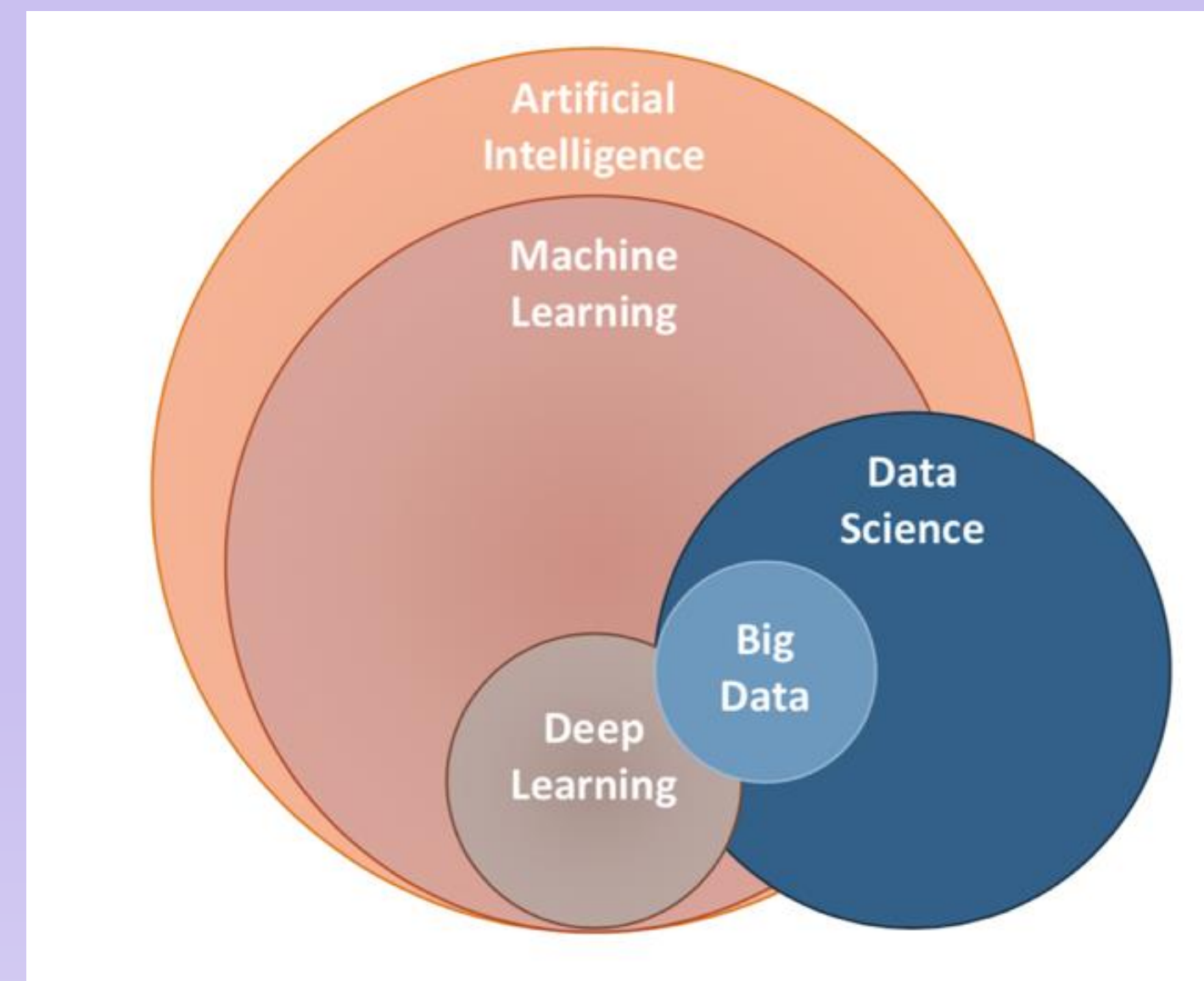


MACHINE LEARNING

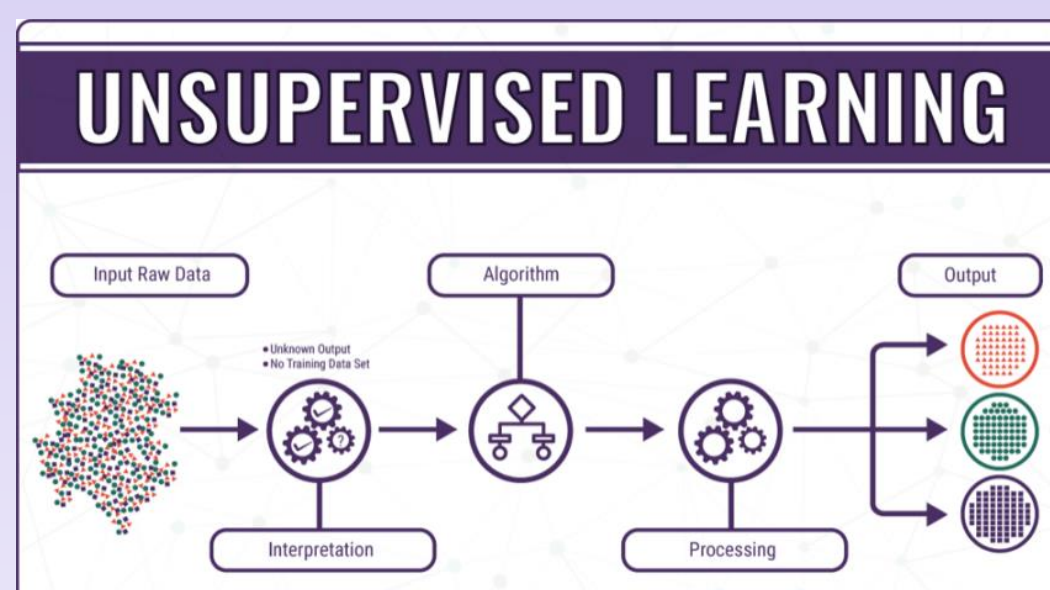
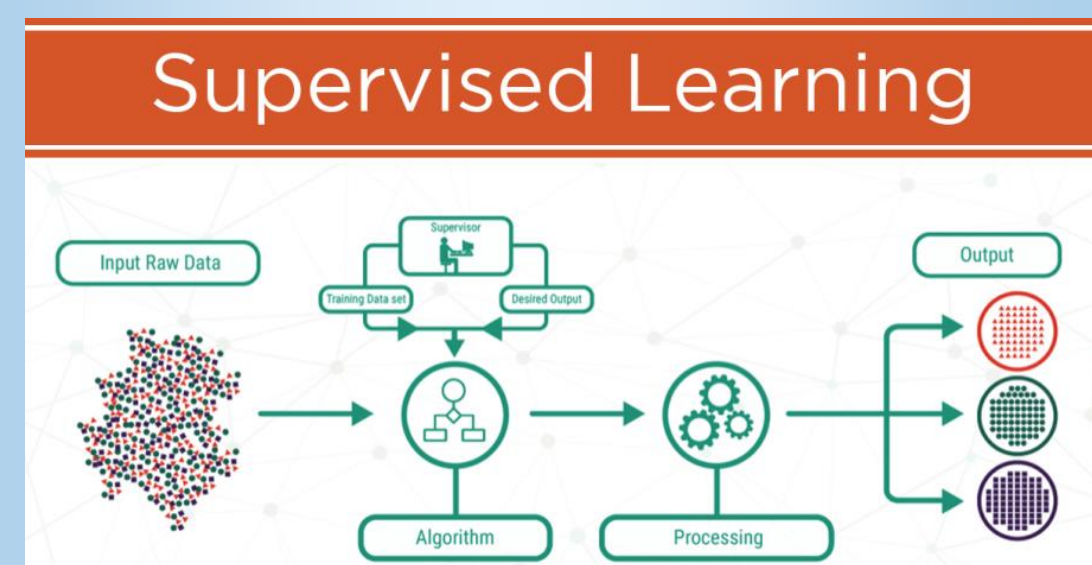
Github: <https://github.com/TTLawlor/CS4182Project>



Machine Learning is a subset of artificial intelligence. For a machine to be deemed ‘intelligent’ in an ever-changing world, it is very important for it to be able to learn, process data and adapt. While artificial intelligence covers the broad base of machines carrying out tasks on their own accord, machine learning focuses specifically on machines learning and adapting from data collected. To do this, machine learning consists of algorithms, statistics, and patterns. Algorithms are devised for machines and can be used to find and analyse patterns in different types of data. These findings can then be used to create a model if desired. Since a machine can very quickly sort through large amounts of data, a machine that has been given the correct algorithm can do any manner of sorting, analysing, and optimising faster and far more effectively than a human. Machine learning is commonly used in many areas such as by finance sectors for creating models to detect fraud and analyse stocks, in healthcare to help diagnosis and by the internet to provide users with relevant information.

Supervised Learning

Supervised learning is one of the most common types of Machine Learning. It uses labelled datasets to make predictions for new sets of unknown data using patterns and information previously found in older collections of data. If the algorithm can identify this data successfully, then it has learned correctly. However, if the algorithm fails to do so, it must be changed so that it may learn correctly. Supervised learning can be divided into two types: Regression and Classification. Regression usually involves numerical values and is a continuous set of data, while Classification is derived from a limited set of values. Regression helps the user to understand correlation between variables. Classification outputs discrete, unordered values, making its use limited. Linear Regression is a type of algorithm that shows the linear relationship between two variables, while Clustered Linear Regression breaks down large amounts of data into subspaces.



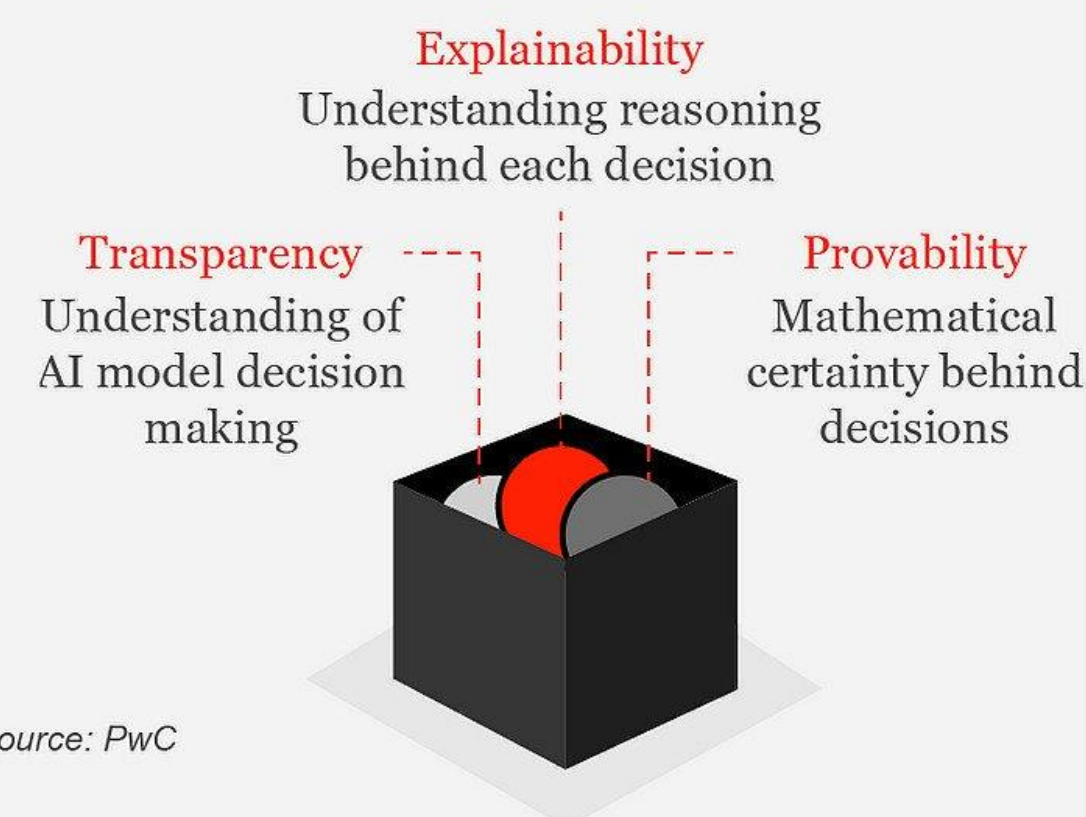
Unsupervised Learning

Unsupervised Learning is the type of machine learning which deals with large amounts of unlabelled data. Unlike supervised learning the data inputs are not classified, and the processing of this data is unsupervised by a human. This means that specific algorithms must be used to analyse the data and identify patterns in order to classify this data. What algorithms can we use? Well one of the most popular algorithms used today is cluster analysis and although there are different types of cluster analysis, the most common being k-means clustering, the main idea behind this method is to look for similar characteristics in the data points and group them together based on these characteristics. Principal component analysis (PCA), another algorithm used in unsupervised learning, is used to compress a dataset with a lot of dimensions so that the dimensionality is reduced, and the data outputs are easier to analyse.

Machine Learning Bias and Ethical Issues

Machine Learning Bias and Ethical Issues is a topic which addresses one of the biggest fears people may have about letting machine learning algorithms run our lives; the system being biased against us. This is a very real issue in the modern development of algorithms and can be influenced by a range of factors including inadvertently (or not so inadvertently) biased data, biased engineers, lack of transparency in how these systems work (leading to “black boxes”) and lack of regulations to keep companies in check. With that said, there are strong reasons to believe in an unbiased future. From constant testing, retesting and improvement of algorithms to the setting up of self-regulating committees, the future looks bright machine learning.

Three keys to understanding AI decision making



Source: PwC



Agriculture and Machine Learning

Agriculture is one of the most important sectors in life. Almost everything we eat in some shape or form, starts off from a farm. From a crop perspective, a main goal is producing as much of a product as possible, at a high quality and doing what you can to maximise the likelihood of this happening. Machine learning has played an important part in gathering data and creating models to help horticultural farmers know the factors that affect their crops the most, and how they can give their crops a better chance to perform well. Also helped by machine learning is the livestock and dairy side of agriculture. With machine learning's help, algorithms and models have been created to allow farmers to identify which traits in their animals will most likely have a positive effect on their fertility.

Healthcare and Machine Learning

Machine learning has the potential to change the landscape of medicine and healthcare dramatically. With the amount of big data available in biomedical and healthcare communities growing exponentially, a major opportunity is forming in the industry for both the discovery and implementation of practical applications to improve healthcare. Machine learning could well become the cornerstone for how epidemiology is studied, revolutionising public health. The role of an epidemiologist is to study and analyse the distribution, patterns and determinants of health and disease conditions in defined populations. The use of supervised machine learning and neural networks will assist in both identifying risk factors for disease and implementing preventive healthcare, meaning the actions taken to prevent diseases from spreading. Machine learning's impact on the healthcare industry could hold no bounds, and it is capable of turning the healthcare system on its head.

