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

It is the process of acquiring knowledge, skills, behaviour through our minds and the same should reflect while behaving with others. we constantly learn and unlearn things as per our experiences. Examples are habits, facts, skills.

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

Forms of human learning are :-

* **Motor Learning**: Our day to day activities like walking, running, driving, etc, must be learnt for ensuring a good life. These activities to a great extent involve muscular coordination.
* **Verbal Learning**: It is related with the language which we use to communicate and various other forms of verbal communication such as symbols, words, languages, sounds, figures and signs.
* **Concept Learning**: This form of learning is associated with higher order cognitive processes like intelligence, thinking, reasoning, etc, which we learn right from our childhood. Concept learning involves the processes of abstraction and generalization, which is very useful for identifying or recognizing things.
* **Discrimination Learning:** Learning which distinguishes between various stimuli with its appropriate and different responses is regarded as discrimination stimuli.

But, in Machine Learning (ML), it is easy to change the learning method by selecting a different algorithm. In ML, we have well defined processes to understand and estimate the accuracy in learning. Estimation of human learning is usually done through examinations and it cannot be considered as a measure of intelligence.

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

ML enables computers/machine to function without being programmed to do so. The process start with collecting the data, cleaning it, understanding the relation between the parameters and fitting the right model in order to make the accurate results.

The key responsibilities include :-

* Perform statistical analysis
* Fine tuning test results
* Train and retrain systems
* Work on frameworks
* Undertaking machine learning experiments and test
* Designing machine learning programs
* Developing deep learning systems to various use cases based on the business needs and
* Finally implementing suitable AI/ML algorithms

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

Reinforcement learning can be understood using the concepts as agent, environment, actions etc. Here an agent is inspired by the behaviour in an environment, by trial and error using from its own actions and experiences.

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

Concept learning can be viewed as the task of searching through a large space of hypotheses implicitly defined by the hypothesis representation. The goal of this search is to find the hypothesis that best fits the training examples.

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

The goal is to discover patterns in the data and then make predictions based on complex patterns to answer business problems, detect and analyse trends. Humans acquire knowledge by experience either directly or shared by others, but machines acquire knowledge by experience shared in the form of data.

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

* Feature engineering
* Feature selection
* Choice of algorithm
* Training
* Choice of metrics
* Testing

All the above steps will be needed in case of real world scenario be it credit card fraud detection, image segmentation or any kind of prediction problem.

1. Provide an example of the abstraction method.

An abstract class can be considered as a blueprint for other classes. It allows you to create a set of methods that must be created within any child classes built from the abstract class.

from abc import ABC, abstractmethod

class Animal(ABC):

def move(self):

pass

class Human(Animal):

def move(self):

print("I can walk and run")

class Snake(Animal):

def move(self):

print("I can crawl")

class Dog(Animal):

def move(self):

print("I can bark")

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

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

Generalization explains that every ML model should be created in such a way that even wrong data is passed it should be able to take care of the all the issues with the data. The model should be able to identify patters or solutions to tackle the data.

Classification technique is such that in any problem statement if the prediction is in form of category as A or B then its called as classification problem. In other case we need to predict numbers in the form of temperature, or flight fare etc then this would involve regression technique to be used.

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

Regression is a technique which involves gradient descent where we try to get the best fit line using various iterations of m slope and c intercept value. Once we reach the global minima point then the iterations end as we get the best m and c value. It further helps us to make predictions as per our test dataset. We can try to predict the flight fare, any regressor model would use regression technique.

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 and dissimilar to the data points in other groups. Basically a hyperplane is created and 2 marginal lines are created on both the sides in such a way that the data points will be divided in the best possible manner.

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

i. Machine learning algorithms are used

ii. Studying under supervision

iii. Studying without supervision

iv. Reinforcement learning is a form of learning based on positive reinforcement.