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What is Machine Learning?

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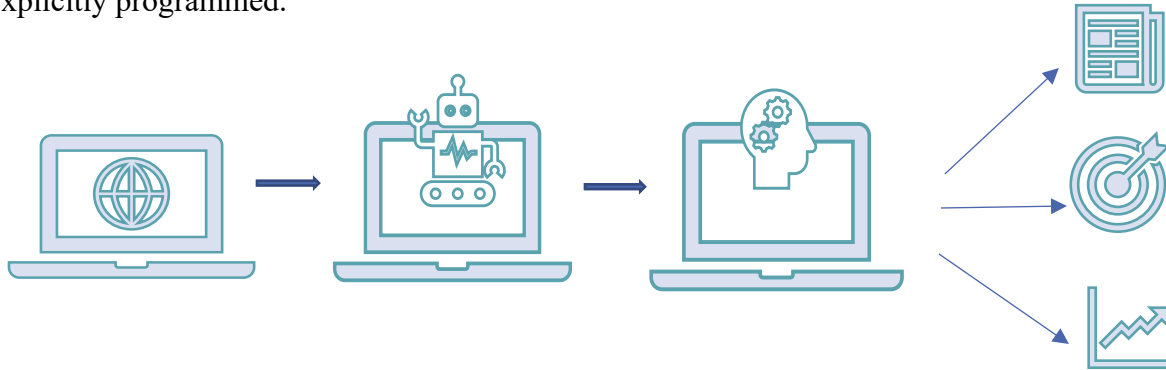
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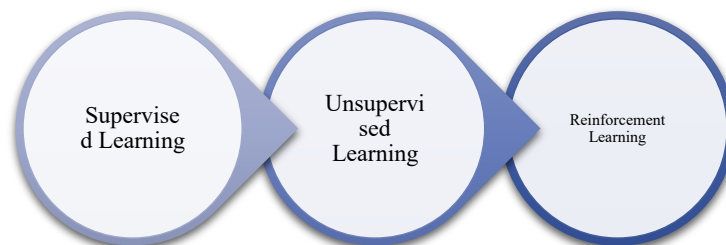
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Define machine learning and describe the main types of machine learning algorithms.

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.

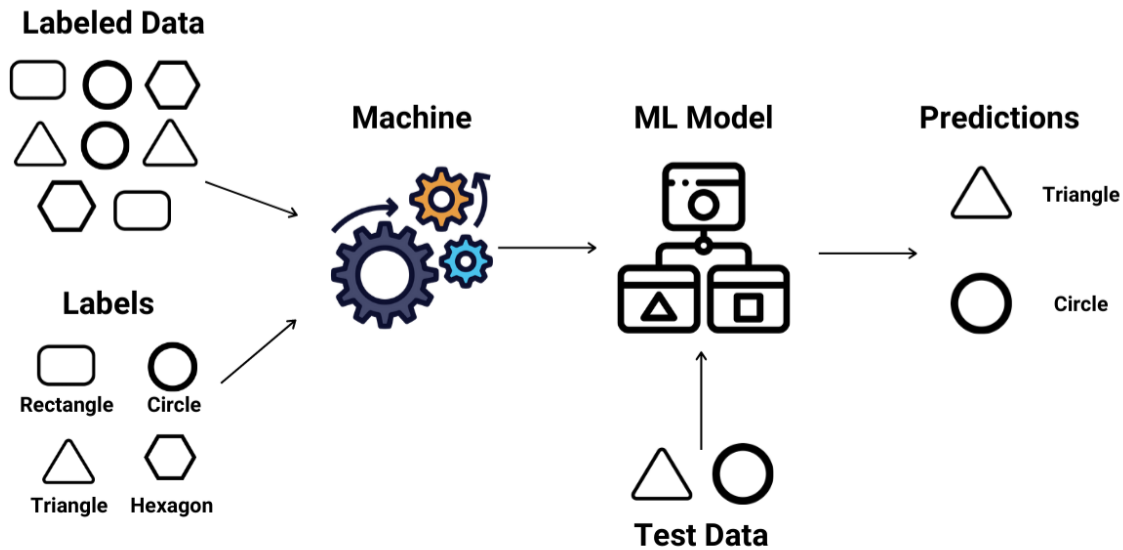


Types of Machine Learning



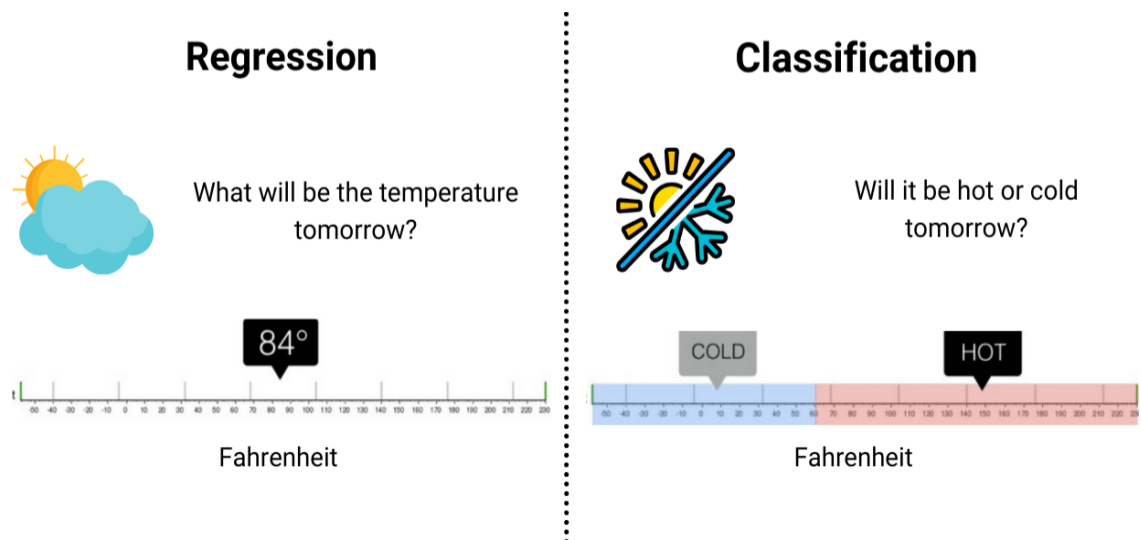
- **Supervised Learning:** Supervised Learning as the name indicates the presence of a supervisor or a teacher. Basically, supervised learning is a learning in which we teach or train the machine using data which is well labeled that means some data is already tagged with the correct answers. After that, the machine is provided with a new set of examples(data) so that the supervised learning algorithm analyses the training data (set of training examples) and produces a correct outcome from labeled data.

Example:



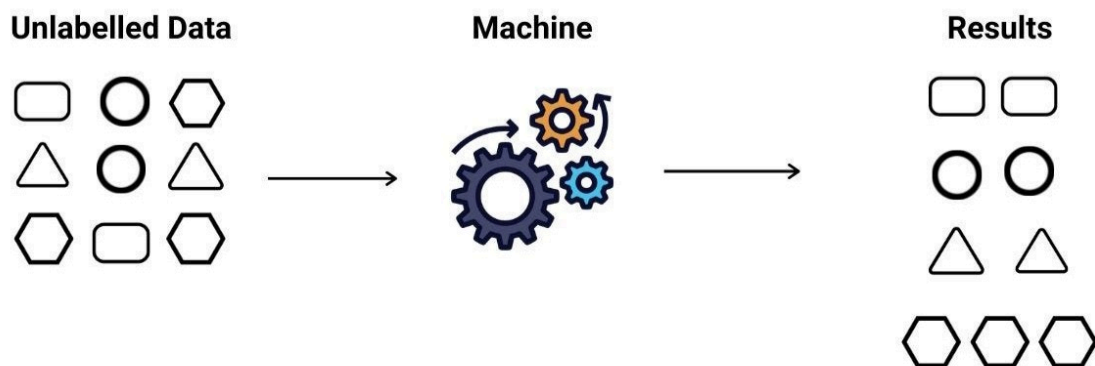
Types: Supervised learning classified into two categories of algorithms.

- i. Classification: A classification problem is when the output variable is a category, such as “Red” or “Blue” or “Disease” or “No disease”.
- ii. Regression: A regression problem is when the output variable is a real value, such as “Dollars” or “Weight”.

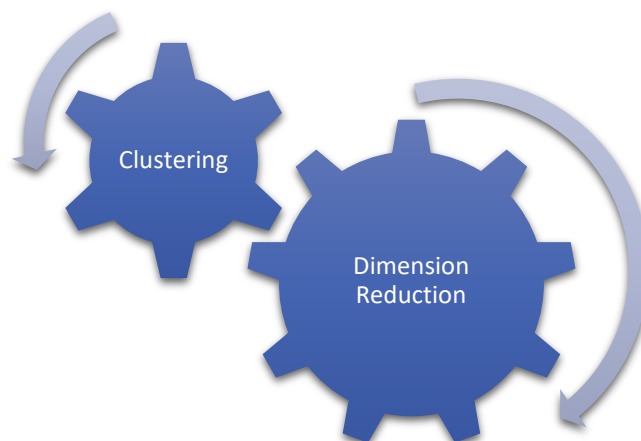


- **Unsupervised Learning:** Unsupervised learning is a machine learning technique, where one does not need to supervise the model. Instead, you need to allow the model to work on its own to discover information. It mainly deals with the unlabeled data. Unsupervised learning algorithms allow one to perform more complex processing tasks compared to supervised learning. Although, unsupervised learning can be more unpredictable compared to other natural learning methods.

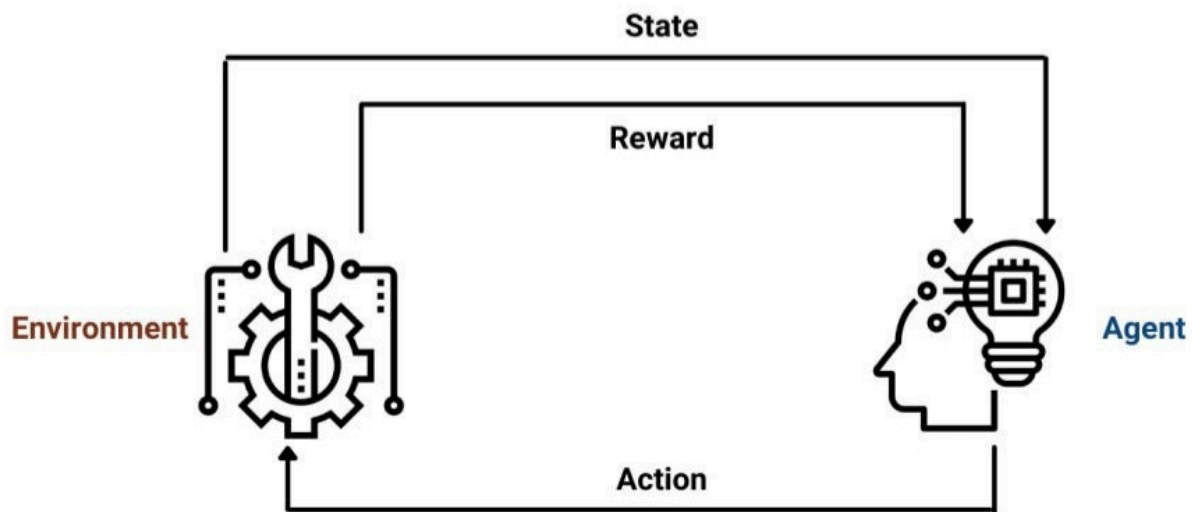
Example:



Types: Unsupervised learning is classified into two categories of algorithms:

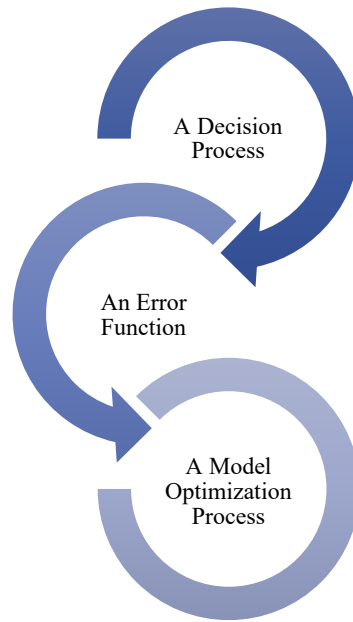


- **Reinforcement Learning:** Reinforcement learning can be understood using the concepts of agents, environment, states, actions and rewards.



How it works: A machine learning algorithm's learning system is divided into three major components by UC Berkeley.

- **A Decision Process:** Machine learning algorithms are typically used to create a forecast or classify something. Your algorithm will generate an estimate about a pattern in the input data based on some labelled or unlabeled input data.
- **An Error Function:** The prediction of the model is evaluated by an error function. If there are known instances, an error function can compare them to determine how accurate the model is.
- **A Model Optimization Process:** The weights are changed to lessen the difference between the known example and the model estimate if the model can match the training set's data points more accurately. Until a predetermined level of accuracy is reached, the algorithm will iteratively update weights through the "evaluate and optimize" procedure.



Common Machine Learning Algorithms: There are numerous machine learning algorithms in use. These comprise:

Neural networks: Neural networks, which have a massive number of connected processing nodes, mimic how the human brain functions. Neural networks are effective at identifying patterns and are crucial in applications such as speech recognition, image creation, natural language translation, and image recognition.

Linear regression: The process known as linear regression uses a linear relationship between several values to predict numerical values. The method, for instance, may be used to forecast housing prices based on local historical data.

Logistic regression: For categorical response variables, such as "yes/no" responses to questions, logistic regression is a supervised learning approach that produces predictions. It can be applied to tasks like sorting spam and performing quality control on a production line.

Clustering: Unsupervised learning is used by clustering algorithms to find patterns in data so that it can be grouped. By spotting distinctions between data points that humans have missed, computers can aid data scientists.

Decision trees: Decision trees are useful for both categorizing data and regression, which is the prediction of numerical values. Decision trees employ a branching series of connected decisions that can be visualized as a tree. Unlike the black box of the neural network, decision trees are simple to validate and audit, which is one of their advantages.

Random forests: In a random forest, the machine learning algorithm combines the output from various decision trees to predict a value or category.

That's all about machine learning and the main types of machine learning algorithms.