

## International Journal of Computer Science and Mobile Computing



A Monthly Journal of Computer Science and Information Technology

ISSN 2320-088X

IMPACT FACTOR: 7.056

*IJCSMC, Vol. 10, Issue. 3, March 2021, pg.32 – 38*

# Machine Learning Its Applications, Challenges & Tools: A Review

**Dr. Meghna Utmal**  
HOD-MCA, GGITS, Jabalpur,(M.P.)  
[meghnautmal@gmail.com](mailto:meghnautmal@gmail.com)

**Vishal Paranjape**  
Research Scholar, RGPV Bhopal,(M.P.)  
[vishal.mca2009@gmail.com](mailto:vishal.mca2009@gmail.com)

**Deepak Paranjpe**  
Asst. Prof. GGITS, Jabalpur,(M.P.)  
[deepakparanjpe@ggits.org](mailto:deepakparanjpe@ggits.org)

**DOI: 10.47760/ijcsmc.2021.v10i03.004**

**Abstract:** Nowadays, a huge amount of data is readily available. As a result, analysing this data in order to obtain any useful information and developing an algorithm based on this analysis is critical. Data mining and machine learning can be used to accomplish this. Machine learning is a subset of artificial intelligence that is used to create algorithms based on data patterns and historical data relationships. Machine learning is an area that spans many disciplines. The various applications of machine learning, the needs of machine learning, the various techniques used by machine learning, the various types of problem solving approaches, and the challenges that machine learning faces are all discussed in this paper.

**Keywords:** Machine learning, data mining, artificial intelligence.

## 1. Introduction

Artificial intelligence (AI) has evolved into a vast and exciting area in computer science in recent decades, as it prepares robots to perform tasks that humans can. It also aims to teach computers how to solve real-world problems with the highest possible success rate. As a result of scientific progress and technological advancements, AI systems are now capable of learning and improving based on previous experiences without the need for specific assistance code if they are exposed to new data. It eventually leads to Machine Learning (ML) technology, which employs learning algorithms to learn from available data [1,2].

## 2. Machine Learning

Machine learning (ML) is a form of artificial intelligence (AI) that enables software applications to improve their prediction accuracy without being specifically programmed to do so[6]. In order to predict new output values, machine learning algorithms use historical data as input. Machine learning is often used in recommendation engines. Fraud detection, spam filtering, malware threat detection, business process automation (BPA), and predictive maintenance are all popular applications.

The science of teaching computers to learn on their own is known as machine learning. The question now is why would we want machines to learn on their own. It has many advantages, such as the ability for machines to perform high-frequency repetitive tasks with high precision while staying bored. The job of mopping and washing the floor, for example. When a person performs the job, the consistency of the result varies. After a few hours of work, we become exhausted/bored, and the possibility of becoming ill has an effect on the result.

On the other hand, if we can teach machines to detect whether or not the floor needs cleaning and mopping, as well as how much cleaning is needed depending on the floor's state and type, machines would be able to do a much better job. They will continue to work without being exhausted or ill!

Machine Learning seeks to accomplish this objective by allowing computers to learn on their own. In order to answer questions such as:

- Does the floor need to be swept and mopped?
- How long should the floor be cleaned?

Machines need a way to think, and this is where machine learning models come in handy[7]. Figure 1 depicts how machine learning works. Data from the world is collected by the machines and fed into the machine learning model. This data is then used by the model to predict stuff like:

- Whether the floor needs cleaning or not, or
- For how long does it need to be cleaned, and so on.

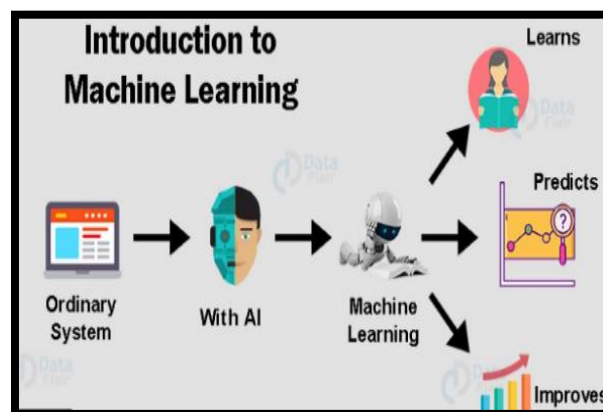


Figure1: Introduction of Machine Learning

### 3. Literature Review

Rahul Khanna, Mariette Awad The year is 2015. 1st This paper aims to provide insight into the importance of preprocessing as well as different preprocessing methods that can be applied in real-world scenarios. This paper explores the various data preprocessing functions that add significance to raw data and prepare it for further processing.

Gong Yuxia1, Teng Xiuyi (2018) [two] The description, model, development stage, classification, and commercial application of machine learning are all discussed in this paper, with a focus on machine

learning's role in data mining. As a result, this paper summarises and analyses machine learning technology, as well as the benefits and drawbacks of using it in data mining.

Rabi Narayan Behera, Kajaree Das (2017) [number four] This paper explains the idea and evolution of Machine Learning, as well as some of the most common Machine Learning algorithms, and attempts to compare three of the most popular algorithms using some fundamental concepts. The Sentiment140 dataset was used, and the performance of each algorithm was recorded and compared in terms of training time, prediction time, and prediction accuracy.

Kotsiantis (2007) [5] Various supervised machine learning classification techniques are described in this paper. Of course, a single chapter cannot cover all supervised machine learning classification algorithms in detail.

Yogesh Singh, Pradeep Kumar Bhatia, and Omprakash Sangwan, Yogesh Singh, Pradeep Kumar Bhatia, and Omprakash Sangwan, Yogesh Singh, Pradeep Kumar Bhatia, and O This paper presents a comprehensive analysis of research on expert software creation estimation using machine-learning techniques (MLT). In this modern age, machine learning is demonstrating the ability to generate reliably accurate estimates. The most widely used machine learning techniques for expert estimation in the field of software development are neural networks, case-based reasoning, classification and regression trees, rule induction, genetic algorithm, and genetic programming.

We discovered that the outcomes of different machine-learning techniques vary depending on the application areas to which they are applied in each of our studies. The authors' analysis of the study shows that these techniques are not only competitive with conventional estimators on a single data set, but also that they are responsive to the data on which they are trained.

#### **4. Applications of Machine Learning In Real Life**

Now that you've got the hang of it, you may be wondering what examples of machine learning [2,11] there are and how it affects our lives. Unless you've been living under a rock, machine learning has already had a major effect on your life.

Let's look at a few scenarios where we've already used the results of machine learning:

- Facebook, LinkedIn, or any other social media platform recommending your friends and advertising you may be interested in
- Amazon recommending items based on your search history
- Banks that use machine learning to detect fraud in real time

##### **4.1 Need of Machine Learning**

With the lower cost of sensors (Force 1)[7], the amount of data generated is rising significantly. The variance of data is depicted in Figure 2. You generate data for these companies any time you take an action on any website, like Facebook and YouTube. Data is produced by all connected devices, including fitness bands, smart watches, and connected equipment.

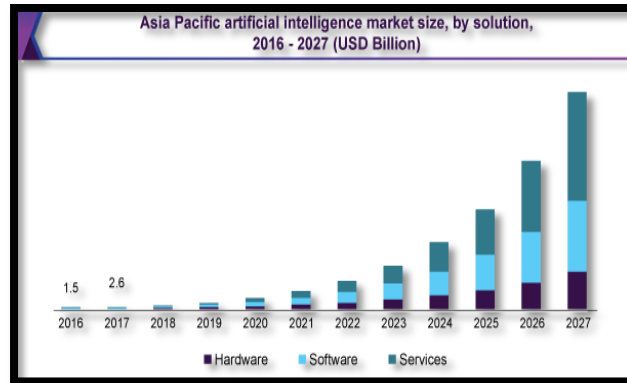


Figure 2: Data Variation Graph

The cost of storing this information has fallen drastically (Force 2).

The cost of computation has dropped dramatically (Force 3).

Cloud computing has made computing more accessible to the general public (Force 4).

These four forces come together to create a world in which we can not only generate more data, but also store it cheaply and perform massive computations on it. Even though machine learning techniques and algorithms were well-known at the time, this was not possible.

## 4.2 Tools Used In Machine Learning

Machine learning makes use of a variety of techniques and languages [9]. The tool you select is determined by your needs and the size of your operations. However, the following are the most widely used machine learning tools:

The machine learning programming language is accessed via machine learning software. They give method and application best practices [8]. Machine learning tools provide frameworks that allow the execution of a module or project. The following are some examples of machine learning platforms:

- **Python SciPy subparts such as scikit-learn, Panda**
- **R Platform.**
- **WEKA Machine Learning Workbench.**

Machine learning tools contains various libraries which provides all capabilities to complete a project and libraries provides various algorithms. Some of libraries are:

- **JSAT in Java.**
- **scikit-learn in Python**
- **Accord Framework in .NET**

Some of Databases used by machine learning are:

- **SQL**
- **Oracle**
- **Hadoop**

### 4.3 Problems Solved By Machine Learning

Machine Learning problems can be divided into 3 broad classes:

- **Supervised Machine Learning**
  - **Classification Problems**
  - **Regression Problem**
- **Unsupervised Machine Learning**
- **Reinforcement Learning**

#### 1. Supervised Machine Learning:

Supervised Machine Learning algorithms are used when you have historical data with outcomes (labels in machine learning terminology) and want to predict potential outcomes [3, 5]. Problems involving supervised machine learning can be divided into two types:

(i) **Classification Problems:** When you need to categorise results into different groups. For instance, deciding whether the floor requires cleaning or mopping is a classification issue. The result will fall into one of two categories: yes or no. Similarly, determining whether or not a customer would default on their loan is a classification issue that every bank is interested in solving.

(ii) **Regression Problem:** When you're trying to figure out how much anything costs, you're dealing with regression issues. For example, determining how much cleaning is required is a Regression issue. A regression issue is when a customer's predicted amount of default is unknown.

#### 2. Unsupervised Machine Learning:

You don't always want to be able to predict an Outcome precisely [4,10]. You simply need to do some segmentation or clustering. For example, a bank may want to segment its customers in order to better understand their actions. Since we are not predicting any outcomes, this is an unsupervised machine learning issue.

#### 3. Reinforcement Learning:

The hope for true artificial intelligence is said to be Reinforcement Learning. And rightly so, since Reinforcement Learning has enormous potential. It's a more complicated subject than conventional machine learning, but it's just as important in the future. This article is as nice as any you'll find for an introduction to reinforcement learning.

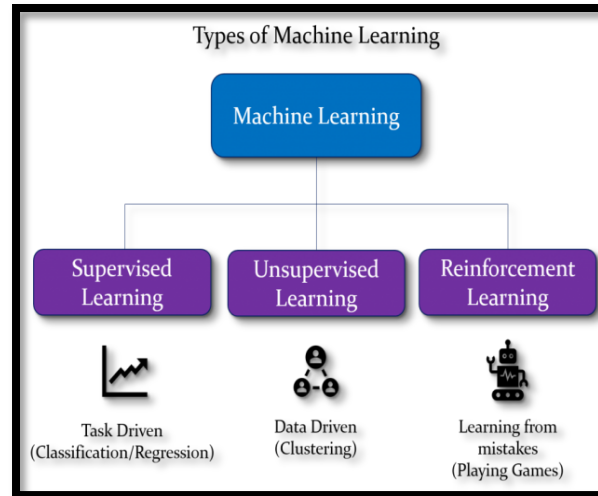


Figure 3: Types of Machine Learning

Above figure depicts the types of ML.

#### 4.4 Challenges of Machine Learning

Although machine learning has come a long way in recent years, there are still some significant challenges to overcome [12]. Figure 4 illustrates the ML challenges. It is an active research field, and we expect a lot of effort to solve these problems in the near future.

- 1. Massive amounts of data are required:** Today, training a model necessitates a massive amount of data.
- 2. Needs a lot of computing power:** Currently, machine learning and deep learning models need a lot of computing power to complete simple tasks (simple according to humans). This necessitates the use of specialised hardware such as GPUs and TPUs. For machine learning to have a significant effect, the cost of computations must be reduced.
- 3. Model analysis can be complicated at times:** Certain modelling methods offer high precision but are difficult to describe. This can be aggravating for business owners. Imagine becoming a bank and not being able to explain why a customer's loan was rejected!
- 4. Need for new and updated algorithms:** Researchers are still on the lookout for new and improved algorithms to solve some of the issues listed above.
- 5. There is a need for more data scientists:** Furthermore, since the domain has expanded so fast, there aren't many people with the requisite skill sets to solve the wide range of problems. This is expected to continue in the coming years. So, if you're considering a career in machine learning, you're in good company!

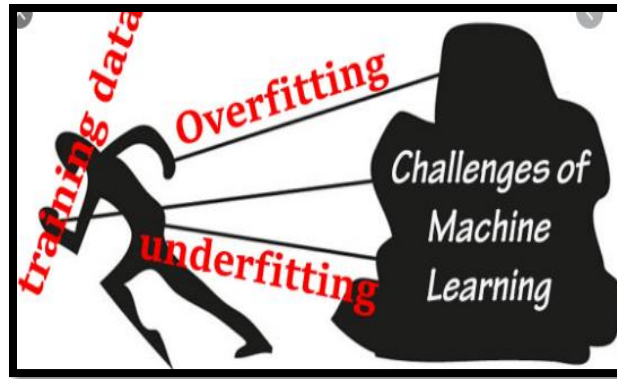


Figure 4: Challenges in Machine Learning

**5. Conclusions:** The various applications of machine learning, the needs of machine learning, the various techniques used by machine learning, the various types of problem solving approaches, and the challenges that machine learning faces are all discussed in this paper.

The methods of machine learning have been discussed in this paper. The different forms of machine learning techniques were also discussed in this paper. Various implementations of machine learning, as well as various processing tools, are being studied. In the literature review section, we looked at how different machine learning algorithms worked in the past years in various areas when combined with conventional approaches, and how they outperformed previous models.

## References

- [1]. Mariette Awad, Rahul Khanna. “Efficient Learning machines: Concepts and Applications”. *Aspress Publishers*, 2015.
- [2]. Teng Xiuyi, Gong Yuxia. “Research on Application of Machine Learning in Data Mining”. *IOP Conf. Series: Materials Science and Engineering*, 2018.
- [3]. M. Praveena, V. Jaiganesh, “Literature Review on Supervised Machine Learning Algorithms and Boosting Process”. *International Journal of Computer Applications*, ISSN No. 0975 – 8887, vol. 169, 2017.
- [4]. Kajaree Das, Rabi Narayan Behera. “A Survey on Machine learning: Concept, Algorithms and Applications”, *International Journal of Innovative Research in Computer and communication Engineering* . vol. 5, 2017.
- [5]. Kotsiantis. “Supervised Machine Learning: A Review of Classification Techniques”, *Informatica*. pp 249-268, 2007.
- [6]. Yogesh Singh, Pradeep Kumar Bhatia & Omprakash Sangwan “A review of studies in machine learning technique”. *International Journal of Computer Science and Security*, vol.1, pp 70 – 84, 2007.
- [7]. Petersp, “The Need for Machine Learning is Everywhere” March 10, 2015.
- [8]. Jason Brownlee, “A Tour of Machine Learning algorithms” November 25, 2013.
- [9]. Jason Brownlee, “Machine Learning Tools”, December 28, 2015.
- [10]. Taiwo Ayodele, “Types of Machine Learning algorithms”, 2010.
- [11]. Teng Xiuyi, Gong Yuxia, Research on Application of Machine Learning in Data Mining, *IOP Conf. Series: Materials Science and Engineering* 392 (2018)
- [12]. F. Lobato, M. Pinheiro, A. Jacob, O. Reinhold and Á. Santana, Social CRM: Biggest challenges to make it work in the real world, in: *Business Information Systems Workshops. BIS 2016*.
- [13]. W. Abramowicz, R. Alt and B. Franczyk, eds, *Lecture Notes in Business Information Processing*, Vol. 263, Springer, Cham, 2017.