

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?

Answer : Machine learning is field of study that gives computers and ability to perform task without being explicitly programmed.

House prices estimation, stock price estimation are examples of regression.

AI presents three major areas of ethical concern for society: **privacy and surveillance, bias and discrimination**, and perhaps the deepest, most difficult philosophical question of the era, the role of human judgment,

2. Describe the process of human learning:

i. Under the supervision of experts

ii. With the assistance of experts in an indirect manner

iii. Self-education

Answer : Under the supervision of experts : Concept Learning.

With assistance of experts in an indirect manner : Operant Conditioning.

Self-Education : Hebbian Learning.

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

Answer : Supervised Learning : Image segmentation, Medical Diagnosis, Fraud Detection.

Unsupervised Learning: Anomaly detection, Clustering Analysis.

4. Examine the various forms of machine learning.

Answer : 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.

Answer : **Well Posed Learning Problem** – A computer program is said to learn from experience E in context to some task T and some performance measure P, if its performance on T, as was measured by P, upgrades with experience E.

Any problem can be segregated as well-posed learning problem if it has three traits – task, performance and experience.

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

Answer : ML probably can run into all problems for solving but lays down with some concerns.

Ethics : The idea of trusting data and algorithms more than our own judgment has its pros and cons. Obviously, we benefit from these algorithms, otherwise, we wouldn't be using them in the first place. These algorithms allow us to automate processes by making informed judgments using available data. Sometimes, however, this means replacing someone's job with an algorithm, which comes with ethical ramifications.

Deterministic Problem : **Machine learning is stochastic, not deterministic. A neural network does not understand Newton's second law, or that density cannot be negative — there are no physical constraints.**

Lack of Data : Many machine learning algorithms require large amounts of data before they begin to give useful results.

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

1. Answer : **Regression**
2. **Classification**
3. **Clustering**
4. **Dimensionality Reduction**
5. **Ensemble Methods**
6. **Neural Nets and Deep Learning**
7. **Transfer Learning**

8. Reinforcement Learning

9. Natural Language Processing

10. Word Embeddings

Regression methods fall within the category of supervised ML. They help to predict or explain a particular numerical value based on a set of prior data, for example predicting the price of a property based on previous pricing data for similar properties.

Another class of supervised ML, classification methods predict or explain a class value. For example, they can help predict whether or not an online customer will buy a product. The output can be yes or no: buyer or not buyer. But classification methods aren't limited to two classes. For example, a classification method could help to assess whether a given image contains a car or a truck. In this case, the output will be 3 different values: 1) the image contains a car, 2) the image contains a truck, or 3) the image contains neither a car nor a truck.

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

Answer : Linear Regression, Nearest Neighbor, Gaussian Naive Bayes, Decision Trees, Support Vector Machine (SVM), Random Forest.

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

Answer : Supervised learning algorithms are trained using labeled data. Unsupervised learning algorithms **are trained using unlabeled data**. In unsupervised learning, only input data is provided to the model. Supervised Learning : Classification and Regression. Unsupervised Learning : Clustering.

10. Describe the machine learning process in depth.

Answer : **There are five core tasks in the common ML workflow:**

Get Data. The first step in the Machine Learning process is getting data. ...

Clean, Prepare & Manipulate Data. Real-world data often has unorganized, missing, or noisy elements. ...

Train Model. This step is where the magic happens! ...

Test Model. ...

Improve.

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)

Answer : Deep learning applications in healthcare

Deep learning provides the healthcare industry with the ability to analyze data at exceptional speeds without compromising on accuracy. It's not machine learning, nor is it AI, it's an elegant blend of both that uses a layered algorithmic architecture to sift through data at an astonishing rate. The benefits of deep learning in healthcare are plentiful – fast, efficient, accurate – but they don't stop there. Even more benefits lie within the neural networks formed by multiple layers of AI and ML and their ability to learn. Yes, the secret to deep learning's success is in the name – learning.

Linear regression (simple)

Linear Regression models describe the relationship between variables by fitting a line to the observed data. Linear regression models use a straight line, while logistic and nonlinear regression models use a curved line. Regression allows you to estimate how a dependent variable changes as the independent variable(s) change.

11. Make a comparison between:-

1. Generalization and abstraction

2. Learning that is guided and unsupervised

3. Regression and classification

Answer :

1. Generalization and abstraction :

Abstraction is the process of removing details of objects.

A generalization, then, is the formulation of general concepts from specific instances by abstracting common properties. A concrete object can be looked at as a "subset" of a more generalized object.

2. Learning that is guided and unsupervised :

Supervised learning is the method that trains machines to use data that is well classified and labeled.

Unsupervised learning, on the other hand, is the method that trains machines to use data that is neither classified nor labeled.

3. Regression and classification :

Classification Models – Classification models are used for problems where the output variable can be categorized, such as “Yes” or “No”, or “Pass” or “Fail.” Classification Models are used to predict the category of the data. Real-life examples include spam detection, sentiment analysis, scorecard prediction of exams, etc.

Regression Models – Regression models are used for problems where the output variable is a real value such as a unique number, dollars, salary, weight or pressure, for example. It is most often used to predict numerical values based on previous data observations. Some of the more familiar regression algorithms include linear regression, logistic regression, polynomial regression, and ridge regression.