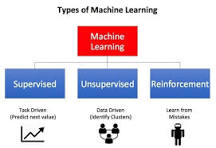
**ML Assignment\_2**

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

Many examples of this case are found in case of human learning. **Learning to drive a motor-car, typewriting, singing or memorizing a poem or a mathematical table, and music** etc. need exercise and repetition of various movements and actions many times

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

**Three Major Types of Human Learning**

* Learning through association - Classical Conditioning.
* Learning through consequences – Operant Conditioning.
* Learning through observation – Modeling/Observational Learning
* Machine Learning  
  
* There are many ways to frame this idea, but largely there are three major recognized categories: **supervised learning, unsupervised learning, and reinforcement learning**.

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

Machine Learning is **an AI technique that teaches computers to learn from experience**. Machine learning algorithms use computational methods to “learn” information directly from data without relying on a predetermined equation as a model.

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

Reinforcement learning is all about gamifying the learning process. This type of machine learning uses a reward-penalty method to teach an AI system. **If it makes the right move, it gets rewarded.** **If it makes a mistake, it receives a penalty**

**5. Explain the term "learning as a search"?**

We can also formulate Concept Learning as a search problem. We can think of Concept learning as **searching through a set of predefined space of potential hypotheses to identify a hypothesis that best fits the training examples**. Concept learning is also an example of Inductive Learning.

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

The goal of machine learning, closely coupled with the goal of AI, is to achieve a thorough understanding about the nature of learning process (both human learning and other forms of learning), about the computational aspects of learning behaviors, and to implant the learning capability in computer systems.

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

Image recognition is a well-known and widespread example of machine learning in the real world. It can identify an object as a digital image, based on the intensity of the pixels in black and white images or colour images.

Real-world examples of image recognition:

* Label an x-ray as cancerous or not
* Assign a name to a photographed face (aka “tagging” on social media)
* Recognise handwriting by segmenting a single letter into smaller images

**8. Provide an example of the abstraction method.**

   
// abstract class.

 abstract class Multiply {

 // abstract methods.

 // sub class must implement these methods.

 public abstract int MultiplyTwo (int n1, int n2);

 public abstract int MultiplyThree (int n1, int n2, int n3);

 // regular method with body.

 public void show()

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

Generalization refers to **your model's ability to adapt properly to new, previously unseen data, drawn from the same distribution as the one used to create the model**. Develop intuition about overfitting. Determine whether a model is good or not. Divide a data set into a training set and a test set

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

The most significant difference between regression vs classification is that while **regression helps predict a continuous quantity, classification predicts discrete class labels**. There are also some overlaps between the two types of machine learning algorithms.

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

A regression is **a statistical technique that relates a dependent variable to one or more independent (explanatory) variables**. A regression model is able to show whether changes observed in the dependent variable are associated with changes in one or more of the explanatory variables

**Real-world examples of linear regression models**

* Forecasting sales: Organizations often use linear regression models to forecast future sales. ...
* Cash forecasting: Many businesses use linear regression to forecast how much cash they'll have on hand in the future

**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 than those in other groups**. In simple words, the aim is to segregate groups with similar traits and assign them into clusters.

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

**i. Machine learning algorithms are used**

**ii. Studying under supervision**

**iii. Studying without supervision**

**Supervised learning is the types of machine learning in which machines are trained using well "labelled" training data, and on basis of that data, machines predict the output**. The labelled data means some input data is already tagged with the correct output

* *Supervised:* Supervised learning is typically the task of machine learning to learn a function that maps an input to an output based on sample input-output pairs .It uses labeled training data and a collection of training examples to infer a function. Supervised learning is carried out when certain goals are identified to be accomplished from a certain set of inputs, i.e., a *task-driven approach*. The most common supervised tasks are “classification” that separates the data, and “regression” that fits the data. For instance, predicting the class label or sentiment of a piece of text, like a tweet or a product review, i.e., text classification, is an example of supervised learning.
* *Unsupervised:* Unsupervised learning analyzes unlabeled datasets without the need for human interference, i.e., a *data-driven process* . This is widely used for extracting generative features, identifying meaningful trends and structures, groupings in results, and exploratory purposes. The most common unsupervised learning tasks are clustering, density estimation, feature learning, dimensionality reduction, finding association rules, anomaly detection, etc

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

Reinforcement learning is **a machine learning training method based on rewarding desired behaviors and/or punishing undesired ones**. In general, a reinforcement learning agent is able to perceive and interpret its environment, take actions and learn through trial and error