

1. What is the concept of human learning? Please give two examples.

It is the form of learning which requires higher order mental processes like thinking, reasoning, intelligence, etc. we learn different concepts from childhood. For example, when we see a dog and attach the term 'dog', we learn that the word dog refers to a particular animal.

2. What different forms of human learning are there? Are there any machine learning equivalents?

The three major types of learning described by behavioural psychology are classical conditioning, operant conditioning, and observational learning.

Yes, Supervised learning is similar to **concept learning** (Bruner & Austin, 1986), where a person is required to classify new objects into existing categories, by matching the features of the new objects to examples in the categories

3. What is machine learning, and how does it work? What are the key responsibilities of machine learning?

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.

Machine learning responsibilities are:

- Study and transform data science prototypes.
- Design machine learning systems.
- Research and implement appropriate ML algorithms and tools.
- Develop machine learning applications according to requirements.
- Select appropriate datasets and data representation methods.
- Run machine learning tests and experiments

4. Define the terms "penalty" and "reward" in the context of reinforcement learning.

The agent receives rewards by performing correctly and penalties for performing incorrectly. The agent learns without intervention from a human by maximizing its reward and minimizing its penalty

5. Explain the term "learning as a search"?

In general, we can think of concept learning as a search problem. The learner searches through a space of hypotheses to find the best one.

6. What are the various goals of machine learning? What is the relationship between these and human learning?

The Goals of Machine Learning is to make the computers smarter, more intelligent. The more direct objective in this aspect is to develop systems (programs) for specific practical learning tasks in application domains and develop computational models of human learning process and perform computer simulations.

- Humans acquire knowledge through experience either directly or shared by others. Machines acquire knowledge through experience shared in the form of past data.

7. Illustrate the various elements of machine learning using a real-life illustration.

Image recognition is a well-known and widespread example of machine learning in the real world. Siri, Alexa, Google Now are some of the popular examples of virtual personal assistants.

8. Provide an example of the abstraction method.

Abstraction takes several forms in Machine Learning, which are related to either features or instances. The main areas of research that include abstraction in learning includes: Feature selection: hiding irrelevant features. Instance selection: hiding irrelevant instances

9. What is the concept of generalization? What function does it play in the machine learning process?

Generalization refers to your model's ability to adapt properly to new, previously unseen data, drawn from the same distribution as the one used to create the model.

A model's ability to generalize is central to the success of a model.

10- What is classification, exactly? What are the main distinctions between classification and regression?

Classification is a process of categorizing a given set of data into classes, It can be performed on both structured or unstructured data. The process starts with predicting the class of given data points. The classes are often referred to as target, label or categories.

The main difference between Regression and Classification algorithms that Regression algorithms are used to predict the continuous values such as price, salary, age, etc. and Classification algorithms are used to predict/Classify the discrete values such as Male or Female, True or False, Spam or Not Spam

11. What is regression, and how does it work? Give an example of a real-world problem that was solved using regression.

A regression is a statistical technique that relates a dependent variable to one or more independent (explanatory) variables.

Housing or fare prediction are some example of regression problem

12. Describe the clustering mechanism in detail.

Clustering is the task of dividing the population or data points into a number of groups such that data points in the same groups are more similar to other data points in the same group than those in other groups. In simple words, the aim is to segregate groups with similar traits and assign them into clusters.

13. Make brief observations on two of the following topics:

- i. Machine learning algorithms are used
- ii. Studying under supervision : YES
- iii. Studying without supervision : YES
- iv. Reinforcement learning is a form of learning based on positive reinforcement : False