

# Machine Learning Algorithms and Its Applications: A Survey

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**Abstract:** In today's world, many microcomputers are being developed in every field. The data we receive contains valuable information for predicting the future. Due to its enormous size, physical forecasting presents a complex task for humans. To overcome this problem, a data model is developed to predict the future by scenario with the help of training data and test datasets. There are many types of machine learning algorithms and tools to train a machine or data model. This paper will emphasize a comprehensive review of some machine learning algorithms (ML) and methods used in several applications and domains.

**Keywords:** Microcomputers, Predicting, Machine Learning, Data Model, Machine-Learning Algorithms

## 1. INTRODUCTION

Machine learning (ML) is a subset of artificial intelligence (AI). Machine learning (ML) can be used to derive applications from human-like experience. As data is fed into these applications, they learn to grow and adapt to experience. This is done by using CRAM algorithms from the data in an iterative process. Applications that use ML use pattern recognition to respond to various data that is fed as input to the application. Machine learning is an applications ability to react to new data we provide as input using iteration. Machine learning algorithms help the computer learn how to predict outputs based on the previous examples we have given it and the correlation between the data we feed as input data and output data called the training data set. The relationship between inputs and outputs of any model is improved incrementally by testing its predictions and correcting it when incorrect output is obtained. Machine learning (ML) is a set of computerized methods for learning about various outliers in data.

The ability for a machine to automatically learn from data, enhance performance based on prior experiences, and make predictions is known as machine learning. Collections of algorithms used in machine learning operate on vast amounts of data. These algorithms are fed data to train them, and after training, they develop a model and carry out a certain task. These ML techniques support the resolution of numerous business issues, including clustering, associations, forecasting, classification, regression, and others.

Based on the methods and way of learning, machine learning is divided into mainly four types.

### 1.1 Types of Machine Learning

Following are the various types of machine learning;

1. Supervised Machine Learning
2. Unsupervised Machine Learning

3. Semi-Supervised Machine Learning
4. Reinforcement Learning

Following figure 1 shows the types of machine learning.

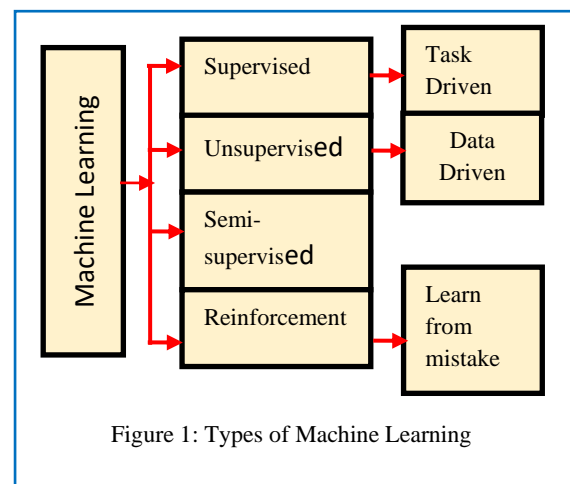


Figure 1: Types of Machine Learning

#### 1.1.1 Supervised Machine Learning

As its name suggests, supervised machine learning is based on supervision. It means in the supervised learning technique, we train the machines using the "labelled" dataset, and based on the training, the machine predicts the output. Here, the labelled data specifies that some of the inputs are already mapped to the output. More precisely, we can say; first, we train the machine with the input and corresponding output, and then we ask the machine to predict the output using the test dataset.

#### 1.1.2 Unsupervised Machine Learning

Unsupervised learning is different from the supervised learning technique; as its name suggests, there is no need for supervision. It means, in unsupervised machine learning, the machine is trained using the unlabeled dataset, and the machine predicts the output without any supervision.

### 1.1.3 Semi-Supervised Machine Learning

Semi-Supervised learning is a type of Machine Learning algorithm that lies between Supervised and Unsupervised machine learning. It represents the intermediate ground between Supervised (With Labelled training data) and Unsupervised learning (with no labelled training data) algorithms and uses the combination of labelled and unlabeled datasets during the training period.

### 1.1.4 Reinforcement Learning

Reinforcement learning works on a feedback-based process, in which an AI agent (A software component) automatically explore its surrounding by hitting & trail, taking action, learning from experiences, and improving its performance. Agent gets rewarded for each good action and get punished for each bad action; hence the goal of reinforcement learning agent is to maximize the rewards.

## 2. LITERATURE REVIEW

Pinky Gupta (2022) has designed a survey form to gather data from all respondents in order to understand how people use machine learning in their daily lives. People are aware of machine learning technologies, according to her survey. so that it is possible to claim that humans are utilizing cutting-edge technology. According to the survey response she received, machine learning is the process of trying to teach a computer what to perform using the code. Artificial intelligence (AI) systems are used to carry out complicated tasks in a manner akin to how people solve issues.

Meherwar Fatima et al.(2017) presents an overview of various machine learning methods for diagnosing diseases like hepatitis, dengue, and the disorders of the heart, liver, and diabetes. Numerous algorithms have produced positive outcomes because they correctly detect the feature. The survey outlines the benefits and drawbacks of various algorithms. Improvement graphs of machine learning algorithms for prediction of diseases are presented in detail. From analysis, it can be clearly observed that these algorithms provide enhanced accuracy on different diseases. This survey paper also provides a suite of tools that are developed in community of AI. These tools are very useful for the analysis of such problems and provide opportunity for the improved decision making process.

Raja Irfan Ahmad Mir describes an overview of machine learning, including its fundamental model, applications in a variety of industries, as well as advantages and disadvantages. Additionally, it looks at a variety of machine learning techniques and tools, including classification and prediction methods, as well as their goals, methods of operation, advantages, disadvantages, real-world applications, and implementation tools. Emerging advances in artificial intelligence and machine learning call for the strong foundations of the aforementioned approaches, and they will be helpful in cross-disciplinary domains as well.

## 3. APPLICATIONS OF MACHINE LEARNING

Machine learning is about how we develop and design our program to automatically improve their performance through its effects in the world of technology. [1]

Following figure 2 shows various machine learning applications.

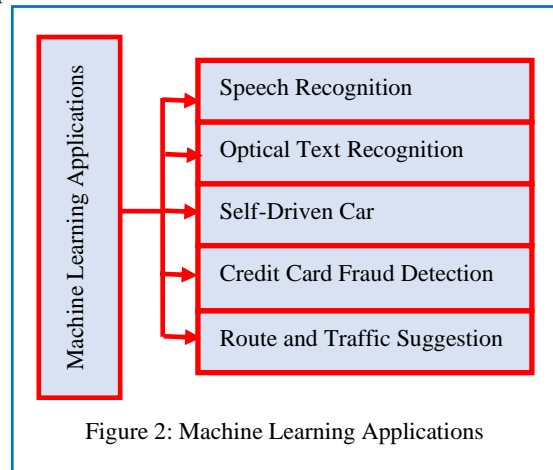


Figure 2: Machine Learning Applications

### 3.1 Speech Recognition

The automatic speech recognition (ASR) and machine learning (ML) groups have increasingly influenced one another in recent years. This is demonstrated by the recent occurrence of a number of dedicated workshops by both communities as well as by the fact that significant ML-centric conferences include sessions on voice processing and vice versa. community to establish assumptions on an issue, create exact mathematical theories and methods to solve the problem in light of those assumptions, but then evaluate on data sets that are generally small and occasionally fabricated [2].

### 3.2 Optical Text Recognition

The process of turning scanned images of printed, handwritten, or typewritten text into machine-encoded text is known as optical character recognition (OCR). Through an optical system, this technology makes it possible to recognize characters automatically. In the case of humans, our eyes are an optical system. Eyes provide the brain with an image to process. OCR is a technology that mimics human reading ability and it cannot match a human reader's ability to read. With the use of OCR technology, you can turn a variety of documents into editable and searchable data, including scanned paper documents, PDF files, and digital camera photographs [3].

### 3.3 Self-Driving Cars

Without the need for human intervention, an autonomous car can recognize its surroundings and drive itself. A driverless or self-driving car is another name for an autonomous vehicle. Without a human operator, it executes software and travels between locations using a combination of sensors, actuators, machine learning systems, and powerful algorithms. The sensors collect information about the environment in real-time, such as geographic coordinates, the vehicle's acceleration, speed, and potential impediments [4].

### 3.4 Credit Card Fraud Detection

Most people throughout the world are most aware of frauds because they have been in the news frequently over the past few years, particularly credit card thefts. Because there will be more valid transactions than fraudulent ones, the credit card dataset is rather unbalanced. EMV cards, which are smart cards that save their data on integrated circuits rather than magnetic stripes as technology advances, have made some on-

card payments safer, although card-not-present fraud rates are still higher. As chip card security has improved, the US Payments Forum study, thieves' attention has switched to crimes involving CNP transactions [5].

### 3.5 Route and Traffic Suggestions

Internet Map Applications like Google Maps recommend the noteworthy path to follow in order to go to our destination. These cues are delivered at the idea of carefully constructed computations. From outside data on speed, locations of cars, etc. It will store all the data on the appropriate server. Our ability to analyze congestion and nice directions is aided by machine learning methods [1].

## 4. ADVANTAGE AND DISADVANTAGES OF MACHINE LEARNING ALGORITHMS

There are several distinctive kinds of algorithms, each with a particular goal and working method. For instance, methodologies influenced by neural networks and tree-based algorithms. The methodology we'll employ in this case is considered to be the most beneficial for cluster processes. Even though these are not ideal, this grouping strategy is appropriate. Additionally, some algorithms can easily fit into a variety of categories.

Following are some of the machine learning algorithms;

**a) Decision Tree Based Classification:** A decision tree algorithm is a kind of categorization that is mainly used to create a model in the form of a structure that resembles a tree like having (root, branch, and leaf), that is based on previous knowledge to categorize or estimate class or identify factors of future (new data) that we can get with the aid of decision rules or decision trees. Decision trees are mostly used with numerical and categorical data. The algorithm uses a greedy search technique, starting at the top and working its way down. **Advantages:** It is easy to implement, less data processing, it can be used to classify and predict the categorical and numerical data. **Disadvantage:** Low predications accuracy, calculation difficulty if the data set is large, additional drawing is required for each data set, high probability of over-fitting.

**b) Support Vector Machines:** It can be classified into two different types i) Linear support vector machine ii) Non-linear support vector machine. The main goal of is to determine the hyper-plane that can be used for dividing the classes in two major types. Based upon the values received the data sets are place into the data set with the similarities. **Advantages:** Its memory efficient and suitable for multi-dimensional data space. It can easily classify the predication problem. **Disadvantage:** Memory usage is very high and it is not suitable for large and noise data sets.it is slow in the test phases.

**c) K- nearest algorithm:** Based on the k-values this type of algorithm it is used to calculate the distance of the data set with the predefined data set. **Advantage:** it supports multi class data. **Disadvantage:** It needs huge data set to calculate the distance with accuracy, larger storage space is required, its difficult to calculate the appropriate k-value.

**d) Linear Regression:** It is used to find the relationship between the dependent and independent variables. It cannot

be applied to the non-linear data set and it only predicts the numerical output.

## 5. CONCLUSION

Machine learning is a subset of AI, which enables the machine to automatically learn from data, improve performance from experiences, and make predictions. Machine learning contains a set of algorithms that work on a huge amount of data. Data is fed to these algorithms to train them, and based on training; they build the model & perform a specific task. The recent development shows that people are aware of all the applications of machine learning that can be used in our day-to-day life. Numerous algorithms can be generated successfully to identify the characteristic and the requirements appropriately.

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