



# A STUDY ON SUPERVISED AND UNSUPERVISED MACHINE LEARNING APPROACHES

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## Abstract:

Machine learning (ML) is a sub-field of Artificial Intelligence (AI), and it is one of the popular research area which has attracted significant attention. The machine learning defined as enabling computers make accurate predictions using past experiences. It has exhibited a magnificent development with the help of the increase in the storage capacity and computer's processing power. In this paper, we review the concepts of machine learning such as feature insights, supervised, unsupervised learning and classification types. Machine learning is used to design algorithms based on the data trends and historical relationships between data. Machine learning is exploited in many fields like Malware Detection, Malware Detection, Game Playing, Bioinformatics, Intrusion Detection, Information Retrieval, Marketing, Image Resolution etc. This paper presents the work done by various authors in the field of machine learning in various application areas. ML is a "area of study that provides computers the capability to get without being explicitly motorized".

**Keywords:**

Natural Language processing. Deep learning, Neural networks, Transfer Learning. Malware detection, Bioinformatics

**Introduction:**

Machine learning represents a powerful set of tools and techniques for extracting insights and making predictions from data. As technology and algorithms continue to evolve the impact of machine learning across industries and society is expected to grow significantly. It focuses on the development of algorithms and techniques that allow computers to learn patterns and make decisions based on data. This field has gained immense popularity due to its ability to handle large amounts of data and make predictions or decisions with minimal human intervention.

Machine learning (ML) is a subdivision of a field of artificial intelligence. It authorizes computers to grasp without being explicitly programmed. Machine learning involves creating and training models using data, which allows these models to recognize patterns and make predictions or decisions. These models are trained using algorithms that iteratively learn from the data, adjusting themselves to improve accuracy over time. The applications of machine learning are vast and diverse, ranging from recommendation systems and image recognition to medical diagnosis and autonomous vehicles. Key concepts in machine learning include supervised learning, where models learn from labelled data and make predictions on new data unsupervised learning, which finds patterns in unlabelled data and reinforcement learning, where models learn to make sequences of decisions through trial and error.

**Research methodology:**

The present study is conceptual and purely based on the secondary data which is collected from book, journal, published reports and other websites.

**Objectives:**

1. To study and examine the Effect of Machine Learning on Efficient Resource Utilization
2. To study and examine the Effect of Machine Learning on Improved Decision Making
3. To study and examine the Effect of Machine Learning on Prediction
4. To study and examine the Effect of Machine Learning on Pattern Recognition
5. To study and examine the Effect of Machine Learning on Real Time Data Analysis

**1. To study and examine the Effect of Machine Learning on Efficient Resource Utilization:**

Machine learning helps optimize resource allocation and utilization by analysing patterns and trends, leading to more efficient processes in manufacturing, supply chain management and energy consumption. Evaluating the efficiency of a machine learning algorithm requires noticeable a balance connecting computational resources, prediction accuracy and various other relevant factors based on specific requirements.

**2. To study and examine the Effect of Machine Learning on Improved Decision Making:**

Machine learning algorithms analyse the vast amounts of data to provide insights and predictions, facilitating better decision making processes across industries like finance, health care, marketing and more. Methodologies like Model Predictive Control (MPC), reinforcement learning and rule-based techniques authorize intelligent agents to build informed choices based on obtainable information, driving desired outcomes and improving overall interpretation.

**3. To study and examine the Effect of Machine Learning on Prediction:**

One of the primary objectives of machine learning is to make accurate predictions based on data. This could involve predicting future outcomes, classifying data into different categories or estimating continuous values. For example, Predict Population Growth using Linear Regression. It permits you to make predictions on the data and it's really intimate and easy to understand. Predictive empirical can be used to expect when users will churn or leave an association. The prediction follower-ship includes people who are in essential of answers to posterity questions in order to make business decisions. Predictive dissection provides confident answers complex problems, investigates new kind of problems and offers real time answers to problems with volatile information. Prediction can be used by everyone because of its tremendous capacities. It is helpful for businesses and other communities when making decisions, but can also be used to make film or document recommendations. Prediction is also used to detect fraud in preceding transactions which is an operation often accustomed by banks.

#### 4. To study and examine the Effect of Machine Learning on Pattern Recognition:

Machine learning aims to identify patterns and relationships within data that may not be immediately apparent to humans. This includes detecting anomalies, clustering similar data points, and recognizing trends over time. Pattern recognition in machine learning involves to the process of distinguishing patterns in data. For humanoid, pattern recognition is a reasonable and analytical process in the brain. We can ready to match the data facts we see with the data stored in our commemorative remembrance.

#### 5. To study and examine the Effect of Machine Learning on Real Time Data Analysis:

Real time data analysis in machine learning refers to the ability of machine learning models to process and analyse data as it is generated, without significant delay. This capability is crucial in applications where immediate insights and decisions are required based on the latest incoming data. Real-time machine learning is also known as online Machine Learning. It is the methodology of using ML systems to anatomize data on-the-fly, as soon as it becomes available, to make immediate predictions and conclusions. This is predominantly significant when data needs to be acted on within a very short timeframe i.e.; seconds or milliseconds to benefit businesses and users. Let's use an e-commerce website as an example to better paint the picture. Real-time machine learning could power the website's recommendation system. Say a user adds a camping tent to their shopping cart. The real-time ML component of the system can analyse this action and predict that the user is interested in camping gear. Based on this, the recommendation system can quickly suggest to the user other items related to go camping, like sleeping bags, backpacks, tent, camp chairs, bug spray, camping stove, drink bottles, sleeping mat and lanterns.

#### Literature review:

➤ Boyan Iazrov is said to learn efficient and effective utilization of limited resources scheduling of MRI development test environment. Increasing the effectiveness and efficiency of resource utilization has been a challenge for the industry. Organizations strive to improve the planning and scheduling of their limited resource and to increase productivity at lower costs. In the settings of research and development end to end construct for complex systems such as this MRI, becomes a real challenge. During the product realization process many unexpected events could cause deviation of the original plan. These could be equipment failure, under- or overestimation of processing time, new task arrival, delay or shortage of materials, shift in greater importance and many more.

➤ By Alan Brnabic & Lisa M. Hess are said that "Systematic literature review of machine learning methods used in the analysis of real world data for patient provider decision making. The theory of decision-making measures the affecting and application of choice for the management of a private, business, or governmental organization in an well-organized manner. Conventional methods often involve waiting for data transfers and external analysis, which can take time. In database machine learning works straight with your data where it's stored, allowing you real-time insights whereas machine learning allows for much faster decision making.

➤ Bruno Miranda Henrique and Herbert Kimura are said that "The prices are financial time series that are difficult to predict". The prediction of financial time series data using machine learning has been actively investigated a Correspondence and Department of Industrial and Systems Engineering, Graduate School of Science and Technology. Traditional models primarily rely on historical price data and technical indicators, which often fail to account for the myriad of external factors influencing price market behaviour. Recently, the advent of deep learning has provided powerful tools to address complex predictive tasks by learning intricate patterns from vast datasets.

➤ Kimya S Tinani and Deepa H Kandpal are said that Pattern Recognition system components are system processing, feature extraction and classification. Some patterns can be complex and difficult to identify, especially when the data is high-dimensional or multi-modal. Scalability means as the amount of data increases, it becomes increasingly difficult to process and analyse, and some algorithms may not be able to handle the volume of data. The statistical approach is the most popular approach that is practised among the several frameworks where pattern recognition is initially formulated. In the recent past, the neural network technique and the methodology scheme from the statistical learning theory have garnered the attention of people. It requires proper attention to deal with the design of the recognition system. There are several issues associated with the design of the recognition system. They are the pattern class definition, sensing environment and representation extraction and selection of features, cluster analysis, classifier design, learning, and choosing the training and test samples.

➤ Dean Croushore is said "how structural modelling is affected by data revisions, how data revisions affect forecasting, the impact of data revisions on monetary policy analysis, and the use of real-time data in

current analysis". Machine learning can enhance data processing through automation. Traditional data processing tasks, such as data extraction, transformation, and loading (ETL), can be time-consuming and error-prone. Machine learning algorithms can automate these processes, reducing manual effort and increasing efficiency.

### Findings:

1. Image recognition is used to identify objects, persons, places, digital images etc.
2. Speech recognition is a process of converting voice instructions into text and it is also known as computer speech recognition.
3. Traffic prediction predicts the traffic conditions such as whether traffic is cleared, slow moving or heavily congested with the help of google maps.
4. Product recommendations is widely used by various e-commerce companies such as Amazon, Flipkart etc., for product recommendations to the user.
5. Self-driving cars plays a significant role in self driving cars.
6. Email spam and malware filtering – whenever we receive a new mail it is filtered automatically as important, normal or spam.
7. Medical Diagnosis is used for diseases diagnosis and helps in finding brain tumour and other brain related diseases easily.
8. Virtual personal Assistant helps in playing music, call someone, scheduling an appointment. For example: google assistant, Alexa, Siri, Cortana etc.

### Suggestions:

- Knowledge based recommendation system is used to capture digitally stored knowledge in a company's backend to match specific user queries by decoding its intents, context and entities and it is used to extract a company's domain knowledge that is governed by 'if-this-then' rules.
- Content-based filtering takes items bought as input data to recommended similar items and recommendations are specific to every user under content-based filtering.
- Neural network is similar to the human brain and it is composed of interconnected neurons that can learn to recognize patterns.
- In the future, we'll see more effort dedicated to improving unsupervised machine learning algorithms to help to make predictions from unlabelled data sets.
- Collaborative filtering recommender system is used to make predictions about what a user might want to buy or watch based on past behaviour of the other users.

### Conclusion:

Machine learning (ML) is a discipline of artificial intelligence (AI) that provides machines with the ability to automatically learn from data and past experiences while identifying patterns to make predictions with minimal human intervention. Machine learning plays a vital role in recent days. The number of people who are using machine learning has drastically increased. Machine learning techniques are being used widely used to solve real-world problems by storing, manipulating, extracting and retrieving data from large sources.

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