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

**Answer : Learning is the process of acquiring new understanding, knowledge, behaviors, skills, values, attitudes, and preferences. Human learning starts at birth (it might even start before) and continues until death as a consequence of ongoing interactions between people and their environment.**

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

**Answer :**

**Learning type**

**1: auditive learning (“by listening and speaking“)**

**2: visual learning (“through the eyes, by watching”),**

**3: haptic learning (“by touching and feeling”),**

**4: learning through the intellect.**

**Yes, as humans learn by training and identifying patterns the same way we can build a machine to learn by training it to find patterns in train data**

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

Answer :

**Machine learning is a method of data analysis that automates analytical model building. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention.**

**ML responsibilities are to find patterns in data and do future prediction.**

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

**Answer : A reinforcement learning algorithm, which may also be referred to as an agent, learns by interacting with its environment. The agent receives rewards by performing correctly and penalties for performing incorrectly.**

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

**Answer : Concept learning can be viewed as a task to search through a large space of hypothesis that best fits the training examples. Here we view learning as a searching problem, we examine different strategies to search the hypothesis space effectively.**

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

**Answer : Its goal and usage is to build new and/or leverage existing algorithms to learn from data, in order to build generalizable models that give accurate predictions, or to find patterns, particularly with new and unseen similar data.**

**Humans acquire knowledge through experience either directly or shared by others. Machines acquire knowledge through experience shared in the form of past data.**

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

**Answer :**

**The 6 elements of the the Machine Learning are:**

1. **Data**
2. **Task**
3. **Model**
4. **Loss Function**
5. **Learning Algorithm**
6. **Evaluation**

8. Provide an example of the abstraction method.

**Answer : abstraction takes several forms in Machine Learning, which are related to either features or instances. The main areas of research that include abstraction in learning includes: Feature selection: hiding irrelevant features. Instance selection: hiding irrelevant instances.**

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

**Answer :**

**In machine learning, generalization is a definition to demonstrate how well is a trained model to classify or forecast unseen data. Training a generalized machine learning model means, in general, it works for all subset of unseen data. An example is when we train a model to classify between dogs and cats.**

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

**Answer :**

**In machine learning, classification refers to a predictive modeling problem where a class label is predicted for a given example of input data. Examples of classification problems include: Given an example, classify if it is spam or not. Given a handwritten character, classify it as one of the known characters.**

**Classification is the task of predicting a discrete class label. Regression is the task of predicting a continuous quantity.**

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

**Answer : Regression in machine learning consists of mathematical methods that allow data scientists to predict a continuous outcome (y) based on the value of one or more predictor variables (x). Linear regression is probably the most popular form of regression analysis because of its ease-of-use in predicting and forecasting.**

**eg . Company sales Prediction.**

12. Describe the clustering mechanism in detail.

**Answer : Clustering is the process of making a group of abstract objects into classes of similar objects. A cluster of data objects can be treated as one group. While doing cluster analysis, we first partition the set of data into groups based on data similarity and then assign the labels to the groups.**

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

i. Machine learning algorithms are used

Answer :

List of commonly used machine learning algorithms. These algorithms can be applied to almost any data problem:

1. Linear Regression
2. Logistic Regression
3. Decision Tree
4. SVM
5. Naive Bayes
6. kNN
7. K-Means
8. Random Forest
9. Dimensionality Reduction Algorithms
10. Gradient Boosting algorithms
    1. GBM
    2. XGBoost
    3. LightGBM
    4. CatBoost

ii. Studying under supervision

iii. Studying without supervision

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

Answer :

Reinforcement learning is a [machine learning training method](https://searchenterpriseai.techtarget.com/feature/Comparing-supervised-vs-unsupervised-learning) based on rewarding desired behaviors and/or punishing undesired ones. In general, a reinforcement learning [agent](https://searchenterpriseai.techtarget.com/definition/agent-intelligent-agent) is able to perceive and interpret its environment, take actions and learn through trial and error.

### How does reinforcement learning work?

In reinforcement learning, developers devise a method of rewarding desired behaviors and punishing negative behaviors. This method assigns positive values to the desired actions to encourage the agent and negative values to undesired behaviors. This programs the agent to seek long-term and maximum overall reward to achieve an optimal solution.

These long-term goals help prevent the agent from stalling on lesser goals. With time, the agent learns to avoid the negative and seek the positive. This learning method has been adopted in artificial intelligence ([AI](https://searchenterpriseai.techtarget.com/definition/AI-Artificial-Intelligence)) as a way of directing [unsupervised machine learning](https://whatis.techtarget.com/definition/unsupervised-learning) through rewards and penalties.

example : Gaming, Robotics

### Common reinforcement learning algorithms

1. **State-action-reward-state-action (SARSA)**
2. **Q-learning**
3. **Deep Q-Networks**