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?

A: Machine learning algorithms represent a set of similar patterns, they act as blueprints that are used to fit models according to the data provided.

Applications of ML: Calls and mails are classified as spam or not spam based on the behavior of the caller. Youtube shows recommendations based on the viewer history

Ethical concerns: Machines cannot be held accountable. Machines may replace humans as decision makers.

2. Describe the process of human learning:

i. Under the supervision of experts

A: Direction, process and progress of learning is decided by experts.

ii. With the assistance of experts in an indirect manner

A: Learner has significant freedom with respect to direction but needs help in terms of process and progress.

iii. Self-education

A: In self-education, there are no benchmarks and no standard process initially. Learner has to think about what is working based on the results.

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

A: Supervised: Sales forecast, identifying spam

Unsupervised: Customer segmentation

Reinforced learning: Self driving cars

4. Examine the various forms of machine learning.

A: Supervised: ML with labelled data

Unsupervised: ML with unlabelled data

Reinforced: ML with reward system

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.

A: A well posed learning problem must have clearly defined target experience and performance which can be achieved through a set of tasks. Experience, performance and Tasks are the required characteristics.

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

A: No, since machine learning depends on the algorithms created by humans and clearly it is not possible to create an algorithm for every problem.

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

A: There are various algorithms that are used to solve ML problems. For regression problems, linear regression can be used and for classification problems logistic regression can be used.

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

A: Regression and classification are the two popular forms of supervised learning. In both of these types a relation (function) is established between inputs and outputs. This relation will be used to predict output for new inputs. The difference lies in the nature of output.

In regression, the outputs are continuous. For example, let's say a store has customer information. Using this Information, they might be able to predict the purchase value of a new customer.

In classification, the outputs are discrete. For example, let's say caller data has labelled information of spam or not spam. This data can be used to label a new call as spam or not spam.

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

A: The difference between supervised and unsupervised learning is that supervised learning works on labelled data when that is not the case for unsupervised.

10. Describe the machine learning process in depth.

a. Make brief notes on any two of the following:

MATLAB is one of the most widely used programming languages.

ii. Deep learning applications in healthcare

iii. Study of the market basket

iv. Linear regression (simple)

A: Machine learning involves data procurement, data treatment, Model training, evaluation, model Optimisation and deployment.

iii. Market basket analysis in mining data and analysing it to increase sales.

iv. Linear regression is a type of supervised machine learning algorithm. It assumes that there is a linear relation between inputs and outputs.

11. Make a comparison between:-

1. Generalization and abstraction

A: Abstraction is using a machine learning algorithm to create a model. Generalization is the ability of a model to work on unseen data. Both of them do not compare.

2. Learning that is guided and unsupervised

A: The difference between the above is usage of labelled data.

3. Regression and classification

A: The difference is output being continuous and discrete respectively.