Introduction to Machine Learning

# What is Machine Learning?

Machine learning is an application of Artificial Intelligence which allows computers to learn from data and learn to perform a task without being explicitly programmed to do so.

## Supervised Machine Learning

Supervised Machine Learning occurs when computers apply what has been learned from labelled data in the past to make prediction based on unlabelled data in the future.

## Reinforcement Machine Learning

Reinforcement machine learning occurs when a program is allowed to interact with its environment and rewards and punishments are discovered. This is a “trial and error” approach which allows a program to learn ideal behaviour based on scored interaction with its environment.

# Types of Machine Learning Algorithms

## Decision Trees

Decision trees take in many different attributes as inputs and use these to attempt to classify these into and output. The algorithm attempts to split the training data into subsets and classify new incoming data into subsets to make a prediction.

The data is split into subsets, if the outcome for all instances are all the same this is known as a “pure subset”. If the subset is pure no further splitting is necessary. If the subset is not pure then it must be split further.

A decision tree is in effect a logical formula, which will make decision based on input criteria to produce an output. When a decision tree is created it is not just the decision that are encoded, but also the counts at each point. This allows a confidence to be assigned to each decision such that an indication can be given as to the confidence of the classification of future data.

## Neural Networks

Neural networks contain nodes which accept inputs and have weighting mechanisms. These pass their outputs on to other nodes within the network and eventually to the overall system output.