

NerdZão Portugal

Machine Learning:

An introduction for Developers
(part. 1 & 2)

AUGUST / SEPTEMBER

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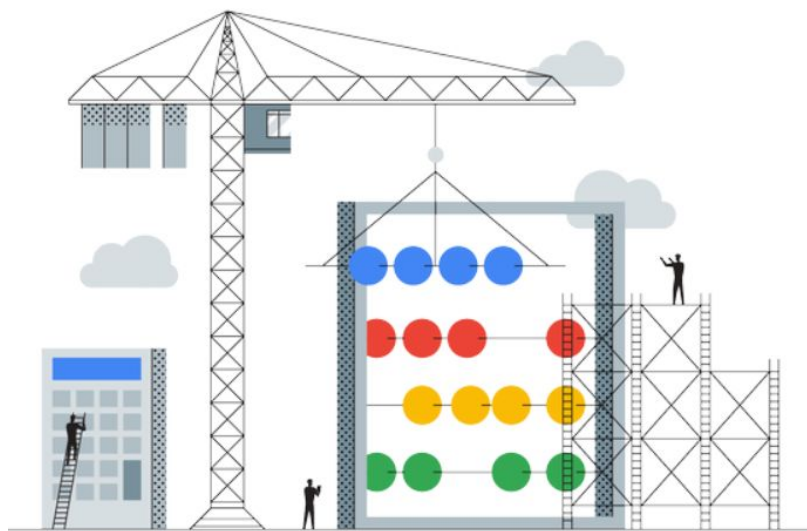


| Agenda

1. What is Machine Learning?
 - History
 - Why only in recent years?
 - Objectives
2. Main types of machine learning algorithms & Technologies
3. Demonstration 1
4. Metrics
5. Consuming Models
6. Black-box
7. Demonstration 2
8. Starting the study

Machine Learning : An introduction for Developers

History



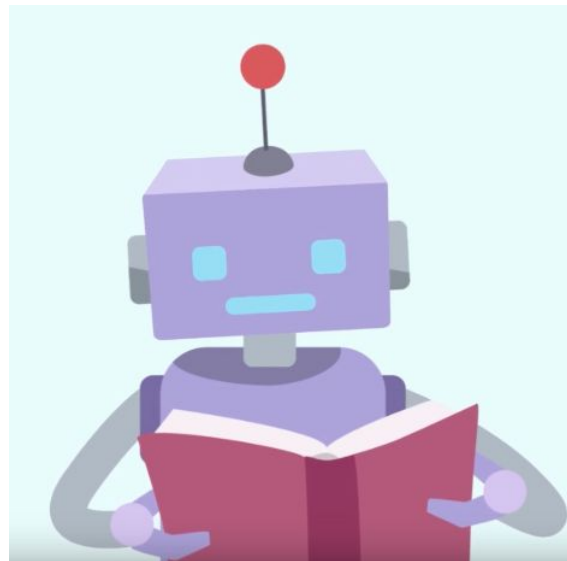
[A history of Machine Learning](#)

| Why only in recent years?

- If Machine Learning is so old, why is it only in recent years that technologies that use statistical models are emerging?

| What is Machine Learning?

- Machine Learning is a subfield of Artificial Intelligence, which was developed from the study of pattern recognition and computational learning.
- Machine learning as a "*field of study that **gives computers the ability to learn without being explicitly programmed***".
[1] Arthur Samuel, 1959



[1] [Some Studies in Machine Learning Using the Game of Checkers - 1959](#)

| Objectives

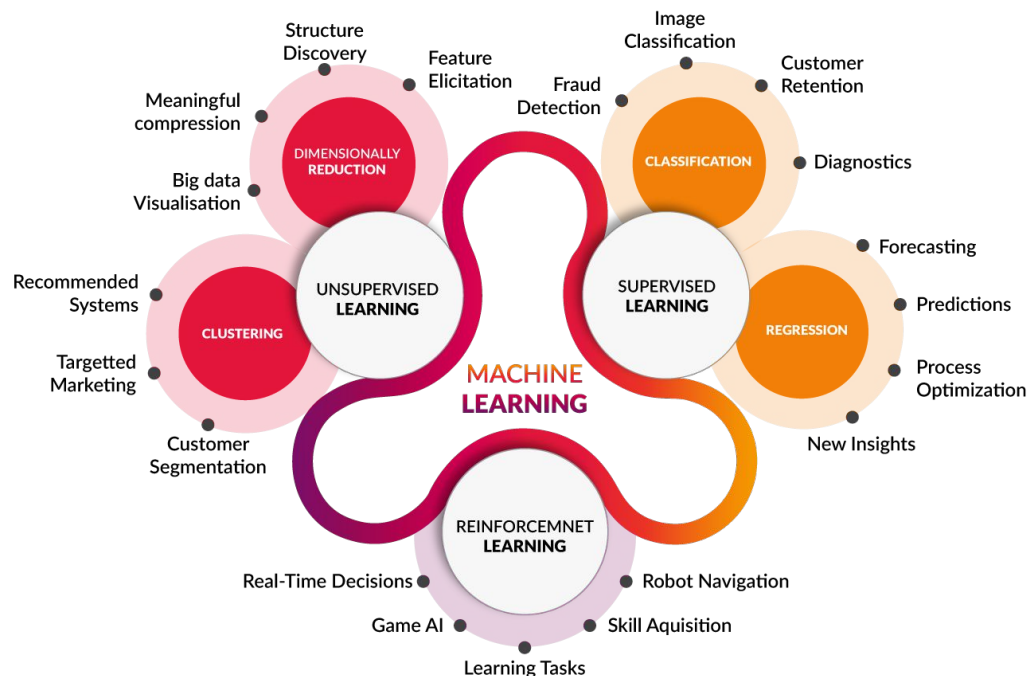
- The purpose of Machine Learning is to build computational models that can adapt and learn from experience. [2] Tom M. Mitchell, 1997
- In practical terms, machine learning algorithms aim to discover the relationship between the variables of a system (input / output) from data. [3] Cherkassky & Mulier, 2007

[2] [Machine Learning - 1997](#)

[3] Learning from Data: Concepts, Theory, and Methods 2nd Edition - 2007

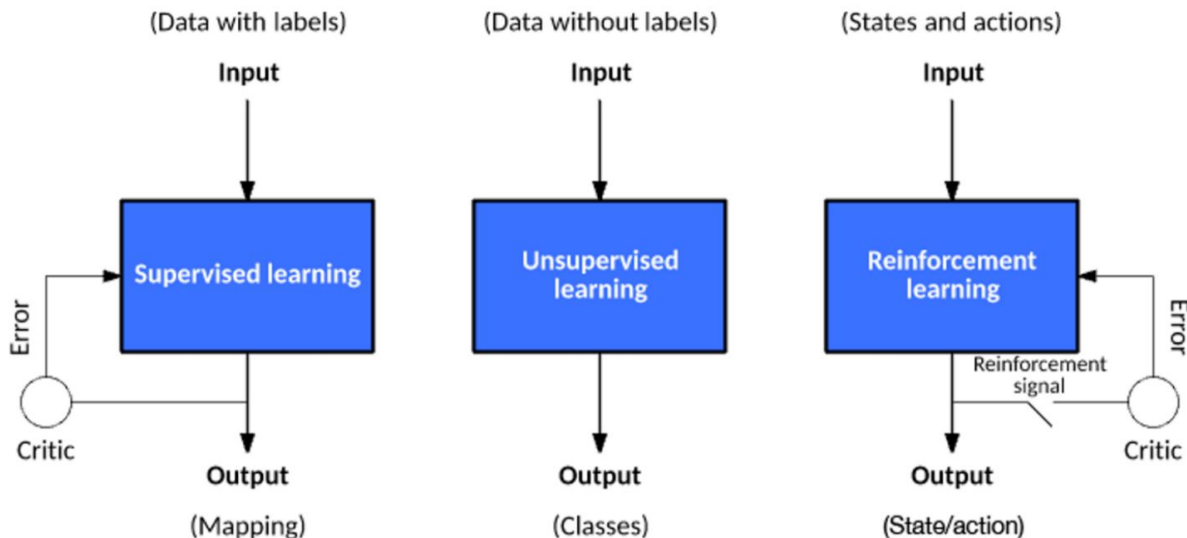
| Main types of machine learning algorithms

- There are three main types of machine learning algorithms.



| Main types of machine learning algorithms

- Basic idea of each type:



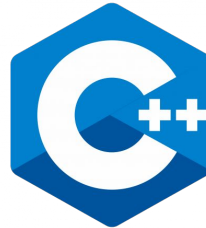
Algorithm Reinforcement learning: [Markov Decision Process](#)
Super Mario Bros: Marl/O - [Machine Learning for Video Games](#)

| Technologies

Languages used to work with Machine Learning algorithms:



Microsoft
SQL Server



Demonstration 1

- In this demo, I show the difference in practice between supervised and unsupervised Machine Learning.



Iris Versicolor

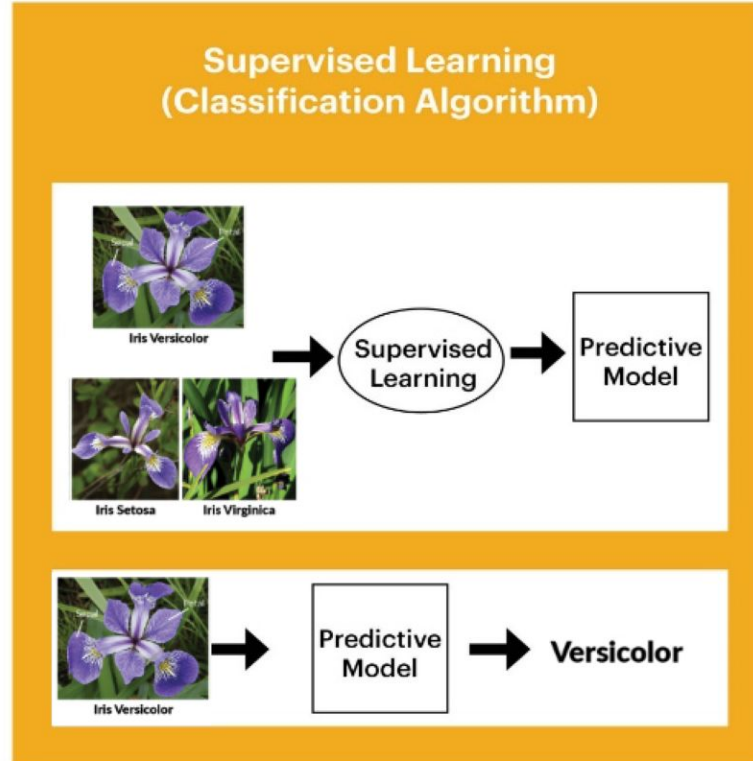


Iris Setosa



Iris Virginica

Demonstration 1 : Flow Supervised Learning

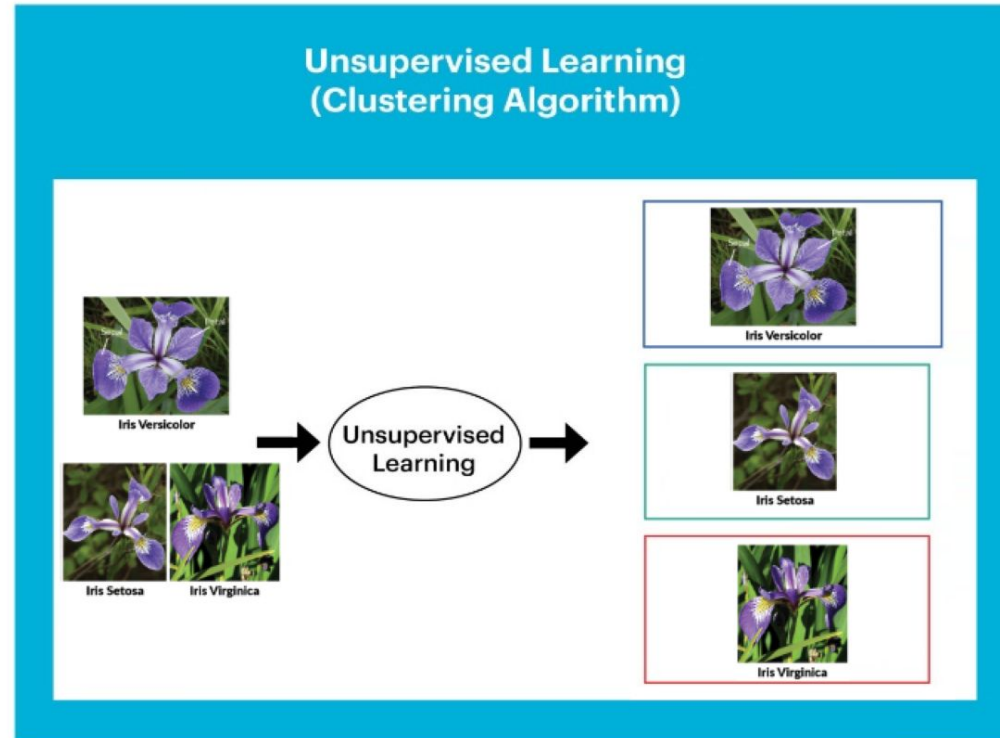


Algorithms:

[Support Vector Machine \(SVM\)](#)

[Artificial Neural Networks\(ANN\)](#)

Demonstration 1 : Flow Unsupervised Learning



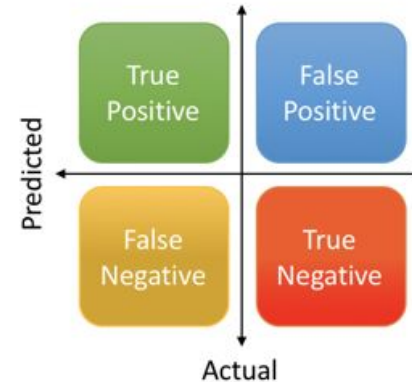
Algorithms:

[K-Means](#)

Metrics

- Metrics is the main way to validate the results of a Machine Learning algorithm. And for each type of learning, there is a metric.

$$\begin{aligned}\text{Precision} &= \frac{\text{True Positive}}{\text{True Positive} + \text{False Positive}} \\ \text{Recall} &= \frac{\text{True Positive}}{\text{True Positive} + \text{False Negative}} \\ \text{Accuracy} &= \frac{\text{True Positive} + \text{True Negative}}{\text{Total}}\end{aligned}$$

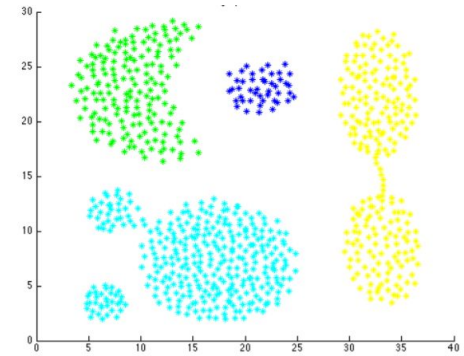
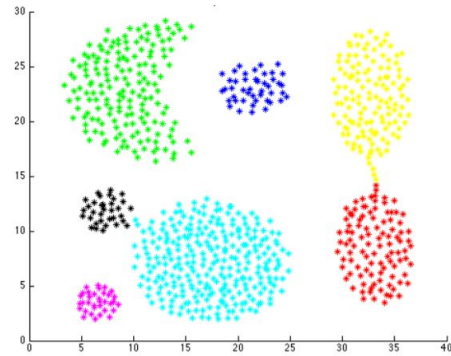


Metrics

- Cluster assessment measures:

$$\text{Índice de Rand: } \frac{(A+D)}{(A+B+C+D)}$$

$$\text{Índice de Jaccard: } \frac{A}{(A+B+C)}$$



```
indice_rand =  
0.8936  
  
indice_jaccard =  
0.6706
```

| Consuming Models

- There are two main ways to consume models created from machine learning algorithms:
 - a. Creating http endpoint:
 - programming language;
 - black-box.
 - b. Create a stream to produce / consume the input / output:
 - Apache Kafka; RabbitMQ; ActiveMQ; and etc.
 - c. Creating batch processes to process and store in storages.

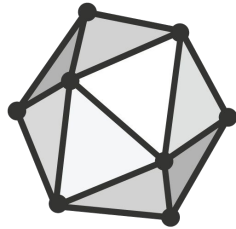
| Black-box

- They are tools and libraries that facilitate the development of models or products of Machine Learning.
 - [Amazon Machine Learning](#);
 - [Watson Machine Learning](#);
 - [AI and machine learning products](#);
 - [Azure Machine Learning](#);
 - outros.



| Consuming Models

- More recently, ONNX (Open Neural Network Exchange) technology has emerged.

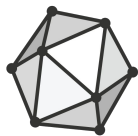


ONNX

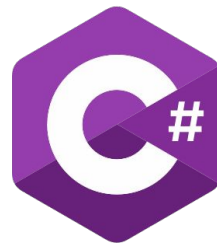
- **ONNX is an open format built to represent machine learning models.**

Demonstration 2 - The ONNX technology in action

- In this demo, a statistical model will be created in Python using the [MNIST](#) data set and this model will be used in C# to make a prediction of a drawn number.

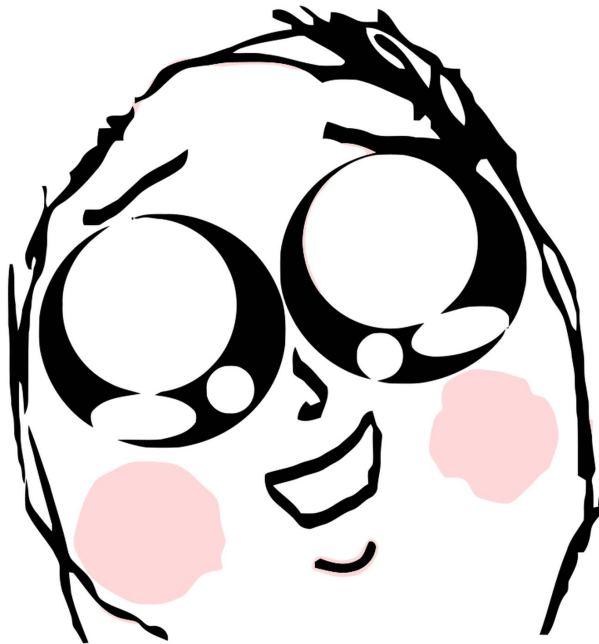


ONNX



Machine Learning : An introduction for Developers

I loved it... I want to learn more!

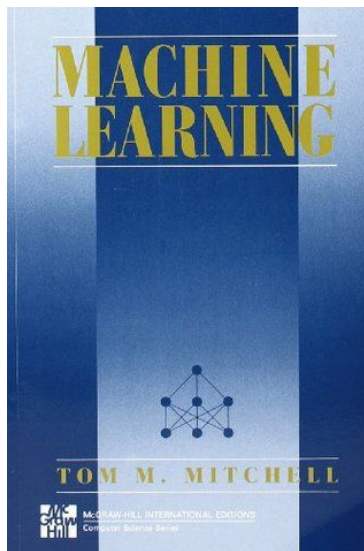


| Starting the study - Courses

- **Coursera:**
 - [Machine Learning](#), by Andrew Ng;
 - [Data Science](#).
- **EDX:**
 - [Data, Analytics and Learning](#).
- **Udemy:**
 - [Data Science A-Z™: Real-Life Data Science Exercises Included](#);
 - [Machine Learning A-Z \(Python & R in Data Science Course\)](#);
 - [Complete Google Cloud Data Engineer & Architect Course \(GCP\)](#).
- **Udacity:**
 - [Intro to Machine Learning](#);
 - [Machine Learning](#).

Machine Learning : An introduction for Developers

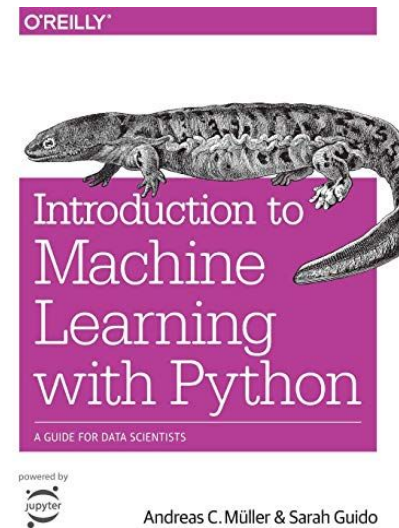
Starting the study - Books



Machine Learning, Tom Mitchell, McGraw Hill, 1997.



Introdução à Mineração de Dados: Com aplicações em R, 2016.



Introduction to Machine Learning with Python: A Guide for Data Scientists, 2016

Thank you

| Contacts



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