

Machine Learning Introduction:

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What is Machine Learning?

Machine Learning (ML) is a subset of Artificial Intelligence (AI) that enables computers to learn from data and improve themselves without being explicitly programmed. Although Machines are stone-hearted, they can also learn. That's how our phone recognizes our fingerprint, that's how google voice translates our speech to text and that's how Siri communicates with us.

Machine learning is learning based on experience. As an example, it is like a person who learns to play chess through observation as others play. In this way, computers can be programmed through the provision of information in which they are trained, acquiring the ability to identify elements or their characteristics with high probability.

As we've seen that machines are becoming more and more intelligent, ML has been applied to Business, Health Care, Finance, Agriculture and several other sectors.

Categories of ML:

There are three main categories of machine learning:

- **Supervised learning(Classification):** The machine learns from labeled data. Normally, the data is labeled by humans.
- **Unsupervised learning(clustering):** The machine learns from un-labeled data. Meaning, there is no "right"

answer given to the machine to learn, but the machine must hopefully find patterns from the data to come up with an answer.

- **Reinforcement learning:** The machine learns through a reward-based system.

Stages of ML:

Stages of machine learning:

- data collection
- data sorting
- data analysis
- algorithm development
- checking algorithm-generated
- the use of an algorithm to further conclusions

To look for patterns, various algorithms are used, which are divided into **two groups**:

- Supervised learning
- Unsupervised learning

Supervised learning implies the computer ability to recognize elements based on the provided samples. The computer studies it and develops the ability to recognize new data based on this data. For example, we can train our

computer to filter spam messages based on the previously received information.

Supervised learning is the most common and studied type of learning because it is easier to train a machine to learn with labeled data than with un-labeled data.

Depending on what you want to predict, supervised learning can be used to solve two types of problems: **regression** or **classification**.

Regression Problem:

If we want to predict continuous values, such as trying to predict the cost of a house or the weather outside in degrees, we would use regression. This type of problem doesn't have a specific value constraint because the value could be any number with no limits.

Classification Problem:

If we are interested in a problem like: "***Am I ugly?***" then this is a classification problem because we trying to classify the answer into **two** specific categories: **yes** or **no** (in this case the answer is yes to the question above). This is also called a, **binary classification problem**.

Unsupervised Learning:

With **unsupervised learning**, our machine receives only a set of input data. Thereafter, the machine is up to determine the relationship between the entered data and any other hypothetical data. Unlike supervised learning, where the machine is provided with some verification data for learning, independent Unsupervised learning implies that the computer itself will find patterns and relationships between different data sets. Unsupervised learning can be further divided into clustering and association.

Since there is no labeled data for machines to learn from, the goal for unsupervised machine learning is to **detect patterns** in the data and to group them. Unsupervised learning machines trying to learn “on their own”, without help.

Depending on what you want to group together, unsupervised learning can group data together by **clustering** or **association**.

Clustering Problem:

Unsupervised learning tries to solve this problem by looking for similarities in the data. If there is a common cluster or group, the algorithm would then categorize them in a certain form. An example of this could be trying to group customers based on past buying behavior.

Association Problem:

Unsupervised learning tries to solve this problem by trying to understand the rules and meanings behind different groups. Finding a relationship between customer purchases is a common example of an association problem. Stores may want to know what type of products were purchased together and could possibly use this information to organize the placement of these products for easier access. One store found out that there was a strong association between customers buying **beer and diapers**. They deduced from this statement that males who had gone out to buy diapers for their babies also tend to buy beer as well.

Reinforcement Machine Learning

This type of machine learning requires the use of a **reward/penalty system**. The goal is to reward the machine when it learns correctly and to penalize the machine when it learns incorrectly.

Reinforcement Machine Learning is a subset of Artificial Intelligence. With the wide range of possible answers from the data, the process of this type of learning is an iterative step. It continuously learns.

Examples of Reinforcement Learning:

- Training a machine to learn how to play ([Chess, Go](#))
 - Training a machine about how to learn and play [Super Mario](#) by itself
 - Self-driving cars

Some **Supervised learning algorithms** are:

- Decision trees
- Support-vector machine
- Naive Bayes classifier
- k-nearest neighbors

- linear regression

Some **Unsupervised learning algorithms** are:

- Kmeans
- Kmedoid
- Hierarchical clustering

Applications of Machine Learning

- **Healthcare**
- **Social Network**
- **Finance**
- **E-commerce:**
- **Biology and many more**

References:

1. <https://towardsdatascience.com/beginners-guide-to-machine-learning-with-python-b9ff35bc9c51>

