**What is it? What does it do?**

Machine Learning is a system’s ability to acquire and adapt new information to improve upon its proficiency in a given task. It allows an existing system to develop without requiring further user input and programming. It is currently used in a variety of different applications, including email filtering, fraud detection and YouTube’s ContentID system, allowing for accurate and automatic detection of specific patterns and details without being explicitly programmed by humans.

Machine Learning currently allows many complicated processes to be completely automated, the aforementioned email filtering and fraud detection are examples of this. Systems utilising this technology are capable of processing large quantities of information and automatically generate comprehensive solutions.

By allowing systems to automatically take in information and develop themselves, developers are able build systems with capabilities that are realistically impossible to manually program in a relatively short amount of time, provided they provide the system sufficient information and processing power.

The technology uses algorithms to build a mathematical model that is based on sample data provided by the user. It uses this model to, ideally, make informed decisions or predictions without being specifically programmed to do so.

There are different approaches to machine learning, different algorithms that require differing inputs from the user and develop differently. This allows the user to cater the system to accomplishing specific tasks and requirements. ‘**Reinforcement Learning**’ is a very general field that can be applied to many different tasks such as autonomous vehicles or to learn how to play games such as chess. It is based on maximising reward for actions, providing the most efficient and beneficial way to accomplish a task. However, it is considered an ‘inexact’ model, as the information it processes are likely to not have a single, perfect solution. ‘**Supervised Learning**’ relates to another differing field. Rather than finding paths and actions to a goal, it is used for tasks such as facial recognition and ranking, as it is designed to identify patterns found within the provided data. At its core, ‘**Supervised Learning**’ is used to predict outputs associated with inputs.

A subset of machine learning is called ‘neural networking’, where computing systems are linked in a way inspired by biological brains and their complex neural networks. Rather than being formed of an algorithm like other forms of machine learning, neural networks are a framework upon which many different machine learning systems and algorithms pool their resources to process extremely complex information.

**What is the likely impact?**

Within the next 3 years, as the processing power of computers continue to increase, the speed in which a machine learning system can be developed will increase accordingly, allowing more members of the general public to apply machine learning to their own systems, greatly increasing its rate of expansion and adoption in our daily lives.

Certain aspects of the technology have come under scrutiny due to privacy concerns. Machine learning can be used to accurately identify individuals from images, leading many to be concerned that personal privacy will essentially come to an end with the widespread adoption of machine learning applications. While it is possible that machine learning can be used nefariously, the benefits that the technology provides must be considered before we come to a global consensus on its usage.

Machine Learning is not without limitations however, they require an initial supply of suitable information with sufficient detail and quantity to build upon, or else it will not develop in expected or desired ways. Additionally, depending on the sample information provided by the user, bias may be introduced into the system. To prevent this, actions must be taken to ensure this bias is minimised such as sampling or providing a much larger and broader amount of information.

A phenomenon worth noting is the increased prevalence of a technology called ‘folding’, in which users can donate the processing power of their computers to create a pseudo-neural network to help researchers fight diseases. As this becomes more popular, the rate at which research can be conducted will greatly increase will also decreasing computing costs for researchers, allowing the money to be allocated elsewhere.

**Effect**

Machine Learning could fundamentally change how we go about day to day. One of the technology’s most direct effects on daily life is its application in autonomous cars, greatly increasing road safety once the system is perfected. Eventually, the drivers of vehicles will be completely replaced by systems utilising machine learning, as the effectiveness of the system will supersede the capabilities of human drivers.

A second, currently more abundant application of machine learning that we encounter on a daily basis is targeted advertising. Using information that you provide to the system, even unknowingly, the system presents you with advertisement it believes you would most likely be interested in.

Another extremely important effect machine learning will have on our lives is its medical applications. When formed into a neural network, these systems can identify patterns and find information that can greatly assist medical researchers in discovering cures for diseases such as cancer and AIDS.