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"Artificial Intelligence for Engineering/Engineers (KMC-201)"_

UNIT-3: Natural Language Processing

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PREPARED FOR
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TOPIC ON: MACHINE LEARNING

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Machine Learning – What is Machine Learning?

- Machine learning is a type of artificial intelligence by which the machine automatically learns and predicts things with the help of its experience and data.

- In other words, "Machine learning is a study that enables computers to learn on their own."

- Just as we humans learn things from our own experience, in the same way machines or computers learn by themselves without the help of humans. The ability of a machine or computer to learn by itself is called machine learning.

- Machine learning was invented in 1959 by Arthur Samuel.

- With the help of machine learning, the machine makes predictions and takes very important decisions.

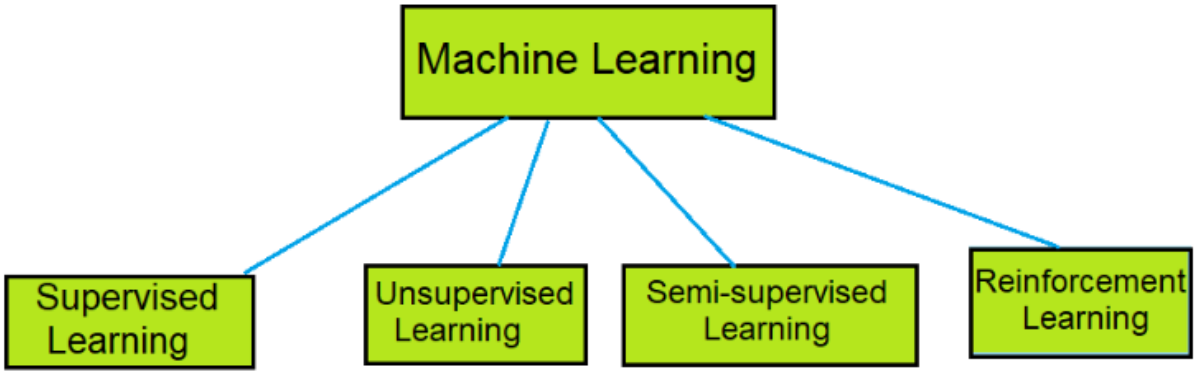
- Machine learning is such a branch of computer science that provides the machine the ability to do its work by itself and develop itself.

- Machine learning enables the machine to think, understand and learn like a human being, so that the system or machine can easily complete a task like a human being.

- In machine learning, algorithms are used to improve a computer or machine, which provides the ability to think and understand the system. Its algorithm is used in many tasks such as - medicine, email filtering, speech recognition, and computer vision etc.

Types of Machine Learning – Types of Machine Learning

Its types are as follows:-



1. Supervised learning
2. Unsupervised learning
3. Semi-supervised learning
4. Reinforcement learning

1. Supervised learning – What is Supervised Learning?

- Supervised learning is a type of machine learning in which labeled data is used to train the machine.
- In this, the machine uses the labeled data to create the model to understand the data sets.
- Labelle data is a kind of input data which is already present with the machine and by analyzing this data the system predicts the output data.
- Understanding it in simple words, supervised learning is a process in which a system provides correct output data to the user with the help of input data.
- Supervised learning is the learning based on supervision. For example - a student (student) learns things under the supervision of the teacher.
- Supervised learning is used in many places such as Risk Assessment, Image classification, Fraud Detection, and for detecting spam filtering.

Types of Supervised Learning

There are mainly two types of it:-

1– Regression

- Regression is a type of supervised learning. It is a technique used to find out the relationship between independent and dependent.

- Also regression is used as a method of predictive modeling in machine learning.

- There are also many types of Regression such as Linear Regression, Non-Linear Regression, Polynomial Regression, Bayesian Linear Regression and Regression Trees etc.

2– Classification

- Classification is a kind of algorithm in which data is organized into categories. Classification is used to classify data into classes or groups.

- In classification, mathematical techniques such as:- decision trees, linear programming, and neural networks are used to classify the data.

- For example – It can be used to classify the students of a class on the basis of their grade (average, good, excellent).

Advantages of Supervised Learning

1- It helps the machine to predict the output data based on the old input data.

2- In this, the user gets accurate information about the classes of objects.
3 – Supervised learning model helps the user to solve real world problems like fraud detection, spam filtering etc.

Disadvantages of Supervised Learning

1.- This learning is not capable of doing difficult tasks.

2- It takes a lot of time to predict the output data.

2. **Unsupervised learning – What is unsupervised learning?**

- Unsupervised learning is a type of machine learning that is the opposite of supervised learning. Simply put, "in this unlabeled data is used to train the machine."

- This is such a learning in which the machine learns things without any supervision.

- Unsupervised learning is used to obtain useful insights from large amounts of data.

- Unsupervised learning models are capable of thinking like a human being, like to behave like a human, act and think etc.

Types of Unsupervised Learning

There are mainly two types of this:-

1- Clustering

- Clustering is a method in which objects are divided into different groups, in which the objects which are similar are kept in one group and the objects which are different are kept in another group. goes.

- Clustering also has a role in our normal life. For example, a restaurant has different types of food and a vehicle showroom has cars, bikes and other vehicles.

2– Association

- Association is a technique that describes how objects are associated with each other. Association is a very well-known method of finding relationships between variables in large databases.

Advantages of Unsupervised Learning

1- In comparison to supervised learning, unsupervised learning can easily complete more complex tasks because it does not have labeled data, due to which it is able to complete complex tasks easily.

2- In this way it is much easier for the user to get the data, because it is much easier to get the unlabeled data than the labeled data.

Disadvantages of Unsupervised Learning

1- This learning takes a lot of time.

2- Its results are not accurate, due to which the user does not get the correct information.

3. **Semi-supervised learning – What is Semi-supervised learning?**

- Semi-supervised learning is a type of machine learning that is made up of both supervised learning and unsupervised learning.

- In this, a small amount of labeled data and a large amount of unlabeled data are used to teach the machine.

Advantages of Semi-supervised learning

1- Understanding Semi-supervised learning is very easy for any user.

2- Its working capacity is high.

3- Its efficiency is high.

Disadvantages of Semi-supervised

1- In this the user does not get to see the exact result.

2- Its results are not stable.

4. **Reinforcement Learning–What is Reinforcement Learning?**

- Reinforcement learning is such a learning technique in which the agent is rewarded for doing the right thing and penalty is given for doing the wrong thing.
- This is learning based on feedback.

- In this, based on the feedback, the agent automatically learns and improves himself.

- For example- a robot that learns to operate its own hands. This is an example of robot reinforcement learning.

Advantages of reinforcement learning

1. This technique is used to achieve such results which are very difficult to achieve.

2. It provides accurate results.

Disadvantages of reinforcement learning

1. It cannot be used to solve simple problems.

2. This technique requires more data.

Applications of Machine Learning

It is used in the following places.

1- Machine learning is used to recognize objects, persons, places, and pictures. Face detection technology is used to identify pictures.

2- It is used to do voice search, in which the user can get information about anything by speaking on the mic. Big search engines like Google provide voice search facility to the user by using machine learning.
3- It is used to know the traffic situation. Let us understand it with the help of an example.

If a user wants to go to a new place then he uses google map which along with showing him the correct route also provides information about the traffic conditions which is possible only due to machine learning.

4.- It is used by companies such as entertainment and e-commerce such as amazon and netflix to provide output data to the user in exchange for input.

For example, whenever a user searches for a product on Amazon, he gets to see many products in the search result.

This has been possible only due to machine learning, in which the user provided input data to Amazon, in return the user received the output data.

5- Machine learning is used in medical science to diagnose diseases.

In simple language, machine learning is used in medical science to detect diseases, with the help of which the diseases of the patient can be detected and that disease can be treated and saved.

6- Machine Learning is used to predict the stock in the stock market, which share will have less value and which share will have more value, which reduces the chances of loss to the investor. Although this figure is not quite accurate but the investor definitely gets an idea.

7- It is used to detect online fraud, with the help of which both the user's data and money remains safe.

Machine learning can easily detect fake accounts and fake IDs, due to which the chances of fraud are reduced. Apart from this, machine learning helps the user to completely secure all the online transactions.

8- It is used to create virtual personal assistants. Virtual personal assistants are a tool that receives commands through the voice of the user and gives output to the user through that command.

Examples of this are Google Assistant, Alexa, Cortana, Siri.

Advantages of Machine Learning

1- Machine learning helps in making the machine advance and modern, due to which the machine can think and understand like humans and can complete any task easily like humans.

2- It is able to predict the output data with the help of the old input data, so that the user gets to know the future data. Although this data is not completely accurate, but the user definitely gets an idea of the events that will happen in the future.

3- It helps in providing better education to the students, due to which students can easily get high level education.

Machine learning provides such technology to the students, with the help of which students can easily research about anything.

4- It helps in detecting the diseases of the patient, due to which the correct disease can be detected.

In today's time, doctors have such techniques and devices that easily detect the diseases of the patient. All this has been possible because of machine learning.

5- It can review and analyze more data than humans and can also make more accurate predictions than humans.

Apart from this, in machine learning, old data is stored as history, which is also used to predict future data.

6- In this way, any work can be completed easily because most of the tasks in machine learning are automatic. The machine learning algorithm knows what work it has to do at what time, which shows its thinking power.

Disadvantages of Machine Learning– Disadvantages of Machine Learning

1- To fully train machine learning, a large amount of data is required, due to which the chances of making mistakes in the results increase significantly. Due to the huge amount of data, it takes a long time to complete the tasks.

2- The algorithm of machine learning takes a lot of time to develop, due to which a lot of time is wasted.

Apart from this, a large amount of resources are required for the machine to develop its algorithm completely.

3- In this, with the help of old input data, the output data can be predicted, but this result or data may not be completely correct, due to which the user has to face problems.

4- The size of the data in this is very large, due to which the system needs a large amount of memory space.