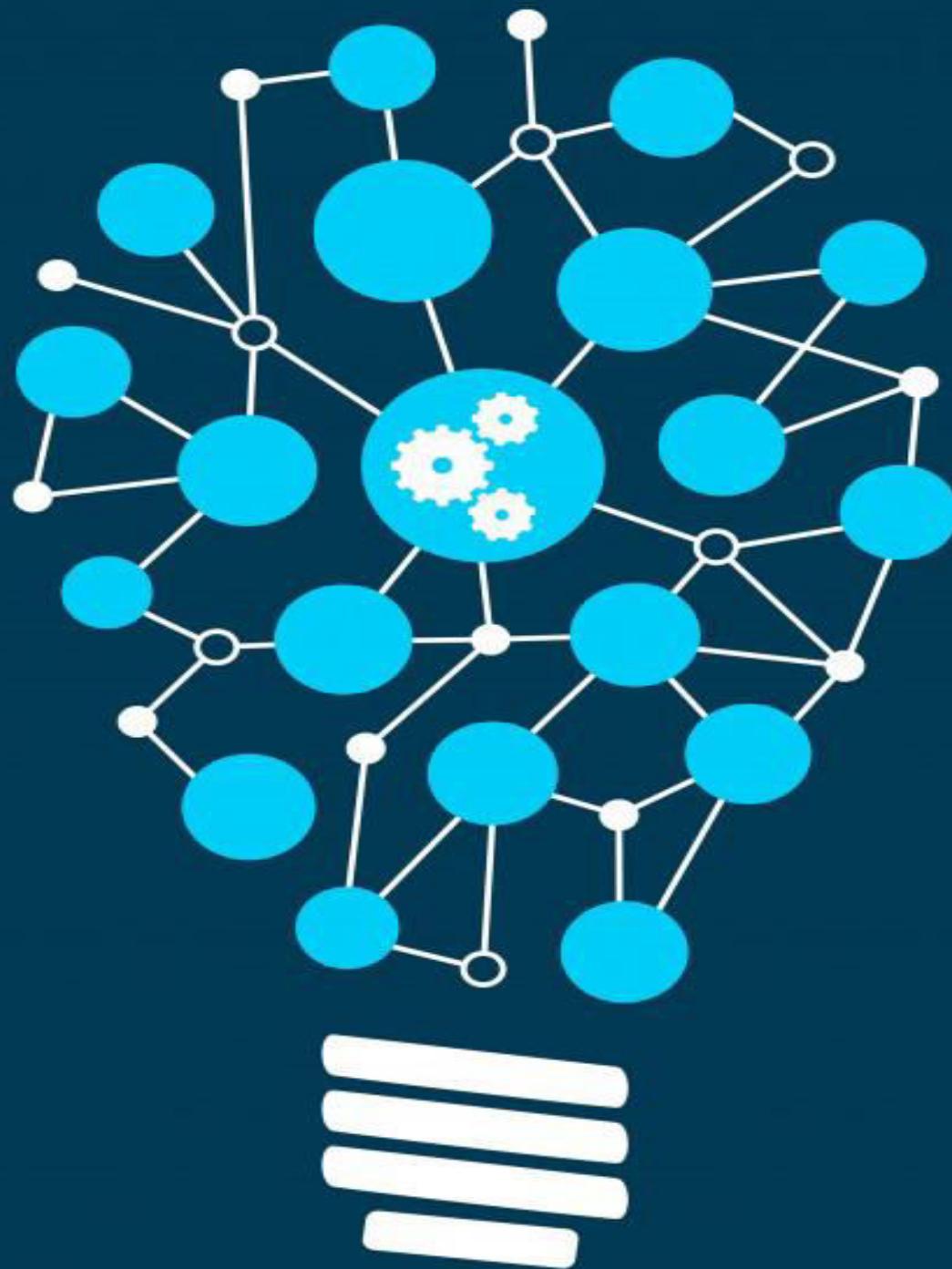
THE TEAM DATA SCIENCE PROCESS



CREATING AN EXPERIMENT



LEARNING RESOURCES



GALLERY

Microsoft Azure Machine Learning Studio

Mithun Prasad-Free-Work... ? ☰ 😊 🚙

Cortana Intelligence

Azure Machine Learning

Gallery

EXPERIMENTS SAMPLES

| NAME | AUTHOR | STATUS | LAST EDITED | PROJECT |
|--------------------------|----------|----------|-------------------------|---------|
| IrisExperimentCrossV... | miprasad | Finished | 10/28/2016 1:02:29 PM | None |
| Lab1 [Predictive Exp.] | miprasad | Finished | 10/28/2016 10:20:09 ... | None |
| Lab1 | miprasad | Finished | 10/28/2016 10:08:55 ... | None |
| Lab1 | miprasad | Draft | 10/27/2016 4:22:59 PM | None |
| IrisExperimentCrossV... | miprasad | Draft | 10/24/2016 10:39:21 ... | None |
| IrisExperiment | miprasad | Draft | 10/20/2016 3:37:13 PM | None |
| IrisExperimentSubset... | miprasad | Finished | 10/20/2016 1:48:13 PM | None |
| IrisExperiment [Predi... | miprasad | Finished | 10/19/2016 4:52:44 PM | None |
| Test | miprasad | Failed | 10/19/2016 12:07:42 ... | Test |

Import Data

Select Columns in Dataset

Multiclass Logistic Regression

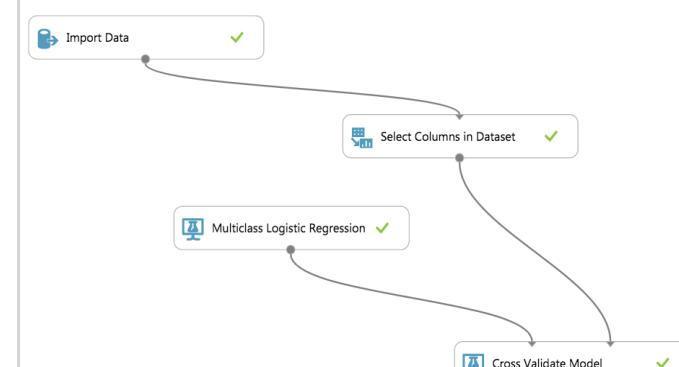
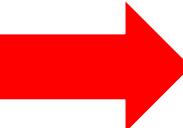
Cross Validate Model

+

NEW

DELETE

ADD TO PROJECT



GALLERY

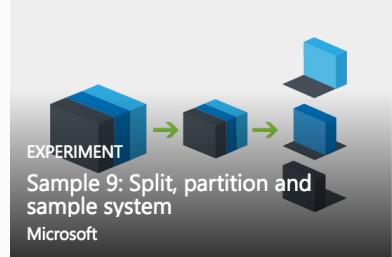
Cortana Intelligence Gallery

Browse all Industries Solutions Experiments Machine Learning APIs Custom Modules Competitions More

Experiments

Explore predictive analytic experiments contributed by Microsoft and the data science community that solve interesting problems or demonstrate advanced machine learning techniques. Use these experiments as starting points to develop your own solutions.

[How to contribute to the Gallery](#)



EXPERIMENT
Online Fraud Detection: Step 1 of 5: Generate tagged data
Microsoft

EXPERIMENT
Sample 9: Split, partition and sample system
Microsoft

DOCUMENTATION

A screenshot of the Microsoft Azure Machine Learning Studio interface. The top navigation bar shows the title "Microsoft Azure Machine Learning Studio" and the user "Mithun Prasad-Free-Work...". A red arrow points down to the top right corner of the interface.

The left sidebar contains navigation links: PROJECTS (selected), EXPERIMENTS (highlighted in blue), WEB SERVICES, NOTEBOOKS, DATASETS, TRAINED MODELS, and SETTINGS.

The main area displays the "experiments" dashboard. It includes tabs for "MY EXPERIMENTS" and "SAMPLES". Below is a table listing experiments:

| | NAME | AUTHOR | STATUS | LAST EDITED | PROJECT |
|--------------------------|--------------------------|----------|----------|-------------------------|---------|
| <input type="checkbox"/> | IrisExperimentCrossV... | miprasad | Finished | 10/28/2016 1:02:29 PM | None |
| <input type="checkbox"/> | Lab1 [Predictive Exp.] | miprasad | Finished | 10/28/2016 10:20:09 ... | None |
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| <input type="checkbox"/> | Lab1 | miprasad | Draft | 10/27/2016 4:22:59 PM | None |
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| <input type="checkbox"/> | IrisExperiment | miprasad | Draft | 10/20/2016 3:37:13 PM | None |
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| <input type="checkbox"/> | IrisExperiment [Predi... | miprasad | Finished | 10/19/2016 4:52:44 PM | None |
| <input type="checkbox"/> | Test | miprasad | Failed | 10/19/2016 12:07:42 ... | Test |

Below the table is a "Search help content" bar and a link to "Documentation Home • Tour".

To the right of the table, a workflow diagram is shown:

```
graph TD; ImportData[Import Data] --> SelectColumns[Select Columns in Dataset]; SelectColumns --> MulticlassLogistic[Multiclass Logistic Regression]; MulticlassLogistic --> CrossValidate[Cross Validate Model]
```

At the bottom of the interface are buttons for "NEW", "DELETE", and "ADD TO PROJECT".



DOCUMENTATION

Microsoft Azure

SALES 000-800-100-3928 ▾ MY ACCOUNT PORTAL Search

Why Azure Solutions Products Documentation Pricing Partners Blog Resources Support FREE ACCOUNT >

Search for docs

▼ Overview

- [What's Machine Learning?](#)
- [Data science for beginners](#)
- [What's the Studio?](#)
- [Studio capabilities](#)
- [Frequently asked questions](#)

► Get started

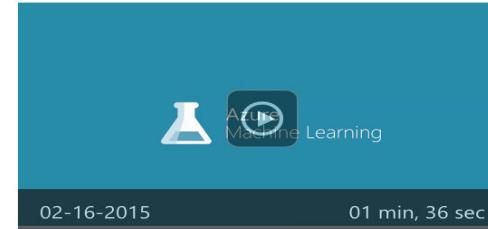
- [Data science process](#)
- [Algorithms](#)
- [Develop a model](#)
- [Work with data](#)
- [Extend with R & Python](#)

Machine Learning documentation

Learn how data scientists and developers can embed predictive analytics into applications

Build your first experiment in Azure Machine Learning Studio [Start tutorial >](#)

Machine Learning videos



[Overview of Azure Machine Learning](#)



[Getting Started with Azure Machine Learning Studio](#)



[Using R in Azure Machine Learning Studio](#)

[See more videos >](#)

Try Machine Learning Studio



FORUMS

Microsoft Azure Machine Learning Studio

Mithun Prasad-Free-Work...    

experiments

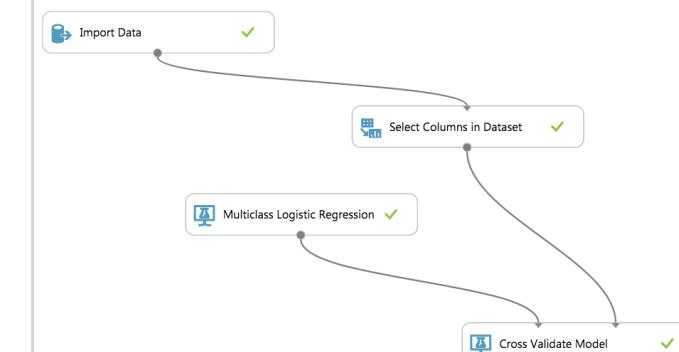
MY EXPERIMENTS SAMPLES

| | NAME | AUTHOR | STATUS | LAST EDITED | PROJECT |
|--------------------------|--------------------------|----------|----------|-------------------------|---------|
| <input type="checkbox"/> | IrisExperimentCrossV... | miprasad | Finished | 10/28/2016 1:02:29 PM | None |
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| <input type="checkbox"/> | Test | miprasad | Failed | 10/19/2016 12:07:42 ... | Test |



Machine Learning Forums

Provide feedback and request features



 NEW

<https://qo.microsoft.com/fwlink/?LinkId=403669&clcid=0x409>

 DELETE  ADD TO PROJECT

FORUMS

SALES: 1-800-867-1380 | MY ACCOUNT | PORTAL | SIGN IN | Search | FREE TRIAL | 

Microsoft Azure

Features Pricing Documentation Downloads Add-ons Community Support

Ask a question

Quick access ▾

Forums [view all]

Please select a forum ...

Selected forums

Clear

Machine Learning 

Top answerers Last 30 days

| | |
|---|-----|
|  Hilary Cotter | 129 |
|  Magnus (MM8) | 77 |
|  Dave Patrick | 74 |
|  Erland Sommarskog | 63 |
|  Dennis Guo | 60 |

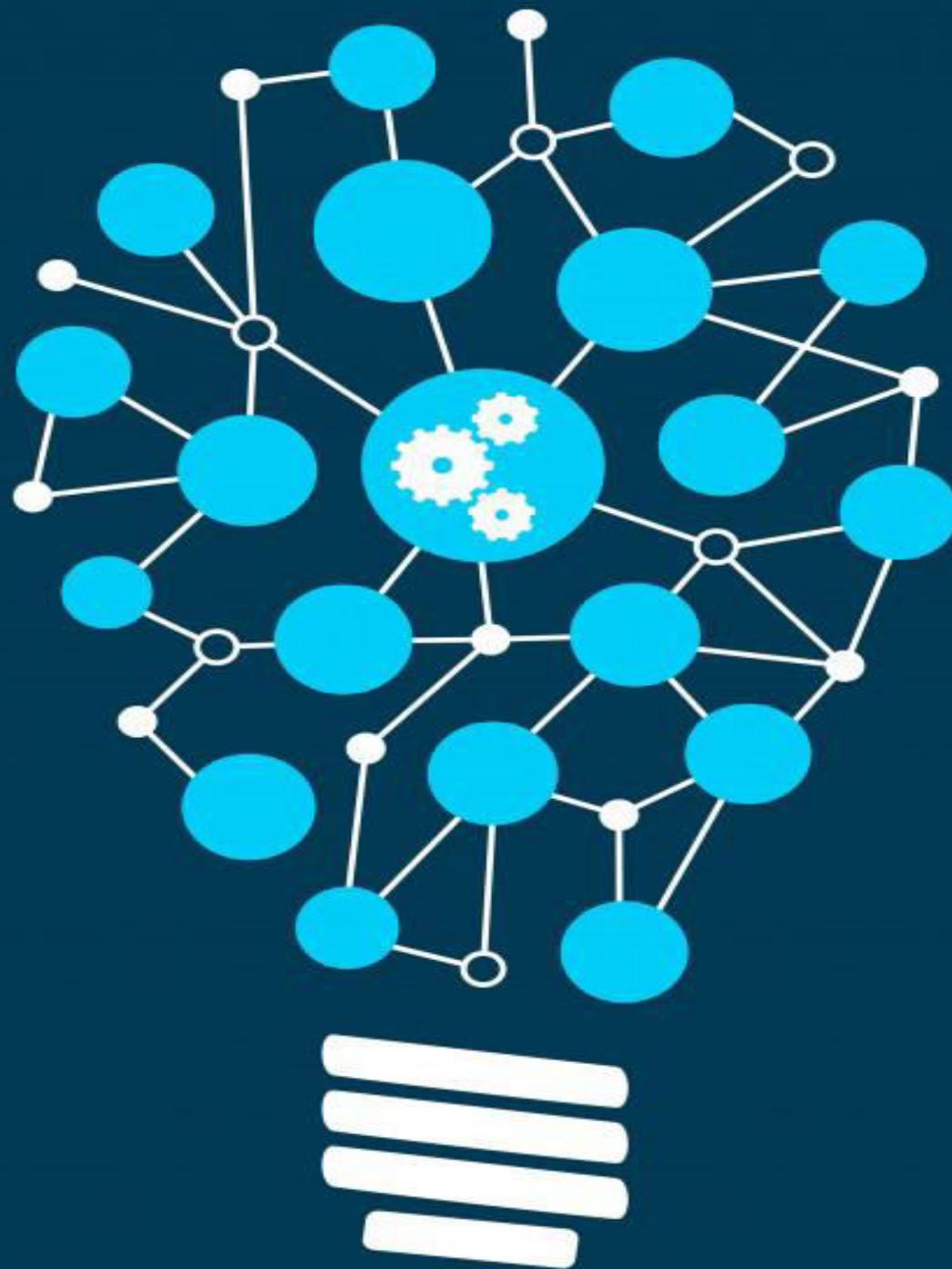
Announcement: 31

Search forum questions 

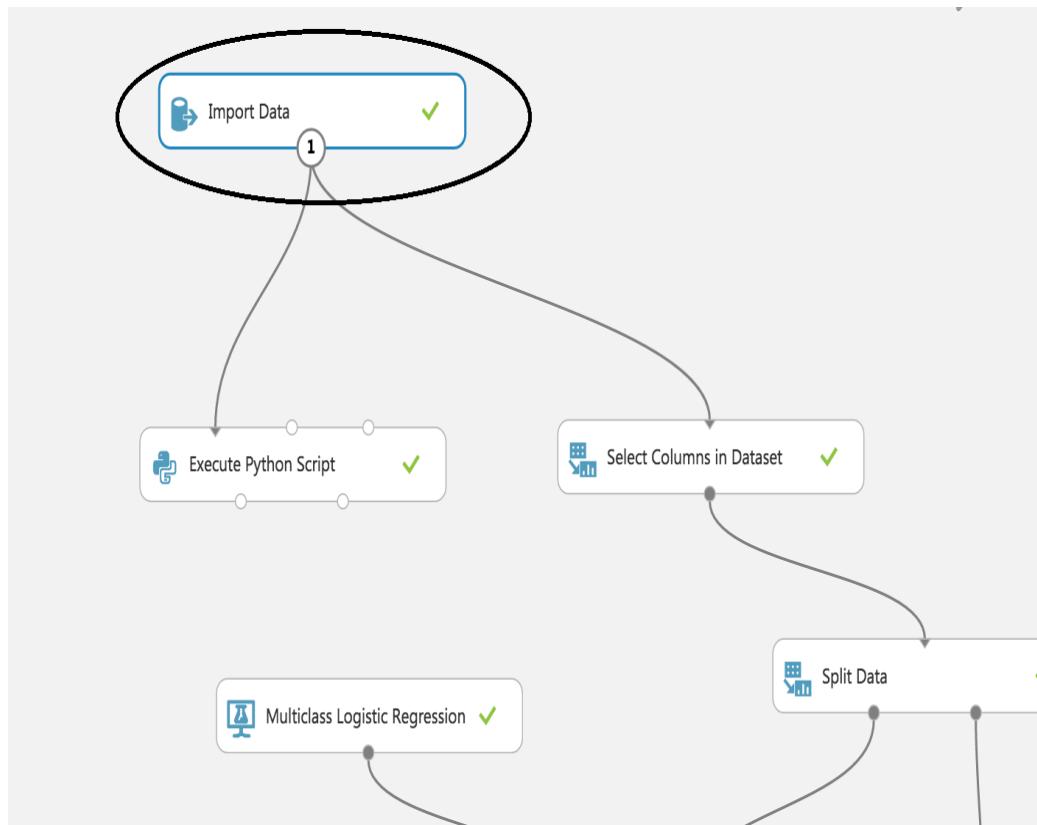
Filter : All threads ▾ Sort : Most recent post ▾

- ▶ Is there any way to get a print friendly or large image version of an AML experiment?
Microsoft Azure > Machine Learning
Greetings, I have a quite large AML experiment that I need to have a large format print out of it. At this point I have to use a screen capture tool and stitch ...
Answered | 1 Replies | 40 Views | Created by amx2012 - Sunday, October 30, 2016 9:02 PM | Last reply by Hai Ning - 8 hours 30 minutes ago
- ▶ Using the AzureML Services REST API instead of MLPS
Microsoft Azure > Machine Learning
Hi, I was going through the MLPS source code. I am not able to run the MLPS module from Mac OS as the powershell core does not currently support the Web.Extensions. However ...
Answered | 2 Replies | 36 Views | Created by vmandke - Tuesday, November 01, 2016 6:39 AM | Last reply by Hai Ning - 8 hours 32 minutes ago
- ▶ Deploying a webservice with multiple models
Microsoft Azure > Machine Learning
Hi, Can only one predictive webservice be associated with an experiment? I have an experiment which trains multiple binary classifiers. (Can only create a webservice for one of the ...
Proposed | 8 Replies | 132 Views | Created by vmandke - Thursday, October 27, 2016 9:55 AM | Last reply by Hai Ning - 8 hours 34 minutes ago
- ▶ Queuing of the tasks in AzureML
Microsoft Azure > Machine Learning
Hi, I observed that training tasks are queued by default in AzureML. Would a queued task be executed with a guarantee or is it be dropped after a stipulated time ...
Answered | 1 Replies | 24 Views | Created by vmandke - Tuesday, November 01, 2016 8:21 AM |

DATA INGESTION AND PREPARATION



DATA ACCESS (IMPORT)



Import Data

Data source

Azure SQL Database

Database server name

irismlbd3.database.windows.net

Database name

irisMLDB

User name

miprasad@irismlbd3

Password

.....

Accept any server certificate (insecure)

Database query

```
1 Select * from iris
```

IMPORT VIA URL

Microsoft Azure Machine Learning Studio

Mithun Prasad-Free-Work... ? 🔍 😊 🚙

Experiment created on 11... Finished running ✓

Import Data 1 ✓

Properties Project

Import Data

Data source: Web URL via HTTP

Data source URL: <https://raw.githubusercontent.com/mithun-prasad/azure-ml/master/Data/irisDataset.csv>

Data format: CSV

CSV or TSV has header row

Use cached results

START TIME: 11/8/2016 2:56:00 PM
END TIME: 11/8/2016 2:56:10 PM
ELAPSED TIME: 0:00:10.242
STATUS CODE: Finished
STATUS DETAILS: None

[View output log](#)

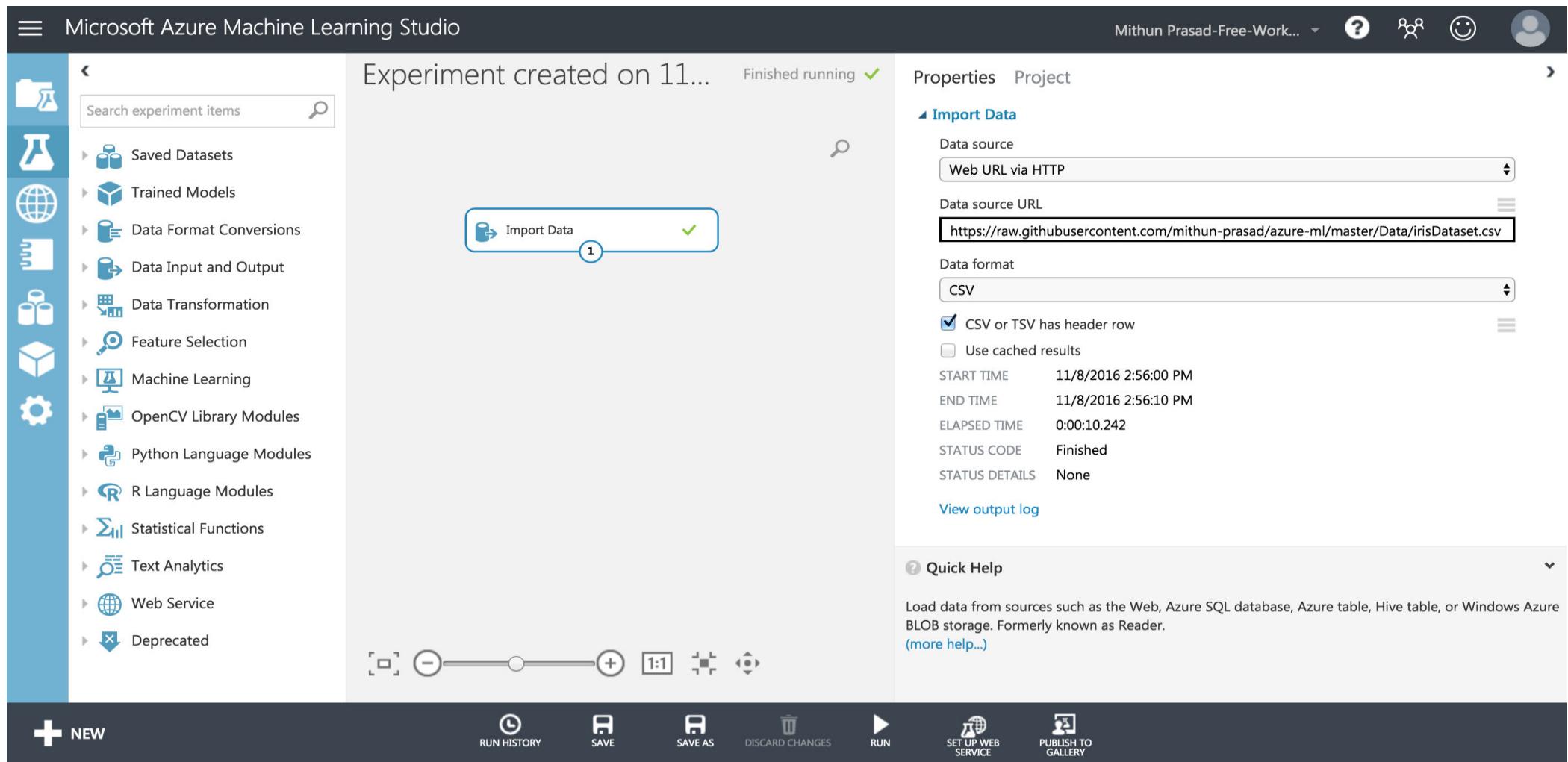
Quick Help

Load data from sources such as the Web, Azure SQL database, Azure table, Hive table, or Windows Azure BLOB storage. Formerly known as Reader.
[\(more help...\)](#)

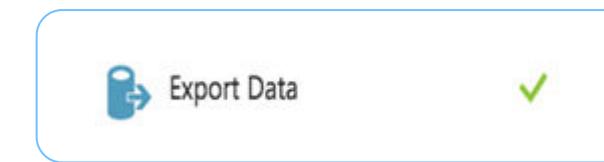
Search experiment items

- Saved Datasets
- Trained Models
- Data Format Conversions
- Data Input and Output
- Data Transformation
- Feature Selection
- Machine Learning
- OpenCV Library Modules
- Python Language Modules
- R Language Modules
- Statistical Functions
- Text Analytics
- Web Service
- Deprecated

NEW RUN HISTORY SAVE SAVE AS DISCARD CHANGES RUN SET UP WEB SERVICE PUBLISH TO GALLERY



DATA ACCESS (EXPORT)



Data Format Conversion

- Convert to ARFF
- Convert to CSV
- Convert to Dataset
- Convert to SVMLight
- Convert to TSV

Export Data

Please specify data destination

Azure SQL Database

Database server name

irisMldb3.database.windows.net

Database name

irisMLDB

Server user account name

miprasad@irisMldb3

Server user account password

.....

Accept any server certificate (insecure)

Comma separated list of columns to be saved

sepallength, petallength, Scored Labels

Data table name

irisOutput

Comma separated list of datatable columns

sepallength, petallength, scoredclass

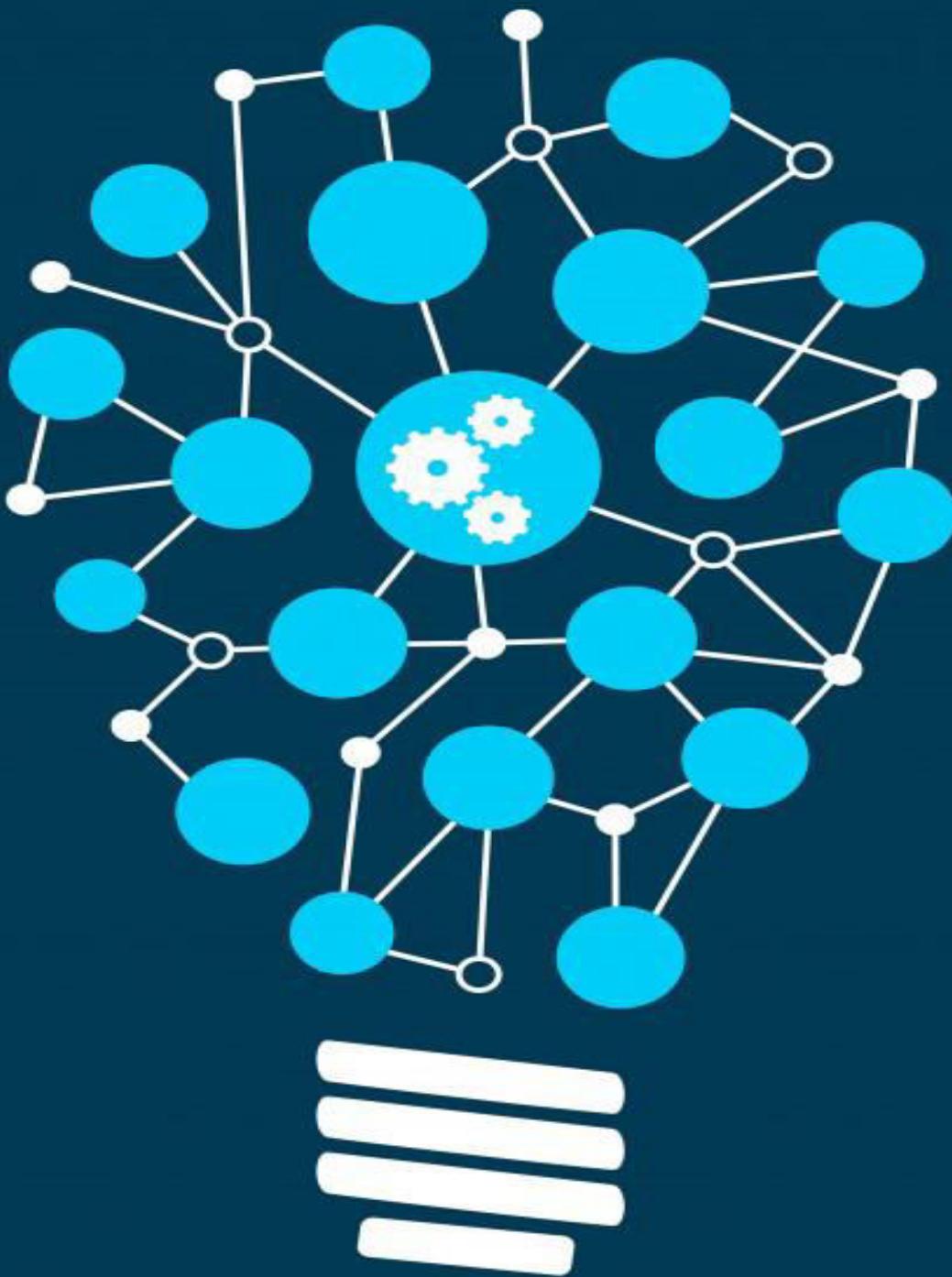
ARFF FILE

```
% 1. Title: Iris Plants Database
%
% 2. Attribute Information:
%    1. sepal length in cm
%    2. sepal width in cm
%    3. petal length in cm
%    4. petal width in cm
%    5. class:
%       -- Iris Setosa
%       -- Iris Versicolour
%       -- Iris Virginica
|
@RELATION iris

@ATTRIBUTE sepallength REAL
@ATTRIBUTE sepalwidth REAL
@ATTRIBUTE petallength REAL
@ATTRIBUTE petalwidth REAL
@ATTRIBUTE class {Iris-setosa,Iris-versicolor,Iris-virginica}

@DATA
5.1,3.5,1.4,0.2,Iris-setosa
4.9,3.0,1.4,0.2,Iris-setosa
4.7,3.2,1.3,0.2,Iris-setosa
4.6,3.1,1.5,0.2,Iris-setosa
5.0,3.6,1.4,0.2,Iris-setosa
5.4,3.9,1.7,0.4,Iris-setosa
4.6,3.4,1.4,0.3,Iris-setosa
5.0,3.4,1.5,0.2,Iris-setosa
4.4,2.9,1.4,0.2,Iris-setosa
4.9,3.1,1.5,0.1,Iris-setosa
5.4,3.7,1.5,0.2,Iris-setosa
4.8,3.4,1.6,0.2,Iris-setosa
4.8,3.0,1.4,0.1,Iris-setosa
4.3,3.0,1.1,0.1,Iris-setosa
5.8,4.0,1.2,0.2,Iris-setosa
5.7,4.4,1.5,0.4,Iris-setosa
5.4,3.9,1.3,0.4,Iris-setosa
5.1,3.5,1.4,0.3,Iris-setosa
5.7,3.8,1.7,0.3,Iris-setosa
5.1,3.8,1.5,0.3,Iris-setosa
5.4,3.4,1.7,0.2,Iris-setosa
5.1,3.7,1.5,0.4,Iris-setosa
4.6,3.6,1.0,0.2,Iris-setosa
5.1,3.3,1.7,0.5,Iris-setosa
4.8,3.4,1.9,0.2,Iris-setosa
5.0,3.0,1.6,0.2,Iris-setosa
```

Exploratory Statistics



STATISTICS

Microsoft Azure Machine Learning Studio

Mithun Prasad-Free-Work... ? ☺ ☺ ☺

Training experiment Predictive experiment

Lab1

Finished running ✓

irisDataset.csv

Submitted by mprasad
Size 4.50 KB
Format GenericCSV
Created on 10/28/2016...

Properties Project

dataset

1

irisDataset.csv

1

Download Visualize Generate Data Access Code... Open in a new Notebook

Multiclass Decision Forest ✓

Train Model

Score Model ✓

Quick Help

Search experiment items

Saved Datasets Trained Models Data Format Conversions Data Input and Output Data Transformation Feature Selection Machine Learning OpenCV Library Modules Python Language Modules R Language Modules Statistical Functions Text Analytics Web Service Deprecated

NEW RUN HISTORY SAVE AS DISCARD CHANGES RUN SET UP WEB SERVICE PUBLISH TO GALLERY

```
graph TD; DS[irisDataset.csv] --> MD[Multiclass Decision Forest]; MD --> TM[Train Model]; TM --> SM[Score Model];
```

STATISTICS

Microsoft Azure Machine Learning Studio

Mithun Prasad-Free-Work... ? ☰ ☺ ☻

Lab1 > irisDataset.csv > dataset

rows: 150 columns: 5

sepallength sepalwidth petallength petalwidth class

| sepallength | sepalwidth | petallength | petalwidth | class |
|-------------|------------|-------------|------------|-------------|
| 5.1 | 3.5 | 1.4 | 0.2 | Iris-setosa |
| 4.9 | 3 | 1.4 | 0.2 | Iris-setosa |
| 4.7 | 3.2 | 1.3 | 0.2 | Iris-setosa |
| 4.6 | 3.1 | 1.5 | 0.2 | Iris-setosa |
| 5 | 3.6 | 1.4 | 0.2 | Iris-setosa |
| 5.4 | 3.9 | 1.7 | 0.4 | Iris-setosa |
| 4.6 | 3.4 | 1.4 | 0.3 | Iris-setosa |
| 5 | 3.4 | 1.5 | 0.2 | Iris-setosa |
| 4.4 | 2.9 | 1.4 | 0.2 | Iris-setosa |
| 4.9 | 3.1 | 1.5 | 0.1 | Iris-setosa |
| 5.4 | 3.7 | 1.5 | 0.2 | Iris-setosa |

view as:

Properties Project

Statistics

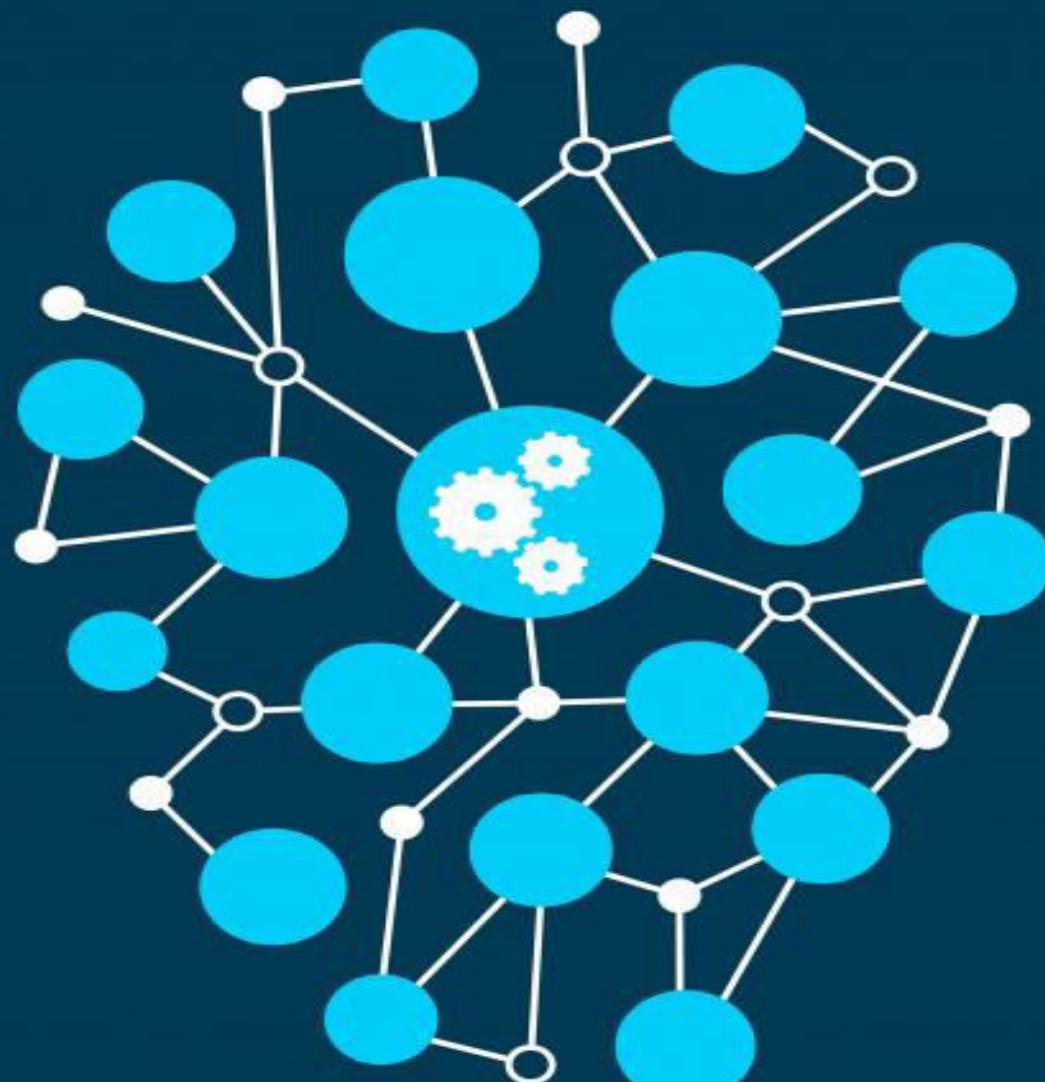
| | |
|--------------------|-----------------|
| Mean | 5.8433 |
| Median | 5.8 |
| Min | 4.3 |
| Max | 7.9 |
| Standard Deviation | 0.8281 |
| Unique Values | 35 |
| Missing Values | 0 |
| Feature Type | Numeric Feature |

Visualizations

sepallength Histogram compare to: None

The screenshot shows the Microsoft Azure Machine Learning Studio interface. On the left, there's a sidebar with various icons for data management, including a folder, a test tube, a globe, and a gear. The main area displays the 'irisDataset.csv' dataset with 150 rows and 5 columns: sepallength, sepalwidth, petallength, petalwidth, and class. A red arrow points to the 'sepallength' column header. To the right, a 'Properties' panel is open, showing detailed statistics for the sepallength feature: Mean (5.8433), Median (5.8), Min (4.3), Max (7.9), Standard Deviation (0.8281), Unique Values (35), Missing Values (0), and Feature Type (Numeric Feature). Below the statistics, there's a section for 'Visualizations' showing a histogram for sepallength and a dropdown for 'compare to'.

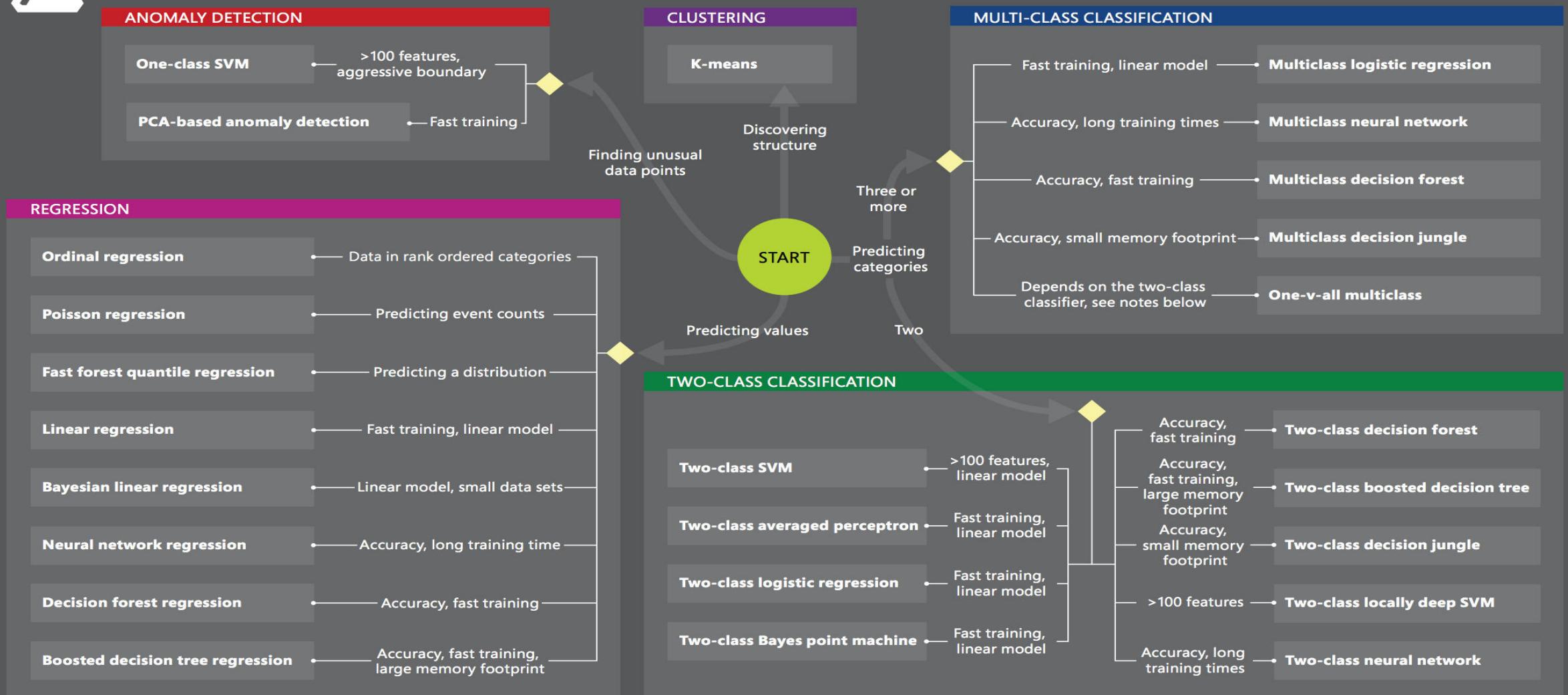
ALGORITHMS





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.



CLUSTERING

Grouping items based on defined Features

- ▲  Machine Learning
 - ▲ Initialize Model
 - ▲ Clustering
- K-Means Clustering
- 

CLASSIFICATION

Predicting the class or category for a single instance of data

Initialize Model

Classification

Multiclass Decision Forest

Multiclass Decision Jungle

Multiclass Logistic Regression

Multiclass Neural Network

One-vs-All Multiclass

Two-Class Averaged Perceptron

Two-Class Bayes Point Machine

Two-Class Boosted Decision Tree

Two-Class Decision Forest

Two-Class Decision Jungle

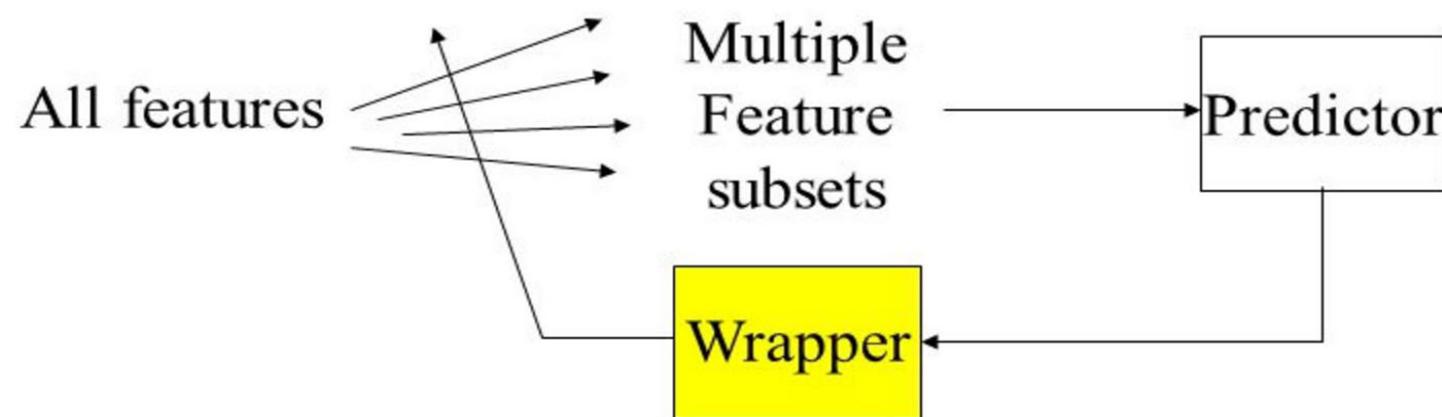
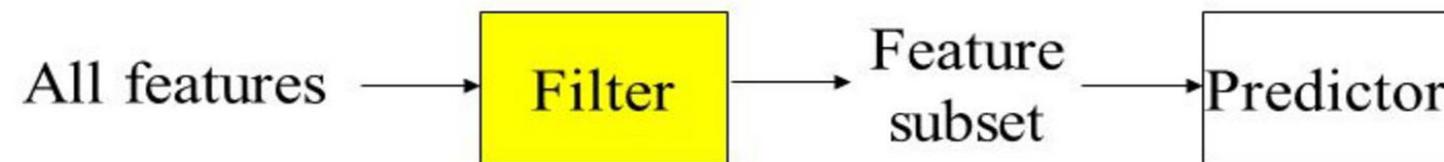
Two-Class Locally-Deep Support Vector Machine

Two-Class Logistic Regression

Two-Class Neural Network

Two-Class Support Vector Machine

FEATURE SELECTION (FILTER)



Filter Algorithms

- ✓ Pearson Correlation
- Mutual Information
- Kendall Correlation
- Spearman Correlation
- Chi Squared
- Fisher Score
- Count Based

ANOMALY DETECTION

Selecting items based on unusual or suspicious patterns

- ▶  Machine Learning
 - ▶ Initialize Model
 - ▶ Anomaly Detection

One-Class Support Vector Machine

PCA-Based Anomaly Detection

REGRESSION

Predicting the value of a datum given its history

- ▲ Initialize Model

- ▲ Classification

- Multiclass Logistic Regression

- Two-Class Logistic Regression

- ▲ Regression

- Bayesian Linear Regression

- Boosted Decision Tree Regression

- Decision Forest Regression

- Fast Forest Quantile Regression

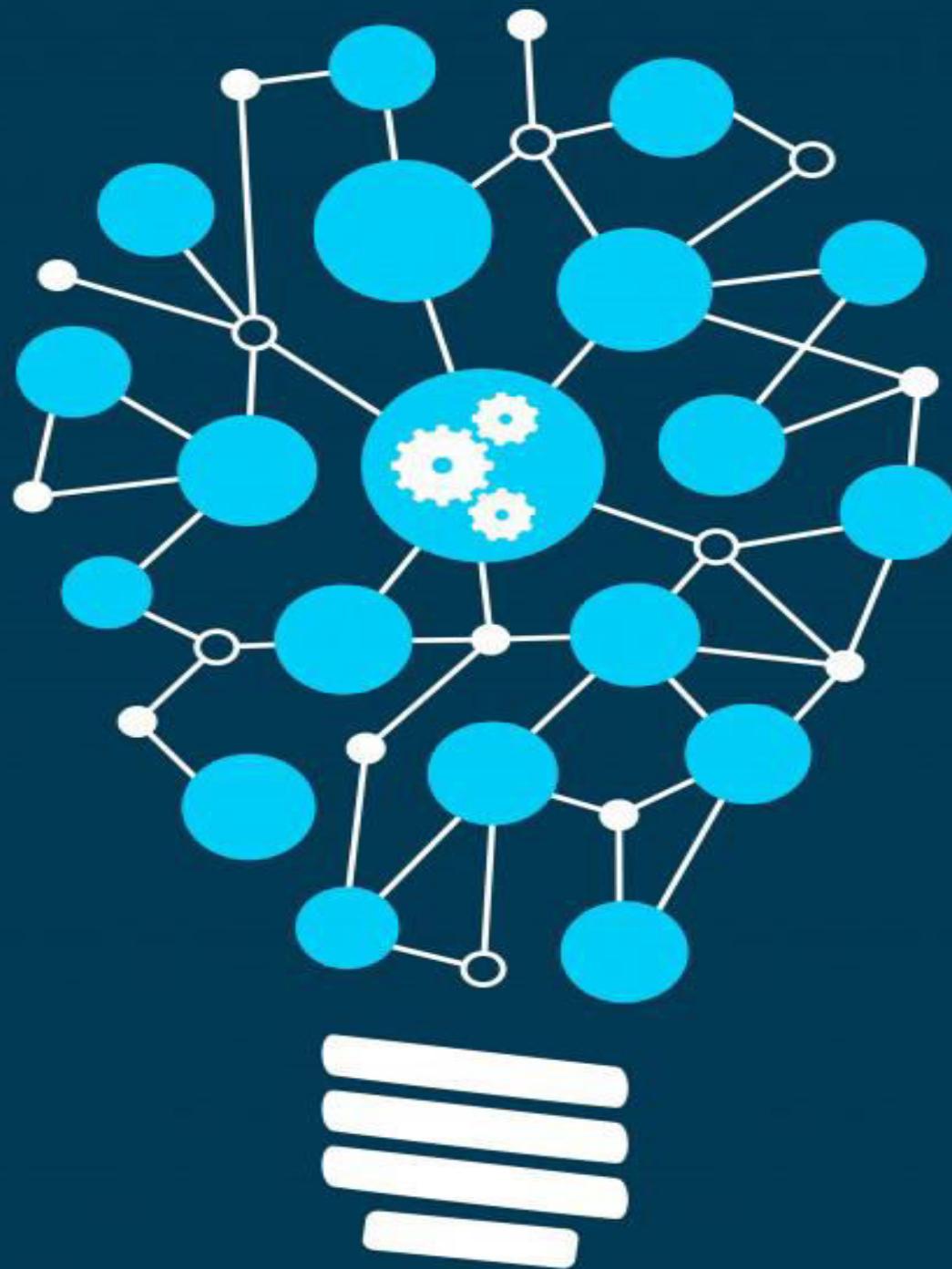
- Linear Regression

- Neural Network Regression

- Ordinal Regression

- Poisson Regression

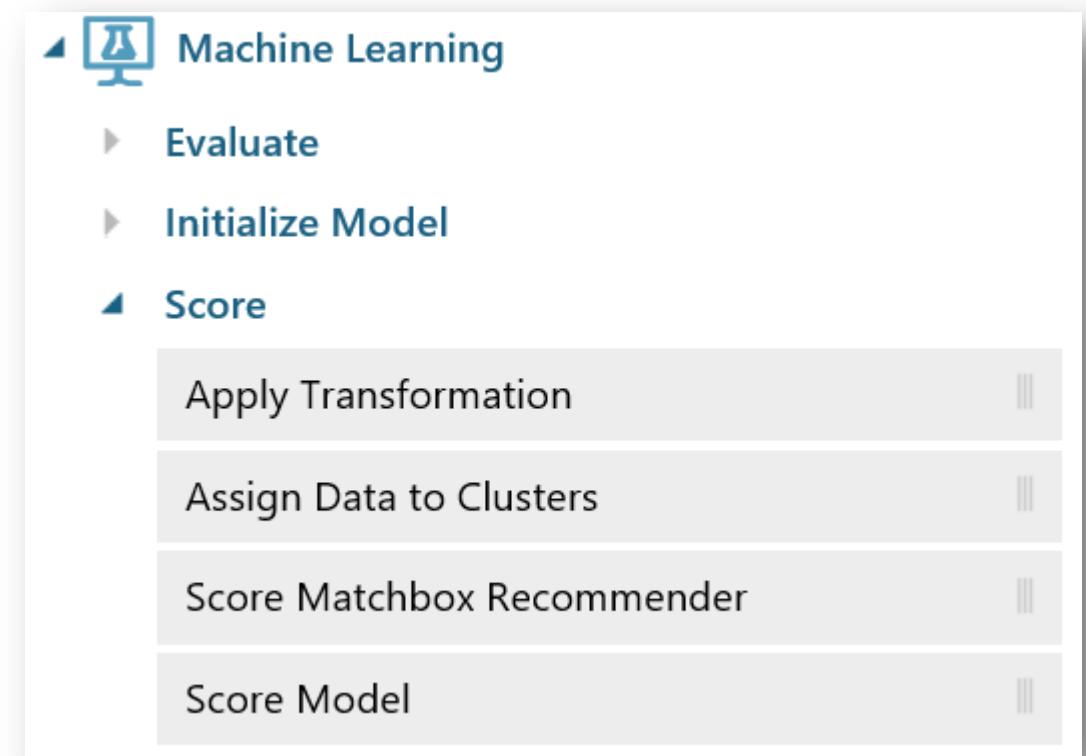
MODEL SCORING AND EVALUATION



SCORING A MODEL

Apply a trained model to:

- A list of recommended items
- Forecasts for time series models
- Estimates of projected demand, volume, or other numeric quantity, for regression models
- Cluster assignments
- A predicted class or outcome, for classification models
- Probability scores associated with these outputs



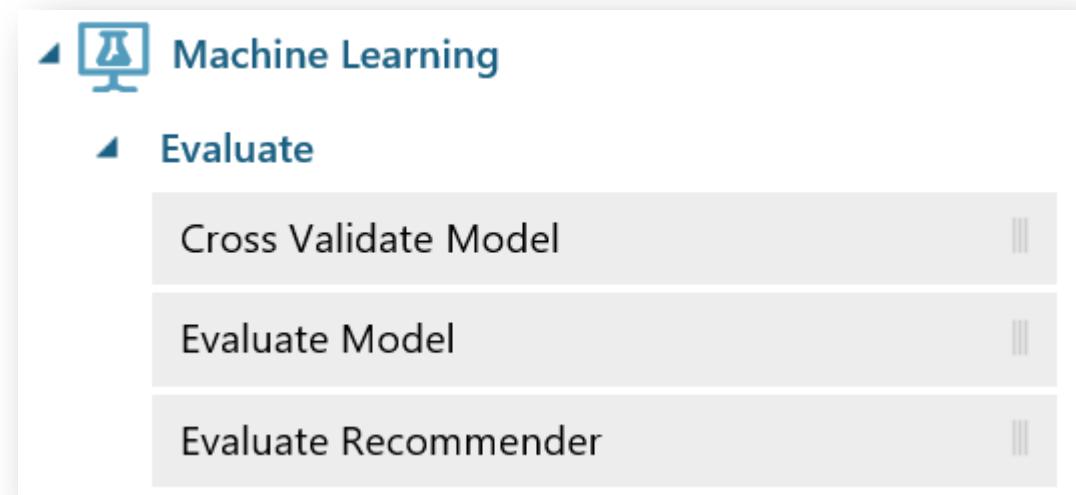
EVALUATING A MODEL

Metrics for Classification Models

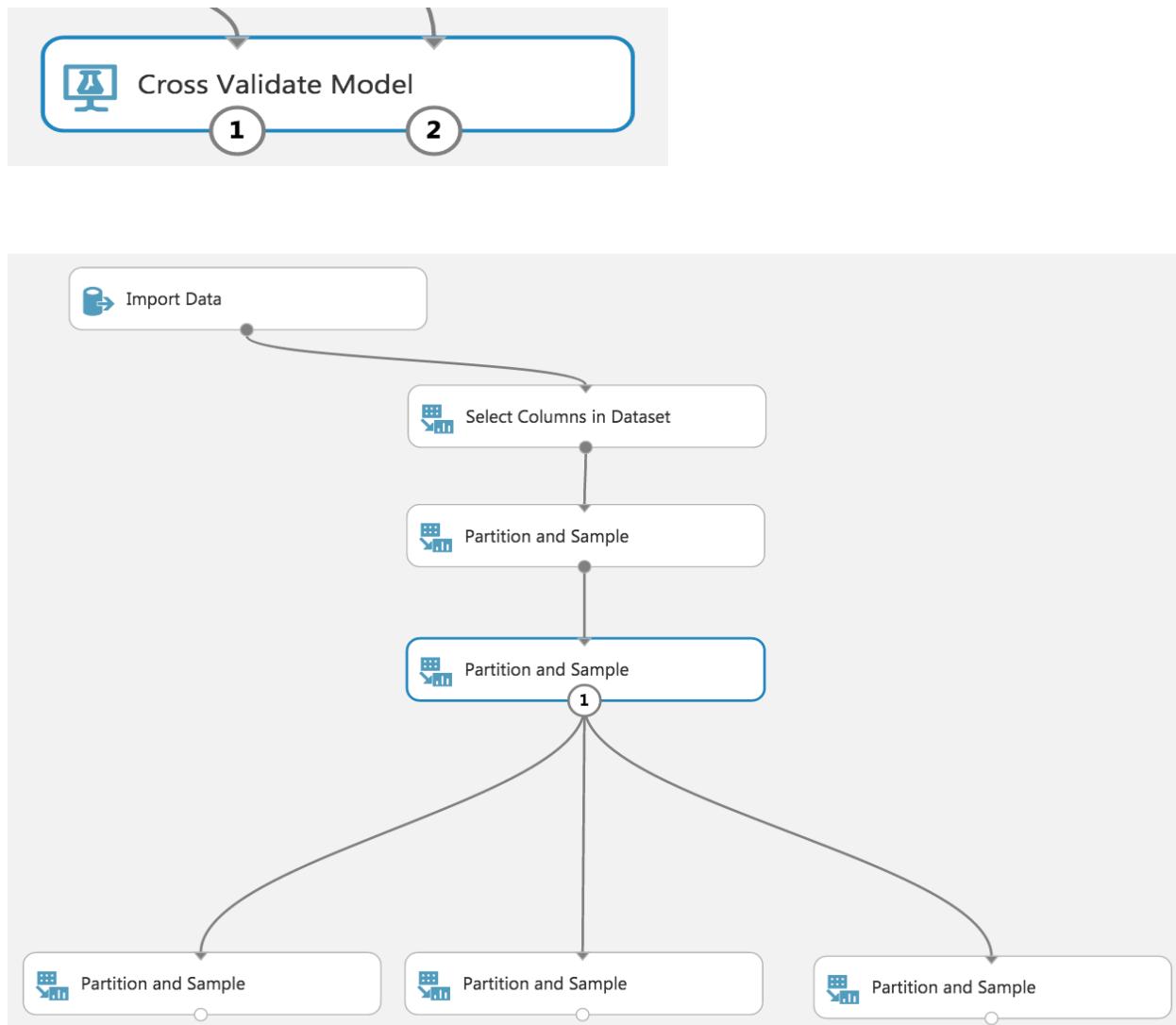
- Accuracy, Recall, Precision, F1-Score
- AUC
- Average Log Loss
- Training Log Loss

Metrics for Regression Models

- Mean absolute error (MAE)
- Root mean squared error (RMSE)
- Relative absolute error (RAE)
- Relative squared error (RSE)
- Coefficient of determination



CROSS VALIDATION



Partition and Sample

Partition or sample mode

Assign to Folds

Use replacement in th...

Randomized split

Random seed

0

Specify the partitioner method

Partition evenly

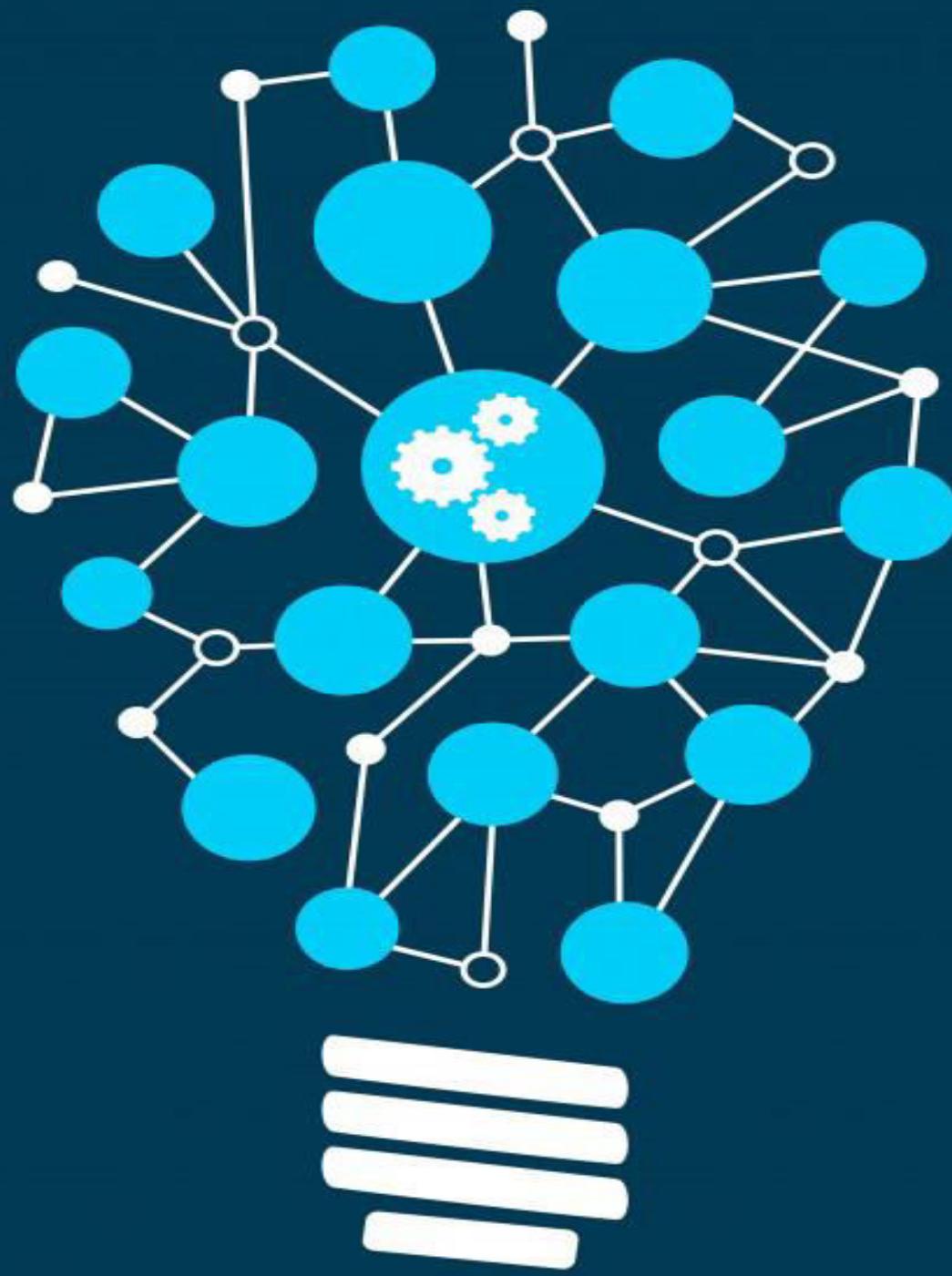
Specify number of folds to...

3

Stratified split

False

CUSTOMIZATION



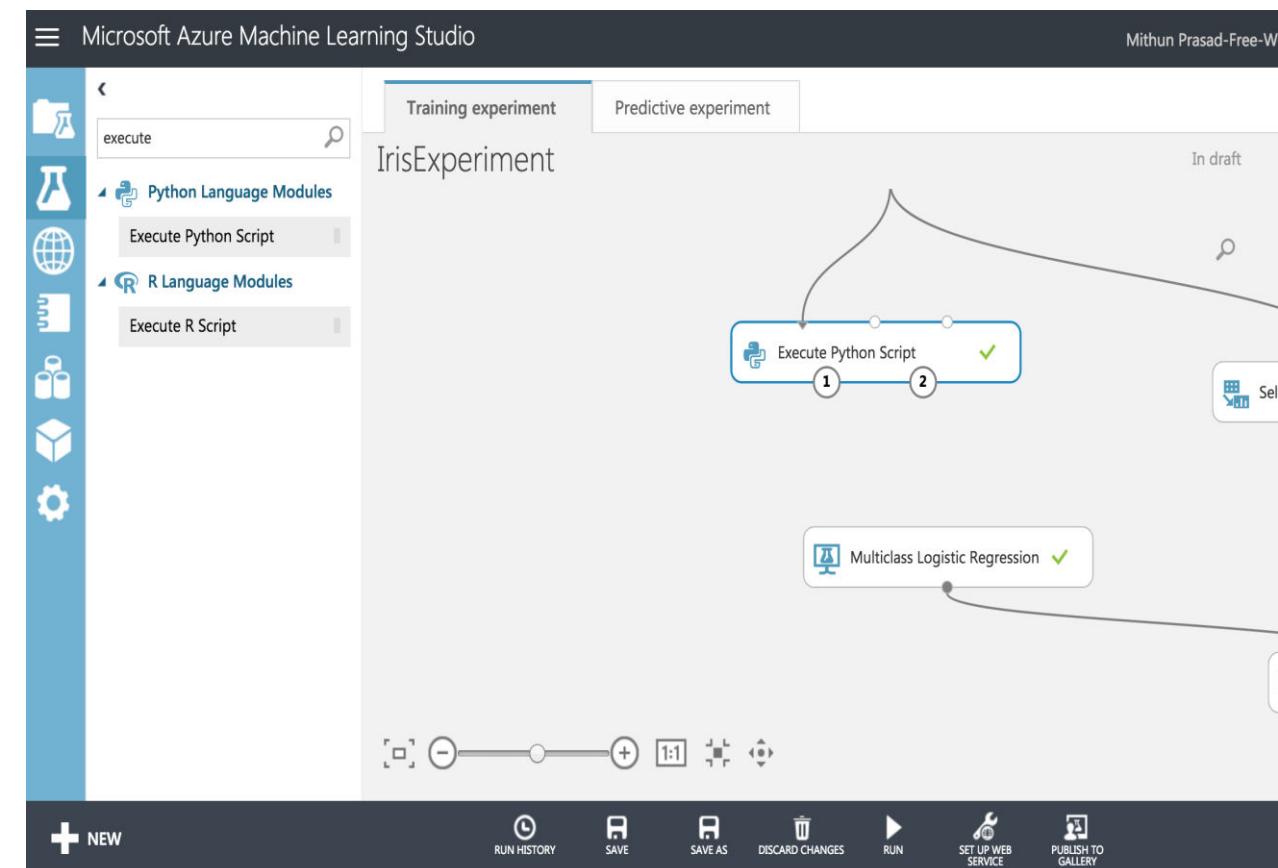
HOW TO USE EXECUTE PYTHON SCRIPT

1. Add the **Execute Python Script** module to your experiment.
2. Connect any datasets that you want to use for input. You can also provide a zipped file containing custom resources.

Dataset1. An optional dataset from your Machine Learning Studio workspace, containing input data or values.

Dataset2. A second dataset, also optional.

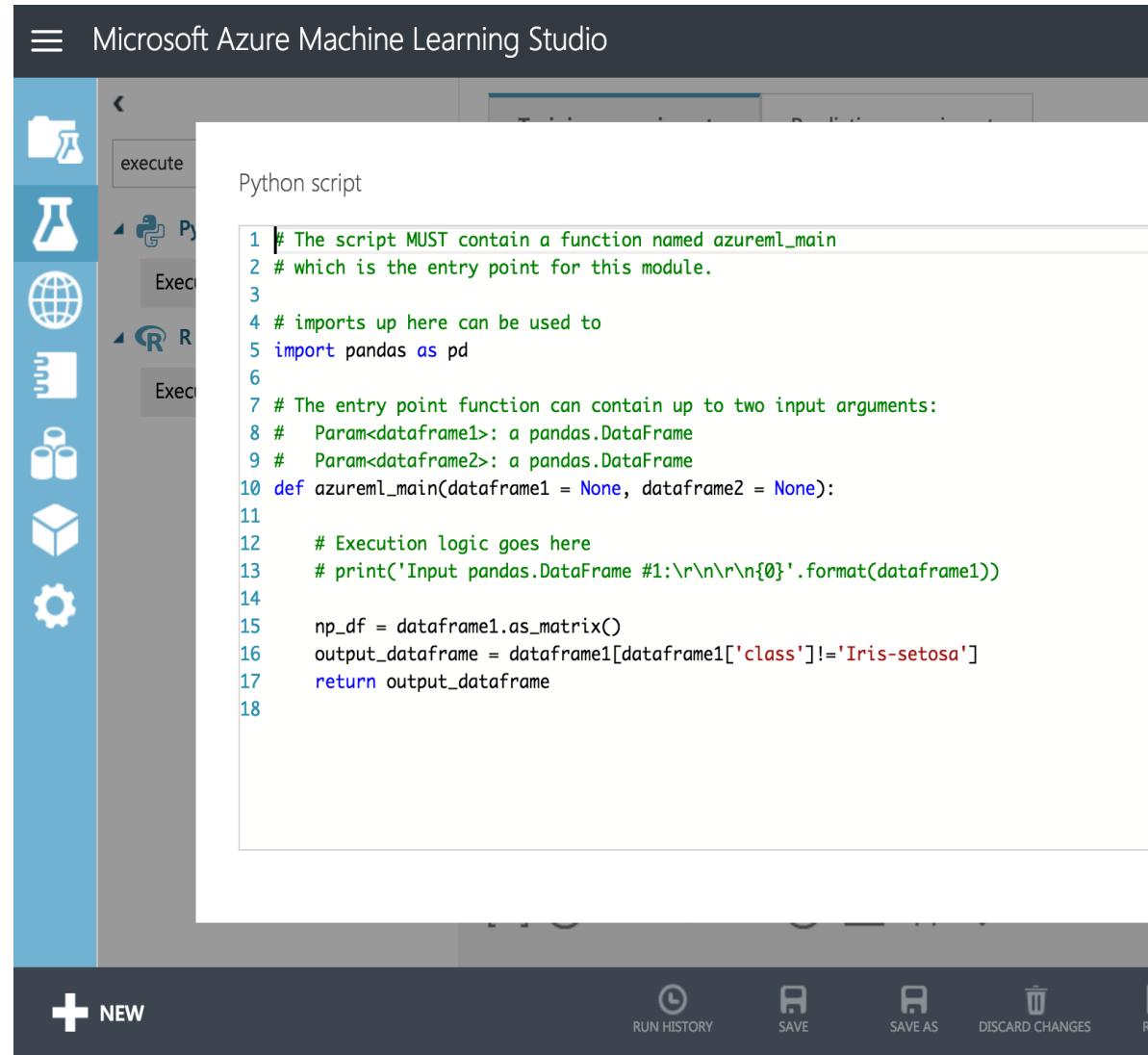
Script bundle. A zipped file containing custom resources.



CUSTOM TASKS

Integrate Ipython notebooks with Azure Machine Learning to perform custom tasks:

- Visualization
- Use Python client libraries to enumerate datasets and models in your workspace
- Read, load, and manipulate data

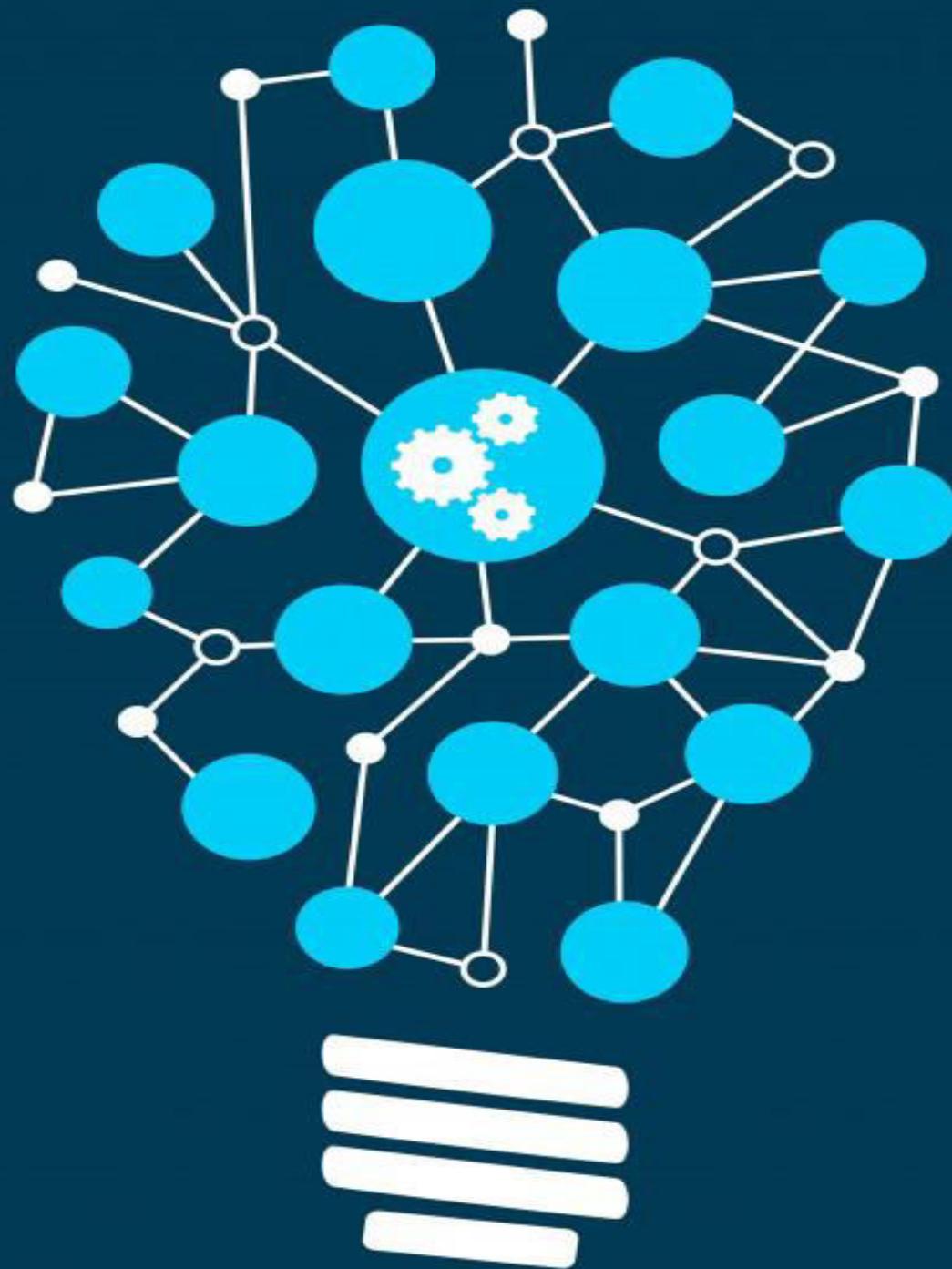


The screenshot shows the Microsoft Azure Machine Learning Studio interface. On the left, there is a vertical toolbar with icons for file operations, execute, Python, R, and other tasks. The main area is titled "Python script" and contains the following code:

```
1 # The script MUST contain a function named azureml_main
2 # which is the entry point for this module.
3
4 # imports up here can be used to
5 import pandas as pd
6
7 # The entry point function can contain up to two input arguments:
8 #   Param: a pandas.DataFrame
9 #   Param: a pandas.DataFrame
10 def azureml_main(dataframe1 = None, dataframe2 = None):
11
12     # Execution logic goes here
13     # print('Input pandas.DataFrame #1:\r\n{}\r\n{}'.format(dataframe1))
14
15     np_df = dataframe1.as_matrix()
16     output_dataframe = dataframe1[dataframe1['class']!='Iris-setosa']
17     return output_dataframe
18
```

At the bottom of the screen, there are buttons for "+ NEW", "RUN HISTORY", "SAVE", "DISCARD CHANGES", and the Microsoft logo.

DEPLOY AS A WEB SERVICE



WEB SERVICE

1. Deploy the experiment as a web service

Microsoft Azure Machine Learning Studio

Mithun Prasad-Free-Work... ? ☰ ☺

lab1 [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

TToiOovPXbyecWV1ISPLu9UUMKgBQqBaRVl3e8zOG7qVkJR6d59ozDjjdDShB9wrLe0qVs+jnGJLXEyXhfYQ==

Default Endpoint

API HELP PAGE TEST APPS LAST UPDATED

| REQUEST/RESPONSE | Test Test preview | Excel 2013 or later Excel 2010 or earlier workbook | 10/28/2016 10:21:15 AM |
|------------------|-----------------------------------|--|------------------------|
| BATCH EXECUTION | Test preview | Excel 2013 or later workbook | 10/28/2016 10:21:15 AM |

Enter data to predict

SEPALLENGTH

5.1

SEPALWIDTH

3.5

PETALLENGTH

1.4

PETALWIDTH

0.2

CLASS



BATCH CLASSIFICATION

≡ Microsoft Azure Machine Learning Web Services

Quickstart Dashboard Batch Request Log Configure Consume **Test** Swagger API

← Lab1 [Predictive Exp.]

default

[View in Studio](#)

Request-Response **Batch**

✓ input1

irisDataset.csv [Browse...](#)

Storage account irisstorage3

✓ Test Batch Jobs

| JOB ID | STATUS | RUN START | RUN END | DURATION | Result |
|----------------------------------|----------|---------------------|---------------------|----------|-------------------------|
| db2c4ac1fea24d0e80cde9a83f817e75 | Finished | 10/28/2016 10:37 AM | 10/28/2016 10:37 AM | 2s | output1 |

1 / 1

Note: We will enable CORS on your storage account to upload this file

[Test](#)