

# Azure Machine Learning

Teerachai Laohtong

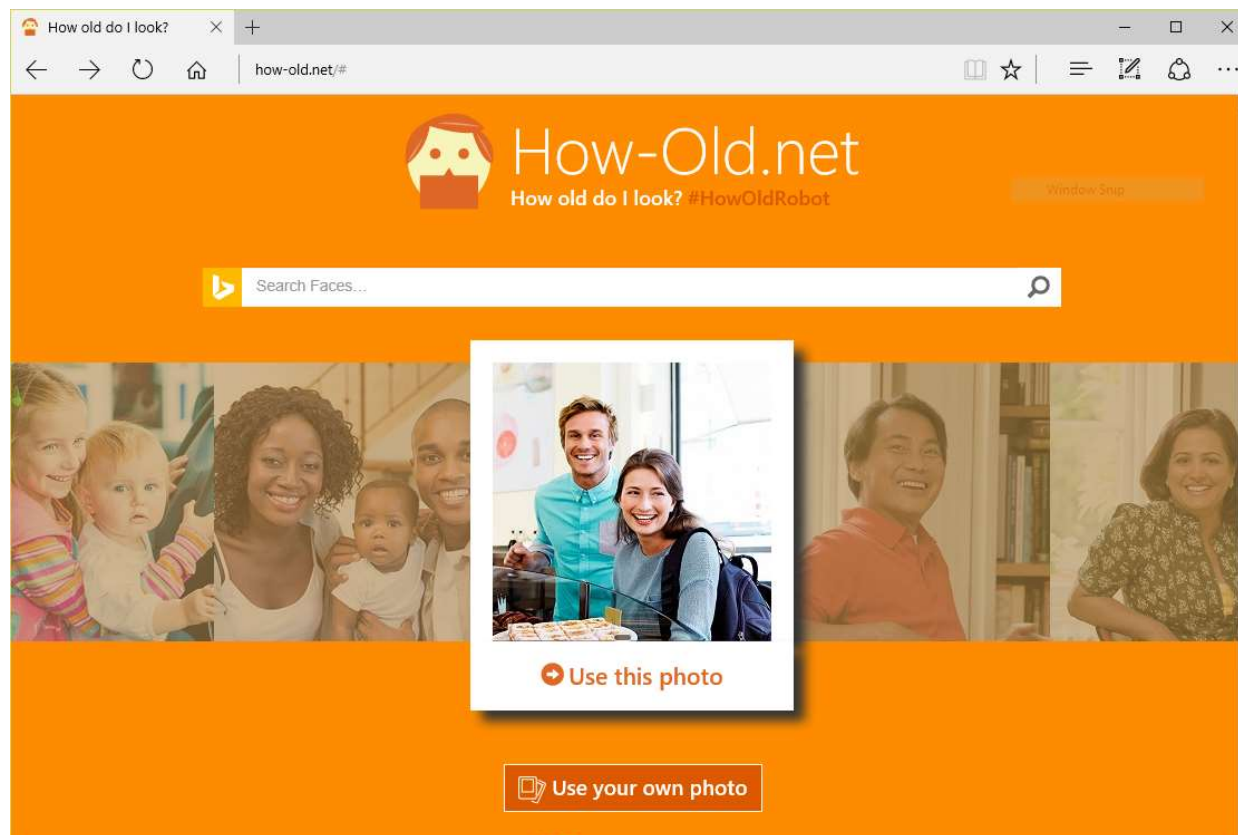
IMC Institute

# What is Machine Learning?

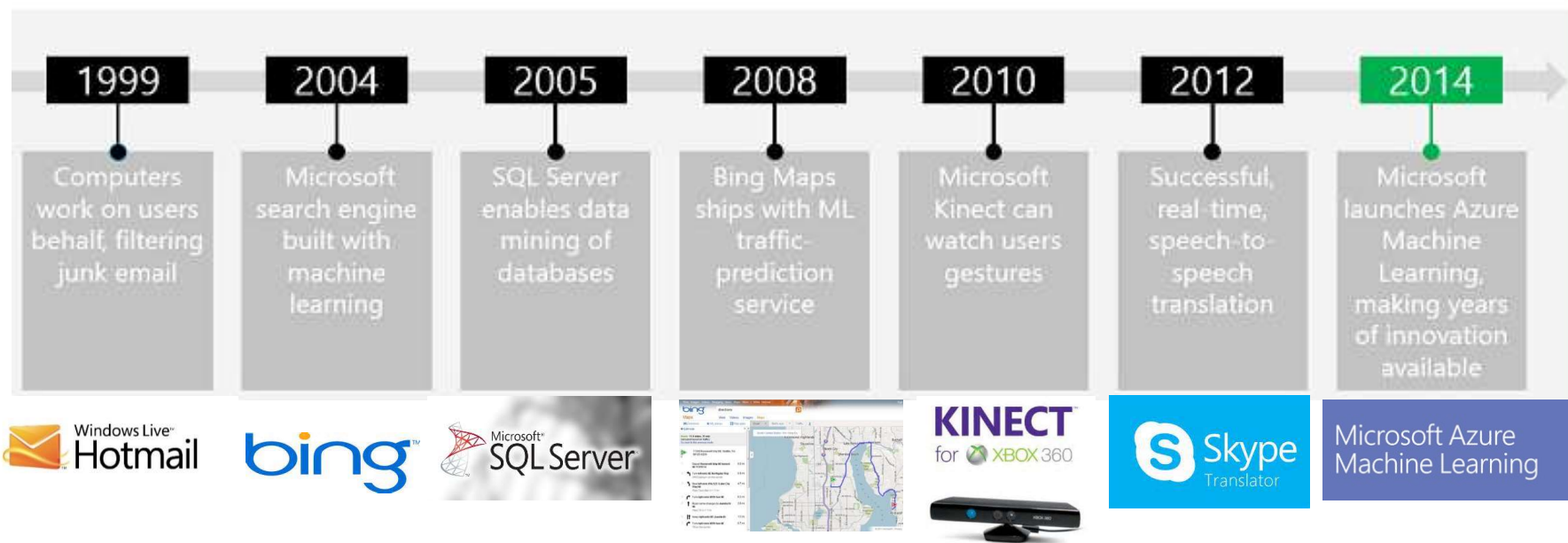
- Branch of computer science in which a computer "learns" from data in order to perform predictive analytics
  - Credit-card fraud detection
  - Online shopping recommendations
  - Self-driving cars and more
- Supervised learning
  - Regression and classification
- Unsupervised learning
  - Clustering



# Machine Learning in Action



# Microsoft and Machine Learning



Modified from <http://pulsweb.fr/predict-wine-quality-azureml>

# Azure Machine Learning

- Fully managed cloud service for building and operationalizing ML models



## Fully managed

No software to install, no hardware to manage, and one portal to view and update.

## Integrated

Simple drag, drop and connect interface for Data Science. No need for programming for common tasks.

## Best in Class Algorithms + R

Built-in collection of best of breed algorithms. Support for R and popular CRAN packages.

## Deploy in minutes

Operationalize models with a single click. Monetize in Machine Learning Marketplace.

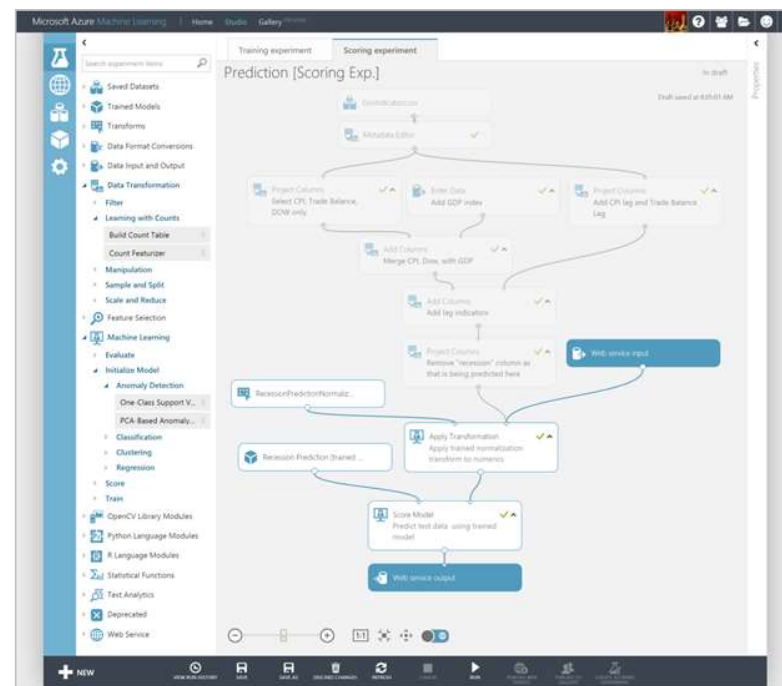
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*I spent last semester  
building a regression model  
in Python, and I just did the  
same thing in 10 minutes  
with Azure ML*

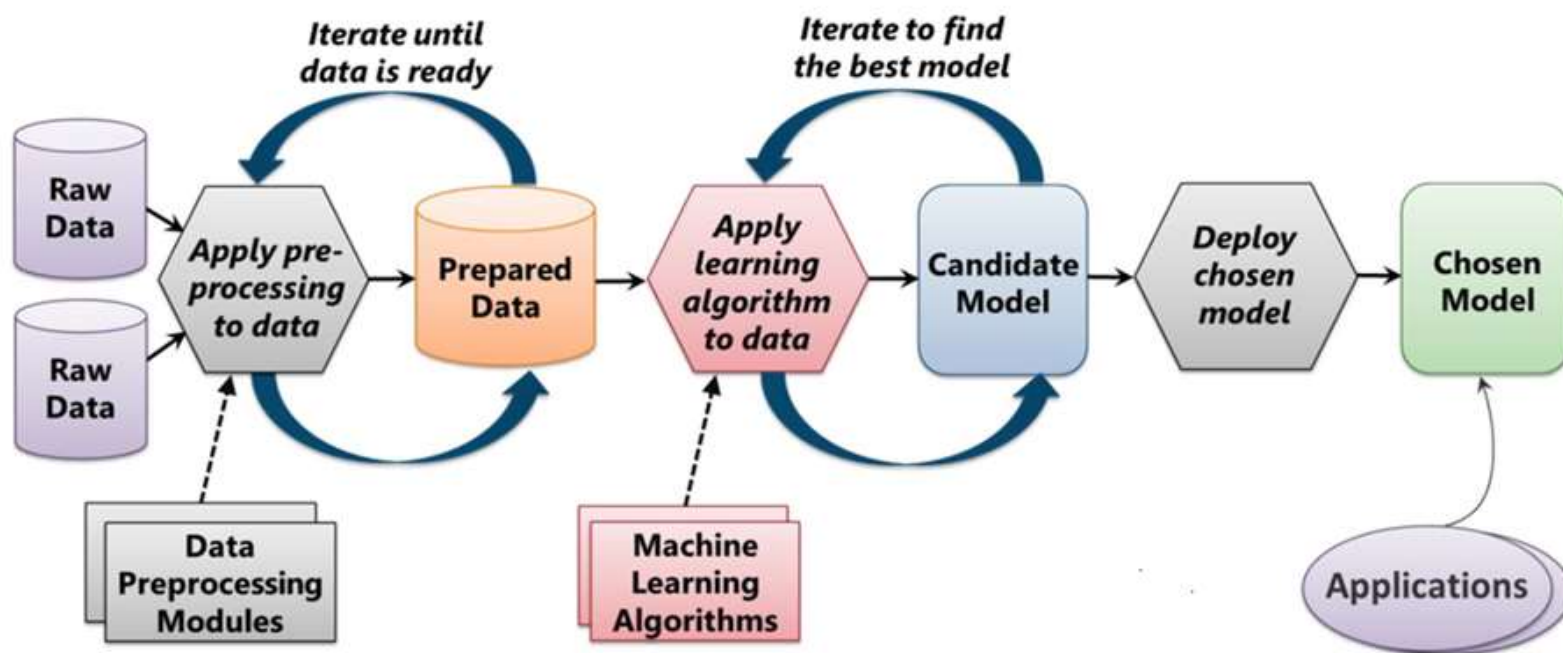
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# Azure Machine Learning Studio

- Visual editor for composing, testing, refining, and deploying machine-learning models
  - Includes hundreds of modules
  - Includes common algorithms for classification, regression, and more
  - Supports numerous input formats
  - Supports R and Python
- Machine learning for the masses



# The Machine Learning Process



From "Introduction to Microsoft Azure" by David Chappell



# Azure Machine Learning Algorithms

- Machine Learning
  - Evaluate
  - Initialize Model
    - Anomaly Detection
      - One-Class Support Vector Machine
      - PCA-Based Anomaly Detection
    - Classification
    - Clustering
    - Regression

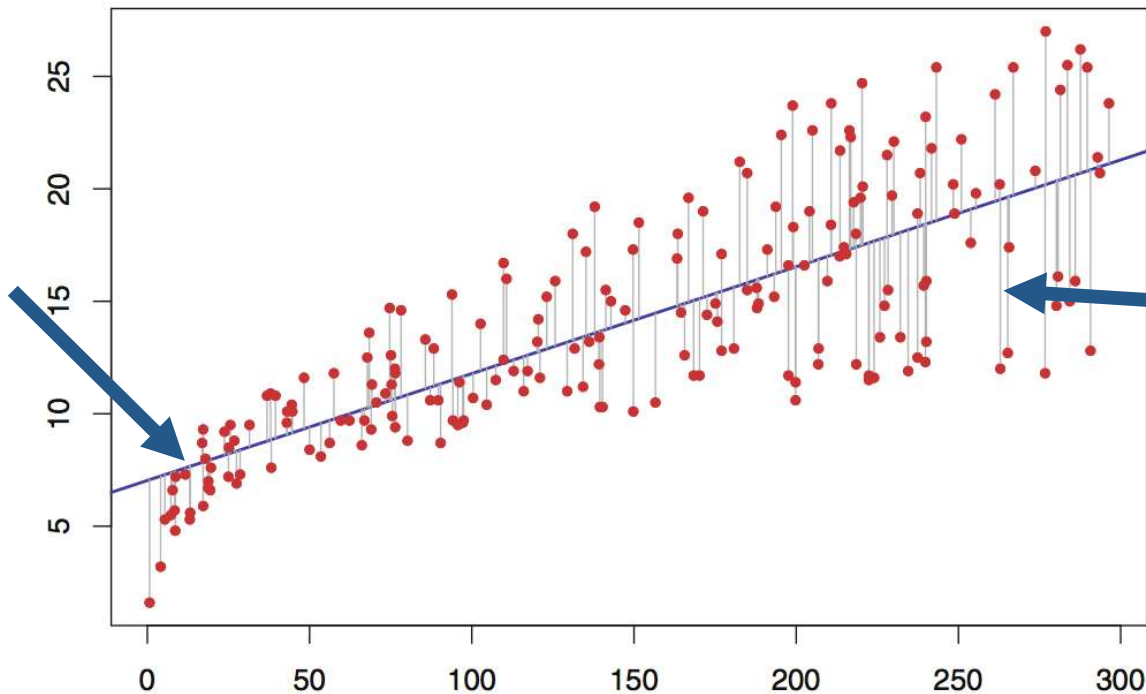
- Machine Learning
  - Evaluate
  - Initialize Model
    - Anomaly Detection
    - Classification
      - Multiclass Decision Forest
      - Multiclass Decision Jungle
      - Multiclass Logistic Regression
      - Multiclass Neural Network
      - One-vs-All Multiclass
      - Two-Class Averaged Perceptron
      - Two-Class Bayes Point Machine
      - Two-Class Boosted Decision Tree
      - Two-Class Decision Forest
      - Two-Class Decision Jungle
      - Two-Class Locally-Deep Support...
      - Two-Class Logistic Regression
      - Two-Class Neural Network
      - Two-Class Support Vector Machine
    - Clustering
    - Regression

- Machine Learning
  - Evaluate
  - Initialize Model
    - Anomaly Detection
    - Classification
    - Clustering
      - K-Means Clustering
    - Regression

- Machine Learning
  - Evaluate
  - Initialize Model
    - Anomaly Detection
    - Classification
    - Clustering
    - Regression
      - Bayesian Linear Regression
      - Boosted Decision Tree Regression
      - Decision Forest Regression
      - Fast Forest Quantile Regression
      - Linear Regression
      - Neural Network Regression
      - Ordinal Regression
      - Poisson Regression

# Simple (Univariate) Linear Regression

Regression line represented by an equation of the form  $Y = b_0 + b_1X$  where  $Y$  is the dependent variable

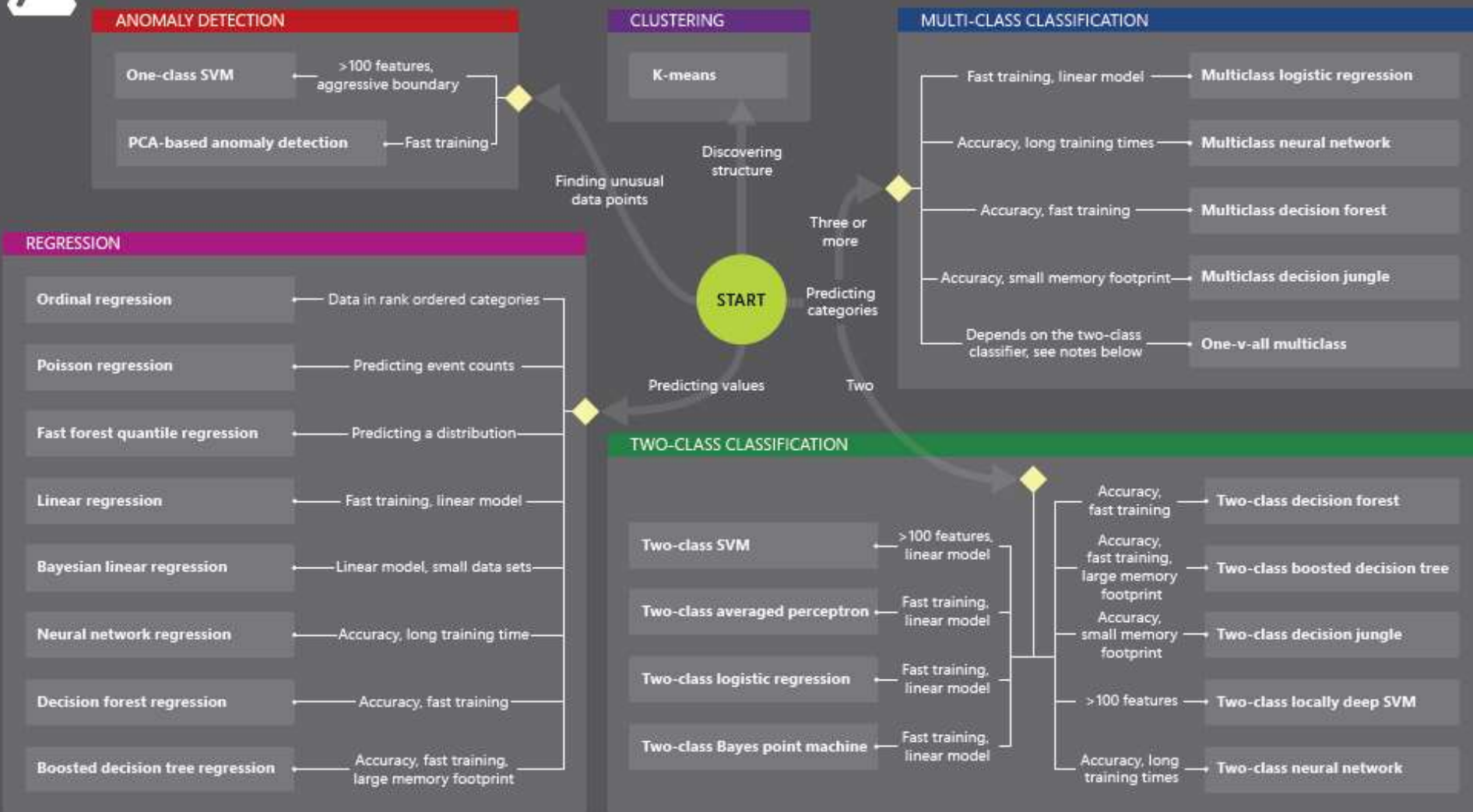


Error between actual and computed output minimized using least-squares or gradient-descent method



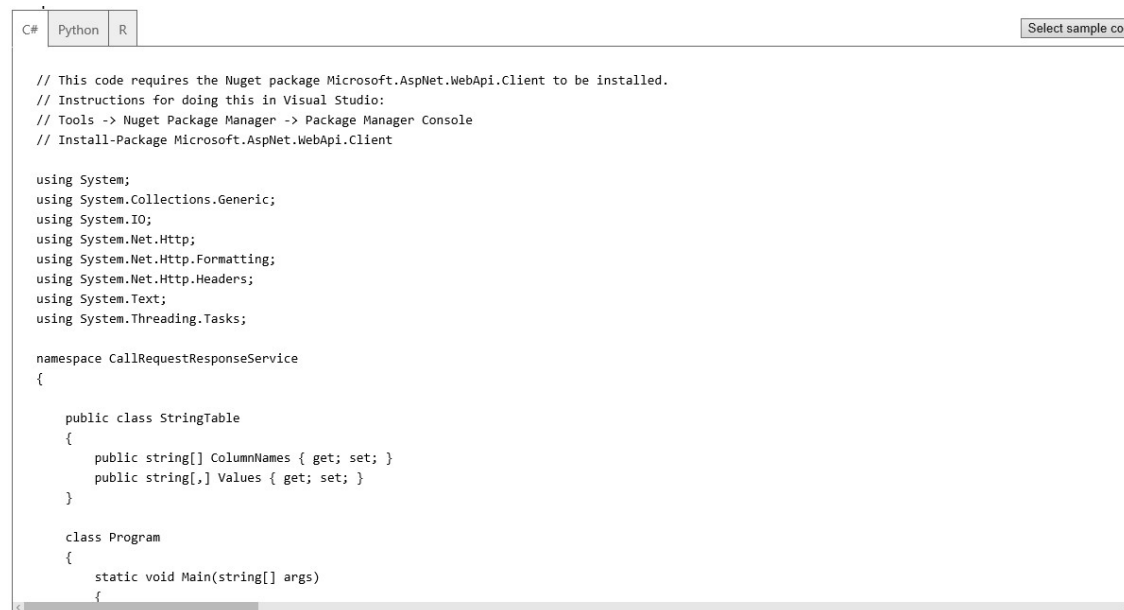
# Microsoft Azure Machine Learning: Algorithm Cheat Sheet

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.



# Deploying as a Web Service

- A button click in ML Studio deploys a model as a Web service and provides sample code for calling it in three languages



The screenshot shows a code editor window with tabs for C#, Python, and R. The C# tab is active, displaying sample code for calling a web service. The code includes comments about installing the NuGet package Microsoft.AspNet.WebApi.Client and a 'Select sample code' button in the top right corner.

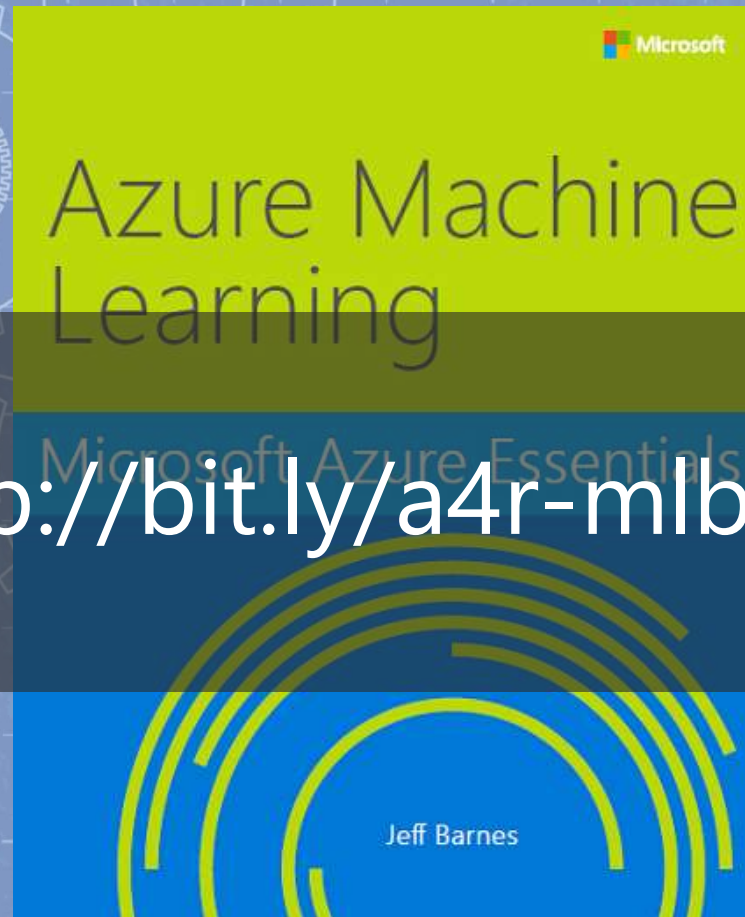
```
// This code requires the Nuget package Microsoft.AspNet.WebApi.Client to be installed.
// Instructions for doing this in Visual Studio:
// Tools -> Nuget Package Manager -> Package Manager Console
// Install-Package Microsoft.AspNet.WebApi.Client

using System;
using System.Collections.Generic;
using System.IO;
using System.Net.Http;
using System.Net.Http.Formatting;
using System.Net.Http.Headers;
using System.Text;
using System.Threading.Tasks;

namespace CallRequestResponseService
{
    public class StringTable
    {
        public string[] ColumnNames { get; set; }
        public string[,] Values { get; set; }
    }

    class Program
    {
        static void Main(string[] args)
        {
        }
```

Free e-Book



<http://bit.ly/a4r-mlbook>

# Hands-On Lab

Azure Machine Learning HOL.html



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