

# "A brief Introduction of Machine Learning with different Tasks and Applications"

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**ABSTRACT:** Machine Learning is a field of computer science that allows computers to learn without being programmed explicitly. Machine learning is used in a variety of computational tasks for which the design and programming of explicit algorithms with good performance is not easy. Machine learning is the central area of artificial intelligence. Applications include email filtering, intruder discovery, or malicious insiders looking for data breaches. One of the fundamental objectives of machine learning is to train computers to use data to solve a specific problem. A number of machine learning applications, such as e-mail classifiers, can distinguish between spam and other messages, fraud detection. Machine learning focuses on automatic methods. In this article, we will focus on the basics of machine learning with its basic approaches and its comparison based on the use machine learning applications. It Provides drain level related to ML methodologies. It also covers the various applicable domains that use ML approaches.

**Key Words:** Machine Learning, Supervised Learning, Unsupervised Learning, Reinforcement Learning

## 1. INTRODUCTION

Machine learning is a branch of artificial intelligence that allows information systems to learn directly from examples, data and experiences. The Machine Learning field evolved from the broad field of Artificial Intelligence, which aims to mimic intelligent abilities of humans by machines. By enabling computers to perform specific tasks intelligently, machine learning systems can perform complex processes by learning from data rather than following pre-programmed rules. Machine learning is used to teach machines how to handle the data more efficiently. Sometimes after viewing the data, we cannot interpret the pattern or extract information from the data. In that case, we apply machine learning. The purpose of machine learning is to learn from the data. Many studies have been done on how to make machines learn by themselves. Machine learning, by definition, is an information technology field that has evolved from the study of model recognition and computational learning theory to artificial intelligence. It is learning and building algorithms that can learn and make predictions on data sets. Machine learning is a paradigm that can refer to lessons learned from past experience (historical data) to improve future performance. Machine learning methods are the only goal in this area. Learning refers to the modification or improvement of an algorithm based on "experiences" passed automatically without any external assistance from human beings. When designing a machine (software), the programmer always has a specific goal in mind. These procedures work by constructing an example input model for making predictions or choices based on data rather than following static program instructions.

We need machine learning in the following cases:

- Human competence is absent. For example Navigate on Mars.
- Humans are unable to explain their expertise. For example, Speech Recognition.
- The solution changes over time E. g. Temperature control.
- The solution must be adapted to particular cases. For example Biometrics.
- The size of the problem is too important for our limited reasoning skills. For example, calculating the ranks of web pages.

## 2. DIFFERENT TASKS OF MACHINE LEARNING

Machine learning tasks are typically categorized into three main categories.

- ❖ Supervised learning
- ❖ Unsupervised learning
- ❖ Reinforcement learning

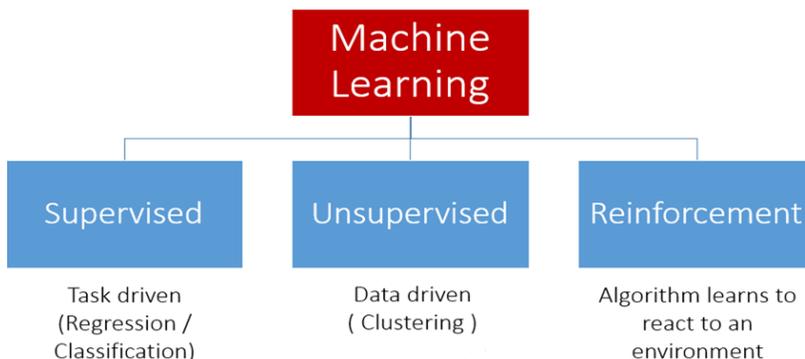


Figure 1: Machine Learning different tasks

❖ **Supervised learning**

In supervised learning, the learning set consists of a pair of desired inputs and outputs, with the aim of learning how to map between input and output spaces. Supervised machine learning is a work based on a predefined set of "training examples", which then facilitates its ability to reach an accurate conclusion when new data are provided.

❖ **Unsupervised machine learning:**

Unsupervised learning refers to how to learn by yourself, by discovering and adopting, depending on the input model. In this learning, the data is divided into different clusters and this learning is called the classification algorithm.

This is the task of machine learning to infer a function that describes the hidden structure of "unlabeled" data. Because the examples specified to the learner are not labeled, there is no evaluation of the accuracy of the structure generated by the appropriate algorithm, which makes it possible to distinguish unsupervised learning from supervised learning and reinforcement learning. The problem of density estimation in statistics is a central case of unsupervised learning.

❖ **Reinforcement learning:**

A computer program interacts with a dynamic environment in which it must reach a certain objective. The program receives comments in terms of rewards and punishments as it navigates through its problematic space.

Reinforcement learning is, in a sense, between supervised learning and unsupervised learning. Unlike unsupervised learning, there is some form of monitoring, but it is not about specifying the desired result for each data entry. Instead, a reinforcement learning algorithm receives feedback information from the environment only after selecting an output for a particular input or observation. The feedback indicates to what extent the result, called action in reinforcement learning, meets the learner's objectives.

Reinforcement learning is applied to the sequential decision-making problems in which the learner interacts with an environment performing sequential actions (the results, based on their observations, their contributions) while receiving comments, in each selected action. Reinforcement learning is based on the results, according to the way an agent must act in an environment to maximize the notion of long-term reward. A reward is awarded for a correct exit and a penalty for an incorrect exit.

**3. Example of Supervised Learning, Unsupervised Learning and Reinforcement Learning**

If you teach your child different types of fruits available around the world by displaying the image of each fruit (X) and its name (Y), then it is a supervised learning.

- If you ask your child to put apples in different cubes according to their size or color, this is unsupervised learning.
- If you give apples to your child in the morning only after brushing your teeth, this is a reinforcement learning.

**4. Difference between Supervised and Unsupervised Learning:**

	<b>Supervised Learning</b>	<b>Unsupervised Learning</b>
<b>Input Data</b>	Uses Known and Labeled Data as input	Uses Unknown Data as input

Computational Complexity	Very Complex	Less Computational Complexity
Real Time	Uses off-line analysis	Uses Real Time Analysis of Data
Number of Classes	Number of Classes are known	Number of Classes are not known
Accuracy of Results	Accurate and Reliable Results	Moderate Accurate and Reliable Results

**Table:1 Supervised Learning Vs Unsupervised Learning****5. APPLICATION OF MACHINE LEARNING**

This section develops classified machine learning applications based on different machine learning algorithms, as part of supervised learning and unsupervised learning.

❖ **Supervised Learning**

- Any automated voice system on your cell phone will train your voice and then start operating based on that training.
- Based on several characteristics (face-to-face history, throwing, player vs. player), WASP predicts the winning percentage of both teams.
- Train your handwriting to the OCR system and once you are trained, you can convert your handwritten images into text.
- On the basis of some previous knowledge (in sunny weather, high temperature, cloudy weather, humidity, etc.), weather applications predict the parameters for a given time.
- Based on the previous spam information, filter a new incoming email in the Inbox (normal) or Spam (Spam) folder.
- The biometric or ATM presence systems, in which the machine trains after some inputs (of its biometric identity: thumb, iris or ear lobe, etc.), can validate its future entries and identify it.

❖ **Unsupervised Learning**

- A friend invites you to his party where you meet strangers. Now you will classify them using unsupervised learning (without previous knowledge) and this classification can be based on gender, age group, clothing, diploma or any other medium you want. Why is this learning different from supervised learning? As he did not use any previous / prior knowledge about people and classified them as "to take".
- NASA discovers new celestial bodies and finds them different from the previously known astronomical objects: stars, planets, asteroids, black holes, etc., intensity, gravitational force, red / blue displacement or other.
- Suppose you have never seen a cricket match and by chance, watching a video on the Internet, you can now classify players according to different criteria: class (drummers, bowlers, players) or at the base of a hand (RH) vs. LH) or some other way of observing [and classifying].
- We are conducting a survey of 500 questions about the prediction of the IQ level of university students. As this questionnaire is too large, after 100 students, the administration decides to reduce the questionnaire to fewer questions and uses a statistical procedure such as the PCA.

**6. Conclusion**

The article illustrates the concept of machine learning with its tasks and applications. Human beings have always tried to build a comfortable life. The proof is that we have always relied on machines to make our work easier, faster and more efficient. In the past, machines have been used to reduce the manual labor required, but today, with the advent of machine learning, humans seek to build machines that are not only powerful but also intelligent, hence their appearance. As such Field of study that is always in bloom. Machine learning has not only made machines autonomous by promoting the concept of stand-alone computing, it has also reduced the constant vigilance that users need to maintain applications. In this article, we analyze the three categories of machine learning, namely, supervised learning, unsupervised learning

and reinforcement learning, and also examples and the difference between supervised learning and unsupervised learning. Then, after many applications. The main objective of machine learning is to develop algorithms that facilitate the creation of intelligent machines, reducing the number of tasks of the programmers as the machine learns to improve its performance over time. Therefore, the applications of machine learning are endless and it remains an active field of research with immense development opportunities and a promising future.

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