Machine Learning Challenge: Day 1

Welcome to the very first day of our 30 days Machine learning Challenge.

Highlights

- Core concepts of Machine Learning
- Machine Learning Process
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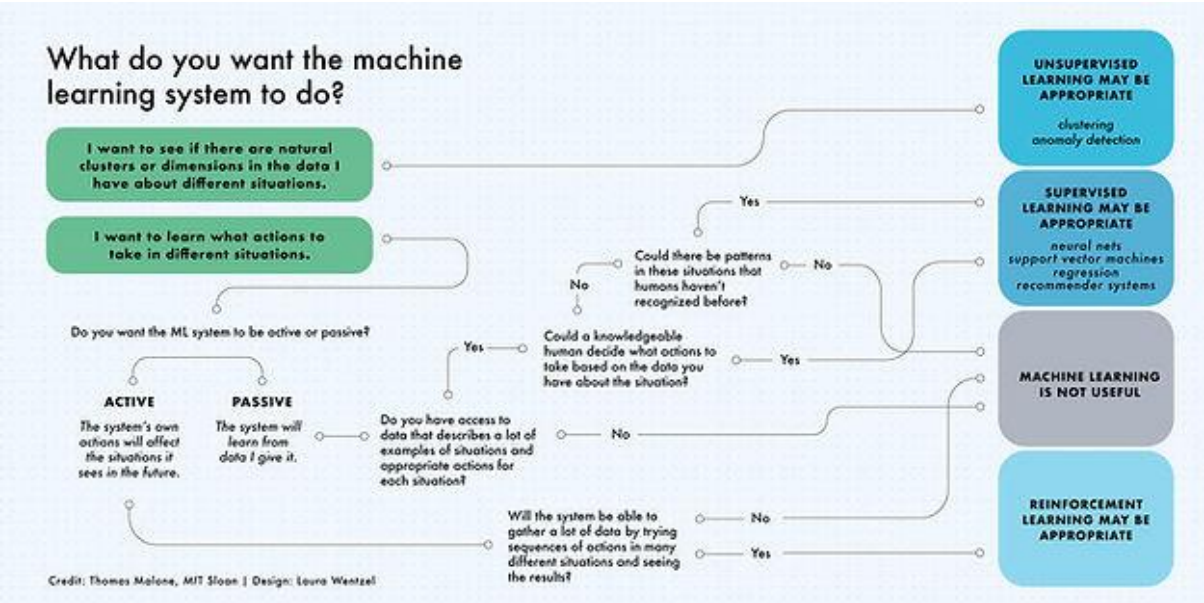
Core concepts of Machine Learning:

Machine learning is a specific branch of artificial intelligence that lets machines learn automatically from data and past experiences while looking for patterns and making predictions with little help from humans. ML applications are fed new data and can learn, grow, develop, and adapt independently.

Machine learning extracts useful information from large amounts of data by using algorithms to recognize patterns and learn in an iterative process. Instead of depending on any predefined equation that may serve as a model, ML algorithms use computation methods to learn directly from data.

During the 'learning' processes, the performance of ML algorithms improves adaptively as the number of available samples increases. Deep Learning, for example, is a sub-domain of machine learning that makes computers mimic natural human traits, such as learning from examples. It outperforms traditional ML algorithms in terms of performance parameters.



Reference: Thomas Malone | MIT Sloan. See: https://bit.ly/3gvRho2, Figure 2

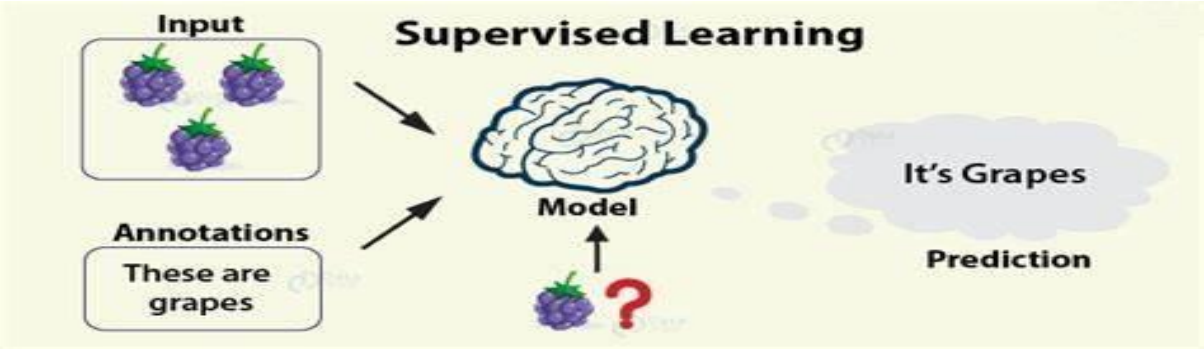
Machine learning is not a new concept. It has been used since World War II with the Enigma Machine; It is a relatively recent development to be able to apply complex mathematical calculations automatically and simply to the expanding volumes and varieties of available data.

- A machine learning system's function can be either descriptive, which means it uses the data to explain what happened, predictive, which means it uses the data to forecast what will happen, or prescriptive, which means it uses the data to recommend what action to take.

Types of Machine Learning

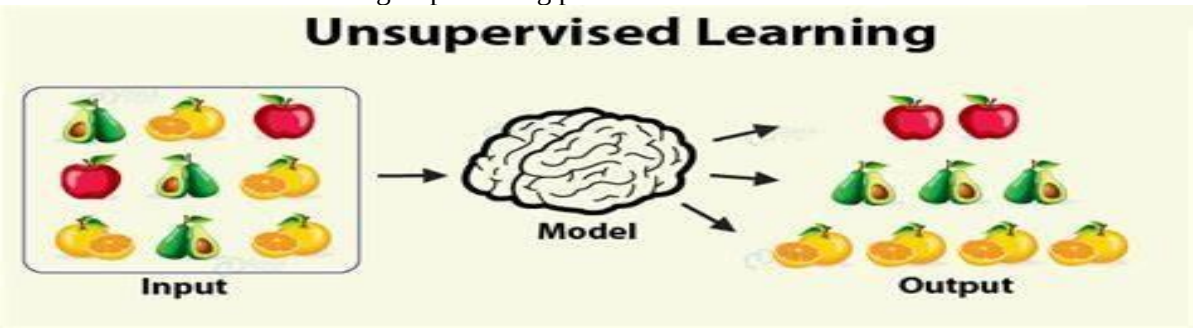
- **Supervised machine learning**

Labeled data sets are used to train supervised machine learning models, allowing them to learn and become more accurate over time. As an illustration, an algorithm may be taught using images of dogs and other objects that have all been identified by humans, and the computer would then learn how to recognize images of dogs on its own. The most popular kind of machine learning nowadays is supervised learning.



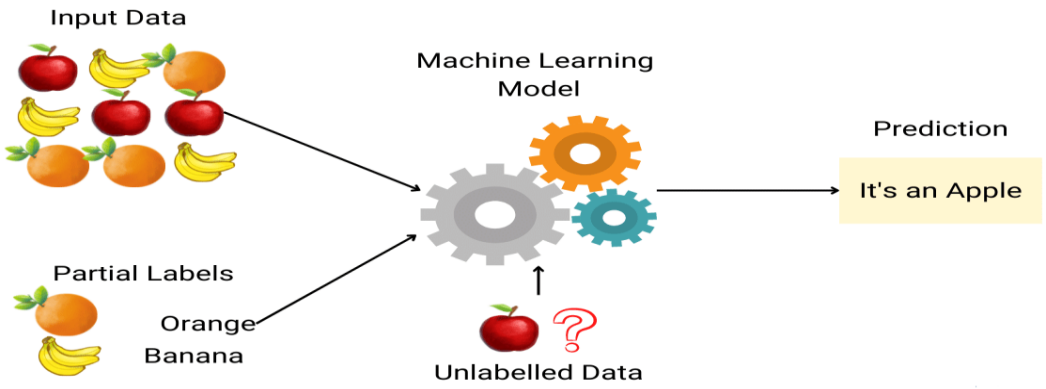
- **Unsupervised machine learning**

In unsupervised machine learning, the software scans unlabeled data for patterns. Unsupervised machine learning has the ability to identify patterns or trends that individuals are not consciously seeking. For instance, by examining online sales data, unsupervised machine learning software may determine the various customer groups making purchases.



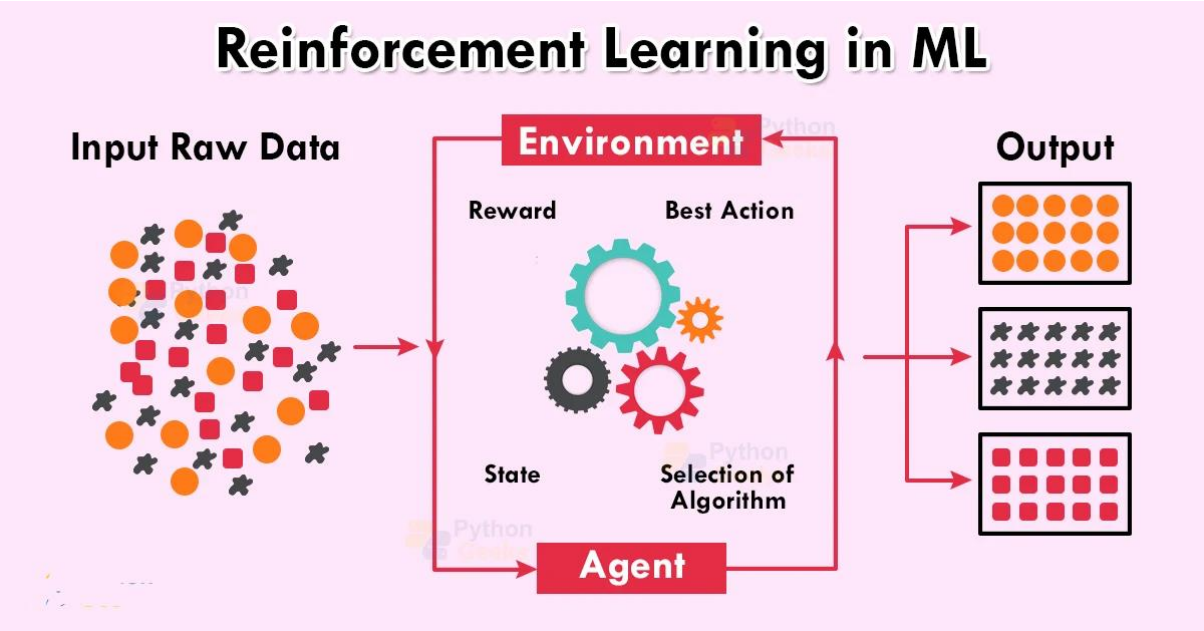
- **Semi-supervised learning**

A good compromise between supervised and unsupervised learning is offered by semi-supervised learning. It guides categorization and feature extraction from a larger, unlabeled data set during training using a smaller, labeled data set. The lack of sufficient Labeled data for a supervised learning system can be resolved via semi-supervised learning. It also helps if labelling enough data is too expensive.



- **Reinforcement machine learning**

By setting up a reward system, reinforcement machine learning teaches computers to choose the best action via trial and error. By letting the machine know when it made the appropriate choices, reinforcement learning may teach models to play games or train autonomous cars to drive. Over time, the computer will understand what actions to take.



Additionally, machine learning is related to the following additional branches of artificial intelligence:

- **Natural language processing**

In the topic of machine learning known as "natural language processing," rather than using the usual facts and numbers to teach computers, machines learn to comprehend natural language as it is spoken and written by humans. In addition to translating between languages and producing new text, this

enables robots to identify, comprehend, and respond to language. Commonplace technologies like chatbots and virtual assistants like Siri or Alexa are made possible by natural language processing.

- **Neural networks**

A popular and distinct type of machine learning technique is neural networks. Artificial neural networks are based on the human brain, which has layers made up of dozens or millions of linked processing nodes.

An artificial neural network comprises interconnected cells, or nodes, where each cell processes inputs and generates an output sent to neighbouring neurons. Labeled data is transmitted across the nodes, or cells, where each cell has a specific purpose. The various nodes of a neural network trained to determine whether an image contains a cat would evaluate the data and produce an output indicating whether a picture has a cat.

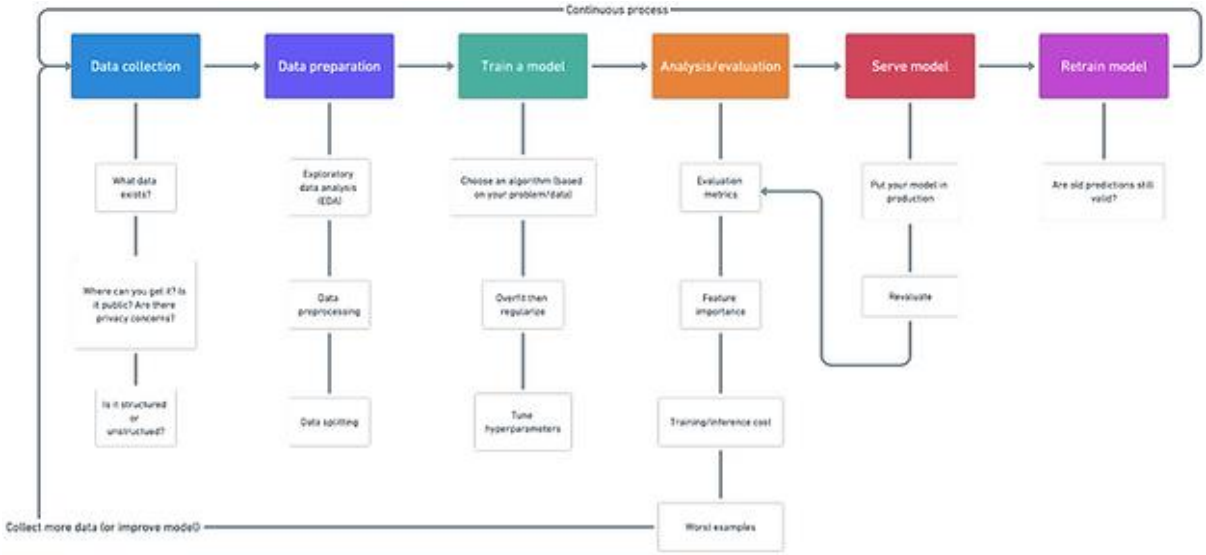
- **Deep Learning**

Deep learning neural networks are multi-layered neural networks. For instance, in an image recognition system, some layers of the neural network might detect individual features of a face, like eyes, noses, or mouths, while another layer would be able to tell whether those features appear in a way that indicates a face. The layered network can process large amounts of data and determine the "weight" of each link in the network.

Like neural networks, deep learning is based on how the human brain functions and is used to power various machine learning applications, including chatbots, autonomous cars, and medical diagnostics.

Machine Learning Process:

The working of Machine learning consists of a few essential steps. The trained ML algorithm predicts based on the built-in model when new input data is introduced.



Please remember that the above image depicts a high-level use case scenario. However, typical machine learning examples may include many additional factors, variables, and steps.

The prediction of the model is then verified. The ML algorithm is repeatedly deployed or trained with an improved training, new features, and hyper-parameter dataset until the desired accuracy is achieved. Given below are the steps of working machine learning:

Step 1: Data Collection
Your data's specific quantity or quality dictates how accurate our model is. The result of this step is a representation of data that will be used for training.

Step 2: Data Preparation
This step includes Wrangling your specific data and preparing it for training. This step includes data randomization, data cleaning, data visualization, and splitting of data into training sets and specific evaluation sets.

Step 3: Choose a Model
In this step, Different algorithms are used for different tasks to choose the right model.

Step 4: Train the Model
The training aims to correctly answer a question or make a prediction for the future as often as possible.

Step 5: Evaluate the Model
The model evaluation uses some metric or specific combination of metrics to "measure" the objective performance of the specific model.

Step 6: Serve or Deploy the Model
An ML model is deployed when it is integrated into a production environment, and output is obtained to support business decisions.

Step 5: Retain the Model

When a machine learning (ML) model is retrained, the same architecture and hyper parameters are used, and the model is then trained on the most recent set of data. But the model can also undergo more alterations and improvements. In essence, model retraining should be used if the intent of training a new model is to address performance decline and model staleness.