

1. Explain the term machine learning, and how does it work? Explain two machine learning applications in the business world. What are some of the ethical concerns that machine learning applications could raise?

Ans:- Machine learning is a form of artificial intelligence (AI) that teaches computers to think in a similar way to how humans do: Learning and improving upon past experiences. It works by exploring data and identifying patterns, and involves minimal human intervention.

One of the most notable machine learning applications is image recognition, which is a method for cataloging and detecting an object or feature in a digital image. In addition, this technique is used for further analysis, such as pattern recognition, face detection, and face recognition.

2. Describe the process of human learning:

- i. Under the supervision of experts
- ii. With the assistance of experts in an indirect manner
- iii. Self-education

Ans:- i) Human-guided machine learning is a type of supervised learning, which uses a set of human-labeled training data to develop a model. In supervised learning, the algorithm learns a set of inputs along with corresponding correct outputs.

ii) Indirect guidance is provided through learners actively observing, listening, and engaging with social practices and norms, which serve to furnish models and goals for performance and individuals' learning.

3. Provide a few examples of various types of machine learning.

A. Supervised Machine Learning

eg:- we will provide the training to the machine to understand the images, such as the shape & size of the tail of cat and dog, Shape of eyes, colour, height (dogs are taller, cats are smaller), etc

B. Unsupervised Machine Learning

example to understand it more precisely; suppose there is a basket of fruit images, and we input it into the machine learning model. The

images are totally unknown to the model, and the task of the machine is to find the patterns and categories of the objects.

So, now the machine will discover its patterns and differences, such as colour difference, shape difference, and predict the output when it is tested with the test dataset.

C. Semi-Supervised Learning

eg:-Supervised learning is where a student is under the supervision of an instructor at home and college. Further, if that student is self-analysing the same concept without any help from the instructor, it comes under unsupervised learning. Under semi-supervised learning, the student has to revise himself after analyzing the same concept under the guidance of an instructor at college.

D. Reinforcement Learning

The reinforcement learning process is similar to a human being; for example, a child learns various things by experiences in his day-to-day life. An example of reinforcement learning is to play a game, where the Game is the environment, moves of an agent at each step define states, and the goal of the agent is to get a high score. Agent receives feedback in terms of punishment and rewards.

Due to its way of working, reinforcement learning is employed in different fields such as Game theory, Operation Research, Information theory, multi-agent systems.

4. Examine the various forms of machine learning.

5.Can you explain what a well-posed learning problem is? Explain the main characteristics that must be present to identify a learning problem properly.

Ans:- A machine learning problem is well-posed if a solution to it exists, if that solution is unique, and if that solution depends on the data /

experience but it is not sensitive to (reasonably small) changes in the data / experience.

A well-defined learning problem will have the features like class of tasks, the measure of performance to be improved, and the source of experience examples.

6. machine learning capable of solving all problems? Give a detailed explanation of your answer.

Ans:-Complicated processes require further inspection before automation. While Machine Learning can definitely help automate some processes, not all automation problems need Machine Learning.

The possibilities with machine learning are limitless. All you need to do is find a comprehensive way to use it in your particular business domain to improve your services. Sometimes it can be indispensable to understand the problem at hand, as you can't use any ML algorithm for your business needs. Every problem is different from the previous one in machine learning. This means that you can't just feed some data to a machine learning algorithm with a neural network and pray for the results. Every situation demands a different approach and that is why it is crucial to consider looking for professional Machine Learning experts.

7. What are the various methods and technologies for solving machine learning problems? Any two of them should be defined in detail.

Ans:-Machine learning is a data analytics technique that teaches computers to do what comes naturally to humans and animals: learn from experience. Machine learning algorithms use computational methods to directly "learn" from data without relying on a predetermined equation as a model.

Machine learning uses two techniques: supervised learning, which trains a model on known input and output data to predict future outputs, and

unsupervised learning, which uses hidden patterns or internal structures in the input data.

8. Can you explain the various forms of supervised learning? Explain each one with an example application.

Types of Supervised Learning:

A. Classification: It is a Supervised Learning task where output is having defined labels(discrete value). For example in above Figure A, Output – Purchased has defined labels i.e. 0 or 1; 1 means the customer will purchase, and 0 means that the customer won't purchase. The goal here is to predict discrete values belonging to a particular class and evaluate them on the basis of accuracy.

It can be either binary or multi-class classification. In binary classification, the model predicts either 0 or 1; yes or no but in the case of multi-class classification, the model predicts more than one class. Example: Gmail classifies mails in more than one class like social, promotions, updates, and forums.

B. Regression: It is a Supervised Learning task where output is having continuous value.

For example in above Figure B, Output – Wind Speed is not having any discrete value but is continuous in a particular range. The goal here is to predict a value as much closer to the actual output value as our model can and then evaluation is done by calculating the error value. The smaller the error the greater the accuracy of our regression model.

9. What is the difference between supervised and unsupervised learning? With a sample application in each region, explain the differences.

supervised learning is when we teach or train the machine using data that is well-labelled. Which means some data is already tagged with the correct answer. After that, the machine is provided with a new set of examples(data) so that the supervised learning algorithm analyses the training data(set of training examples) and produces a correct outcome from labeled data.

Unsupervised learning is the training of a machine using information that is neither classified nor labeled and allowing the algorithm to act on that information without guidance. Here the task of the machine is to group unsorted information according to similarities, patterns, and differences without any prior training of data.

Unlike supervised learning, no teacher is provided that means no training will be given to the machine. Therefore the machine is restricted to find the hidden structure in unlabeled data by itself.

10. Describe the machine learning process in depth.

Machine Learning is the field of study that gives computers the capability to learn without being explicitly programmed. ML is one of the most exciting technologies that one would have ever come across. As it is evident from the name, it gives the computer that makes it more similar to humans: The ability to learn. Machine learning is actively being used today, perhaps in many more places than one would expect.

Features of Machine learning

- Machine learning is data driven technology. Large amount of data generated by organizations on daily bases. So, by notable relationships in data, organizations makes better decisions.
- Machine can learn itself from past data and automatically improve.
- From the given dataset it detects various patterns on data.
- For the big organizations branding is important and it will become more easy to target relatable customer base.
- It is similar to data mining because it is also deals with the huge amount of data.

Applications of Machine Learning include:

- Web Search Engine
- Photo tagging Applications
- Spam Detector

- Augmentation
- Automation
- Finance Industry
- Government organization
- Healthcare industry:
- Marketing