Answer 1 :

Machine learning is a branch of [artificial intelligence (AI)](https://www.ibm.com/cloud/learn/what-is-artificial-intelligence) and computer science which focuses on the use of data and algorithms to imitate the way that humans learn, gradually improving its accuracy. Real life examples:

Spam filtering

Voice checker

Product recommendation

Some ethical issues are:

* “Awakening” of AI.
* Security problems.
* Lack of quality data.
* Disappearance of jobs.

Answer 2

Under the supervision of experts humans learn by understanding and following commands . They use their own reasoning.

In self-education they learn by experimentation. It’s the human curiosity which motivates people to do self-learning.

Indirect instruction is **a student-centered approach to learning where students observe, investigate and draw inferences from data**. In this instructional model, professors take on the role of a facilitator or supporter as opposed to offering direct instruction.

Answer 3:

Supervised learning is one of the most basic types of machine learning. In this type, the machine learning algorithm is trained on labeled data. Even though the data needs to be labeled accurately for this method to work, supervised learning is extremely powerful when used in the right circumstances.

In supervised learning, the ML algorithm is given a small training dataset to work with. This training dataset is a smaller part of the bigger dataset and serves to give the algorithm a basic idea of the problem, solution, and data points to be dealt with. The training dataset is also very similar to the final dataset in its characteristics and provides the algorithm with the labeled parameters required for the problem.

Unsupervised learning :

Unsupervised machine learning holds the advantage of being able to work with unlabeled data. This means that human labor is not required to make the dataset machine-readable, allowing much larger datasets to be worked on by the program.

In supervised learning, the labels allow the algorithm to find the exact nature of the relationship between any two data points. However, unsupervised learning does not have labels to work off of, resulting in the creation of hidden structures. Relationships between data points are perceived by the algorithm in an abstract manner, with no input required from human beings.

[Reinforcement learning](https://it.toolbox.com/article/openais-robot-learns-to-solve-a-rubiks-cube-with-one-hand-peter-welinder-research-lead-openai-shares-insights) directly takes inspiration from how human beings learn from data in their lives. It features an algorithm that improves upon itself and learns from new situations using a trial-and-error method. Favorable outputs are encouraged or ‘reinforced’, and non-favorable outputs are discouraged or ‘punished’.

Based on the psychological concept of conditioning, reinforcement learning works by putting the algorithm in a work environment with an interpreter and a reward system. In every iteration of the algorithm, the output result is given to the interpreter, which decides whether the outcome is favorable or not.

In case of the program finding the correct solution, the interpreter reinforces the solution by providing a reward to the algorithm. If the outcome is not favorable, the algorithm is forced to reiterate until it finds a better result. In most cases, the reward system is directly tied to the effectiveness of the result.

Answer 5:

A (machine learning) problem is well-posed if a solution to it exists, if that solution is unique, and if that solution depends on the data / experience but it is not sensitive to (reasonably small) changes in the data / experience.

Answer 6:

ML algorithms lack the ability to reason beyond their intended application.

Contextual Limitation:

If we consider the area of natural language processing (NLP), text and speech information are the means to understand languages by NLP algorithms. They may learn letters, words, sentences or even the syntax, but where they fall back is the context of the language. Algorithms do not understand the context of the language used.

Answer 10:

**Different Types of Supervised Learning**

**1. Regression**

In regression, a single output value is produced using training data. This value is a probabilistic interpretation, which is ascertained after considering the strength of correlation among the input variables. For example, regression can help predict the price of a house based on its locality, size, etc.

In logistic regression, the output has discrete values based on a set of independent variables. This method can flounder when dealing with non-linear and multiple decision boundaries. Also, it is not flexible enough to capture complex relationships in datasets.

**2. Classification**

It involves grouping the data into classes.  If you are thinking of extending credit to a person, you can use classification to determine whether or not a person would be a loan defaulter. When the supervised learning algorithm labels input data into two distinct classes, it is called binary classification. Multiple classifications means categorizing data into more than two classes.

**3. Naive Bayesian Model**

The Bayesian model of classification is used for large finite datasets. It is a method of assigning class labels using a direct acyclic graph. The graph comprises one parent node and multiple children nodes. And each child node is assumed to be independent and separate from the parent.

**Decision Trees**

A decision tree is a flowchart-like model that contains conditional control statements, comprising decisions and their probable consequences. The output relates to the labelling of unforeseen data.

In the tree representation, the leaf nodes correspond to class labels, and the internal nodes represent the attributes. A decision tree can be used to solve problems with discrete attributes as well as boolean functions. Some of the notable decision tree algorithms are ID3 and CART.

**4. Random Forest Model**

The random forest model is an ensemble method. It operates by constructing a multitude of decision trees and outputs a classification of the individual trees. Suppose you want to predict which undergraduate students will perform well in GMAT – a test taken for admission into graduate management programs. A random forest model would accomplish the task, given the demographic and educational factors of a set of students who have previously taken the test.

**5. Neural Networks**

This algorithm is designed to cluster raw input, recognize patterns, or interpret sensory data. Despite their multiple advantages, neural networks require significant computational resources. It can get complicated to fit a neural network when there are thousands of observations. It is also called the ‘black-box’ algorithm as interpreting the logic behind their predictions can be challenging.

**Read**: [Top 10 Neural Network Architectures in 2020](https://www.upgrad.com/blog/neural-network-architectures/)

**6. Support Vector Machines**

Support Vector Machine (SVM) is a supervised learning algorithm developed in the year 1990. It draws from the statistical learning theory developed by Vap Nick.

SVM separates hyperplanes, which makes it a discriminative classifier. The output is produced in the form of an optimal hyperplane that categorizes new examples. SVMs are closely connected to the kernel framework and used in diverse fields. Some examples include bioinformatics, pattern recognition, and multimedia information retrieval.