

1. Machine Learning (ML) is an application of Artificial Intelligence (AI) focused around training computer models on data sets to recognize patterns and extrapolate/predict data from other data sets. There are many model training approaches available which are usually divided into three main categories: supervised learning, unsupervised learning, and reinforcement learning.

2. Data: Data is the foundation of machine learning; a computer can't begin to recognize patterns without first being trained on some data set(s) and humans need data in order to consider patterns in it; you can't find patterns in nothing.

Pattern Recognition: While humans are generally better at pattern recognition over computers, there are pattern recognition tasks that computers outperform humans in, in both speed and accuracy. These tasks are usually centered around analyzing large or complex sets of data. By expanding the capabilities of pattern recognition in machine learning, we can develop more advanced autonomous technologies and more quickly find cures for previously terminal illnesses.

Accuracy: The goal of training a model is to make it as accurate as possible on general data. This means not overfitting a model to a particular set of training data and efficiently training your model over a variety of types of data. If a model is no better at predicting results than guessing, then the model serves no real purpose.

3. AI and ML often go hand in hand. Some consider ML to be a subset of AI and others consider them to meet in the middle in some areas, like a Venn Diagram. The goal of ML, however, is to train a computer to recognize patterns in data equally or more efficiently than a human can. This is the essence of artificial intelligence, and it is difficult to explain one without including the other.

4. One well-known application of machine learning is the development of autonomous vehicles. ML is required to develop quick and efficient decision making skills in these types of vehicles; it would be extremely inefficient to attempt to make a program which makes these decisions based on pre-defined rules because the environments that a vehicle would be expected to operate in are far too vast for traditional programming methods.

Another application of machine learning is in healthcare. ML can be used to more efficiently analyze data to research and discover new cures and medications for illnesses. Traditional programming methods could not achieve the same results because it could only be programmed to recognize patterns that the programmer already knows about. ML aims to find previously unrecognized patterns in this type of data.

5. In a data set, an observation is a sample data point, also known as an example or an instance. If you were looking at a table of earnings from different restaurant chains, an observation would be the name and earnings of a particular restaurant (a row in the table).

A feature is an attribute of a sample data point, also known as a predictor. In the same restaurant example, a feature could be the column containing all the earnings of each chain.

Quantitative data is numeric while qualitative data is categorical. In our restaurant example, the earnings feature is quantitative because it is numeric and we can meaningfully analyze it using mathematics. The names of the restaurants would be categorical because we can **NOT** meaningfully analyze it using mathematics.

Observations and features are important because they help us better understand the relationship between different data points and make it simpler to organize and compare. Quantitative and qualitative data are important because they help us understand how to organize and analyze different types of data.

6. Machine learning is very interesting to me because it can be applied to many fields to quickly advance human understanding far faster than we ever could before. ML has so much potential to completely change how we see and understand the world, in the same way the development of the first computers did. Data science is an area that has always been very interesting to me because there is always so much to be learned from the data that surrounds us daily. I would love to be able to harness some of that power for my own work and I hope to one day work with ML as a career.