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 used for predictions and classifications. We use historical data and apply ana appropriate ML algorithm on the data to build a model which can predict an outcome. Two examples of the ML applications in the real world are fraud detection and finding if a person has a particular disease based on symptoms. for instance, if a model that Is built is bias which excludes some of the people and doesn’t predict correct result for them could be an ethical concern for a ML model that is why inclusiveness is import while building ML models**

2. Describe the process of human learning:

i. Under the supervision of experts: **this term is used when we need domain experts to understand the technicality of the data before we proceed to do feature engineering or apply machine learning algorithms.**

ii. With the assistance of experts in an indirect manner: **experts can intervene in the process of human learning or ML process to improve the process manually where Ml algorithms may fail to make sensible decisions.**

iii. Self-education: **in the process of human learning, self education task entails selecting learning tasks and materials on your own without requiring hands-on guidance.**

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

Ans: **two main types of machine learning are supervised and unsupervised. The supervised learning has the labelled data and unsupervised learning algorithms don’t have labelled data.**

**Examples of supervised learning: predicting weather temp or finding if a patient has cancer or not**

**Examples of unsupervised learning: grouping of emails based on spam or not spam.**

4. Examine the various forms of machine learning.

Ans: **there are 3 forms of machine learning. Supervised. Unsupervised and reinforcement learning. The former two have been answered in the aforementioned question and the reinforcement learning is used when there is no model to rely on.**

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: **there are 3 characteristics of a well posed problem.**

1. **There is a solution for the problem**
2. **The solution is unique**
3. **The solution changes with changes in data.**

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

Ans: **No machine learning is not capable of solving all problems. ML concept heavily relies on data in order to predict or classify an outcome. However, there could be problems which are yet to emerge or a problem which has been emerged but there is not much data exist to create a solution for the problem. So ML algorithms may be unable to solve the problem where there is a lack of data or a lack of good data.**

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

Ans: **various methods are supervised, unsupervised and reinforced learning. They have been explained in the previous questions. The technologies which are predominantly used in ML are Deep learning, Deep neural networks, conversational AI etc.**

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

Ans: **it has two forms. Regression and classification. Regression is used where the target variable is continuous like weather temp. or age or house price etc. Classification is used where the target variable is categorical like smoker or non smoker, diabetic or not diabetic etc.**

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

Ans: **The supervised algorithms are used when we have labelled data and unsupervised algorithms are used when we don’t have labelled data. For example, one of the supervised learning examples is finding a house price in any particular region based on several factors and the application of unsupervised learning is fraud detection which finds any fraudulent activity.**

10. Describe the machine learning process in depth.

Ans: **machine learning primarily used for prediction and classification. There are two types of algorithms in ML that are supervised and unsupervised. Supervised algorithms are used for prediction and classification where we have labelled data. We use that labelled data to train the models and test data to find the performance of the models. Supervised can further be divided into two categories that are regression and classification which are used for continuous target variable and categorical target variable respectively. On the other hand, unsupervised algorithms are used when we don’t have labelled data and want to create clusters based on characteristics of input. For example, K means clustering can be used to create clusters of the input bearing the same characteristics.**

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: **the study of the market basket is the analysis of the purchasing behaviour of customers such as what they come and what they buy in pair and which aisle they tend to go more often in the supermarket. These all steps in the analysis process help the decision makers decide customised offers to increase sales.**

iv. Linear regression (simple): **linear regression is used to predict a continuous target variable like salary of people. In simple linear regression, It has one input and one output. We train the model on the training data set with the help of linear regression and try to find the best fit line and then test the model’s performance on the test data set and by using different performance matrixes such as R square or adjusted R square. In order to find the best line we use MSE, MAE or RMSE depending on the presence of outliers.**

11. Make a comparison between:-

1. Generalization and abstraction: **in ML, generalisation is referred when a model is able to work efficiently with unseen data. That is opposite of overfitting in Ml where the model doesn’t behave well with unseen data hence has less generalisation. Abstraction in algorithms are used to ignore the characteristics of problems that are not needed in order to concentrate on those that are needed.**

2. Learning that is guided and unsupervised: **guided learning can be considered supervised learning where we have labelled data set. Unsupervised learning doesn’t have labelled data set.**

3. Regression and classification: **Regression algorithms like linear regression, lasso or ridge regression is used for those data sets where the target or dependent variable is continuous like house price, income, sales figures. On the contrary, classification algorithms like logistic regression is used to categorise data. Binary classification is classifying data into two classes and multiclass for multiple classes.**