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?

- Machine Learning is one of the subsets of AI, which focuses on the use of data and algorithms to imitate the way that humans learn and improve accuracy during learning. It enables computers to learn automatically from history of data and find the patterns and relations between them to predict new data. The main feature of machine learning is predictive modelling, automation, scalability, generalization, adaptiveness

- Amazon Kendra reinvents search for websites and applications so that employees and consumers can access the content they need, even if it is scattered across multiple locations and content repositories within your business. Second one is streaming entertainment service Netflix that via collaborative filtering and machine learning analyse a customer’s viewing history, the viewing history of people with similar entertainment interests, information about individual shows, and other data points to deliver personalized recommendations to its customers.

- The first one can be safety which means an ML system should be accurate, reliable, secure and robust enough to do these things in real-world, unpredictable and sometimes challenging conditions. The second one is privacy and is about the data used to train models, this data may be collected in a way which violates privacy, such as without consent from users. Another one is transparency and is about users and stakeholders having access to the information they need to make informed decisions about ML.

2. Describe the process of human learning:

i. Under the supervision of experts

If we are a person which have a lot of information about different car brands their facilities and appearances, then by seeing a new car we can guess what is its brand and also give some information about power of that car approximately. This is supervised learning.

ii. With the assistance of experts in an indirect manner

In sport, new players watch the video of athlete to learn how an expert sport man use experience and knowledge in different conditions, how they utilize different techniques during match and how they react in front of their contestant, this can be a case of learning from experts indirectly.

iii. Self-education

self-education comes from our experience for example when a child touch something hot and burn will learn that next time when feel some warmness should not touch it because there is chance of burning.

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

Fraud detection in classification problem, customer segmentation in clustering, predicting house price in regression problems, and the way robot learn and try to behave same as humans in a kind of reinforcement problem.

4. Examine the various forms of machine learning.

supervised, unsupervised and reinforcement

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 computer program learns from experience E in context to some task T and some performance measure P and any problem can be segregated as well-posed learning problem if it has these three traits

* Task
* Performance Measure
* Experience

For example, for Handwriting Recognition Problem:

* Task – Acknowledging handwritten words within portrayal
* Performance Measure – percent of words accurately classified
* Experience – a directory of handwritten words with given classifications

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

Machine learning is not answer of all problems and there is some situation that we cannot use them:

- ethical problem of machine learning for example if privacy of people face problem because of misusing of data through Machine learning and it make huge lost for a person who will be responsible?

- lack of data: we don’t have enough data and our model cannot train properly then the accuracy of model will be less and we cannot trust to it in real life

- high cost of solving problem with ML: when training a model need huge hardware and spend a lot of time then the created cost is not valuable for automating a problem.

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

Regression

Classification, Clustering, Dimensionality Reduction, Ensemble Methods, Neural Nets and Deep Learning, Transfer Learning, Reinforcement Learning, Natural Language Processing, Word Embeddings are various method of solving machine learning problems.

- Dimensionally reduction: it helps to remove the least important features from a data set. In real world all the data is prepared for solving a problem does not practice, I often see data sets with hundreds or even thousands of columns (also called features), so reducing the total number is vital. For instance, images can include thousands of pixels, not all of which matter to your analysis. Or when testing microchips within the manufacturing process, you might have thousands of measurements and tests applied to every chip, many of which provide redundant information. In these cases, you need dimensionality reduction algorithms to make the data set manageable

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

application.

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

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

1. 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)

11. Make a comparison between:

1. Generalization and abstraction

2. Learning that is guided and unsupervised

3. Regression and classification