CHAPTER 1 WHAT IS AI?

We have heard a lot about AI over recent years, and the impact it will have upon humans and the planet in general. AI has the ability to change many aspects of human life, and it could lead to massive potential changes in the marketing industry.

Remember, AI is not about replacing humans, but about taking on mundane or repetitive tasks that enable humans to be their most creative, making use of human skills.

Before we continue further, what exactly is AI?

AI is artificial intelligence and it is changing the way we work, live and are entertained.

In our home, we might use AI to –

- Select music

- Turn on our lights or heating system

- Set reminders

- Send messages

AI is becoming increasingly important in many different industries. In the UK, for example, the government announced £100 million in funding to develop the use of AI in agriculture and otherindustries.

A knowledge of AI is beneficial for many organisations and businesses. This knowledge is also essential for students and professionals, helping them to stay head of the crowd by understanding more about the technological advances in AI.

DEEP LEARNING, MACHINE LEARNING AND NEURAL NETWORKS

The terms deep learning, machine learning and neural networks are sometimes used interchangeably, although there are slight variations in their meanings. All three terms relate to artificial intelligence, but they are subsets of each other. Neural networks are part of machine learning and deep learning is part of a neural network.

Machine learning uses a combination of data produced by humans and a set of algorithms to mimic how humans learn. This process allows the machine to improve the accuracy of its work as additional data is provided. The more data samples that the machine has access to, the better it will get at making predictions about what might happen (with more data) or what the audience

might respond positively towards. Normal machine learning requires humans to select the features which will be used to classify any data addressed to answer a specific question. There are three aspects to a machine learning process:

- **The decision** – the machine uses input data to make a pattern. This pattern will allow the machine to either classify or predict something.

- **An error function** – the machine compares the pattern it has made with any known examples. This comparison helps the machine to decide how accurate the model may be.

- **An optimisation process** – the machine compares the model produced to the training set of data. This process will continue across multiple sets of data until accuracy is established.

Machine learning is integral in speech-to-text applications and speech recognition software (such as Siri). Early versions of these applications required samples of speech to be effective. This was not always successful with non-standard accents, although the various apps have improved with time (and more data).

There are four kinds of machine learning models:

- **Supervised learning** – data is labelled in order to train the machine to become accurate at classifying or predicting tasks. Supervised learning is used as part of cross-validation to solve real problems. For example, supervised learning would be used to identify spam emails and divert them to a spam folder.

- **Unsupervised learning** – data is not labelled. This requires the machine to analyse and group the data produced. Unsupervised learning relies on the machine to explore the data and look for similarities that could inform the humans involved. For example, unsupervised learning might be involved in AI making recommendations about potential books to read based on previous purchases or similar buying patterns by other readers.

- **Semi-supervised learning** – this uses a smaller data set to classify or make predictions. For example, the machine may limit recommendations of potential books to only one genre or limit the selection choices to only books currently on sale.

- **Reinforcement learning** – this model isn't trained with sample data but relies on trial and error. Successful outcomes allow the machine to predict the most likely response.

Artificial neural networks contain input, hidden and output layers and function similar to neurons in a human body. A neural node is stimulated when it receives information. When the information load is extensive, the node will pass the information on to the next layer.

Deep learning uses unstructured, or raw, data to determine which sets of features are relevant to the categories chosen for consideration. The term 'deep' is used to indicate how many layers exist in a neural network. The most important aspect of a deep learning structure is that the artificial neural networks that are part of a deep learning structure allow the machine to learn on its own

and to make informed decisions based on the data it receives. Some of the most important types of deep learning involves:

- **Convolutional neural networks** – these are particularly good at processing data that involves images. For example, in facial recognition technology.

- **Recurrent neural networks** – these learn by repetition. For example, a GPS device will make recommendations about alternative routes during heavy traffic. The device may also recognise the drivers' preferred routes and choose those routes as a starting point.

Deep learning can be useful when handing a lot of complex data. It can help to establish patterns in material which might not be visible in normal data analysis methods. However, it requires a large amount of computer memory plus additional processing units. This means that deep learning models can be expensive and time consuming to instal. The accuracy of any deep learning will depend on the quality of the available data. This raises questions about the accuracy of the interpretations made and about the sources of data. Data security is also an ongoing concern for AI programming.
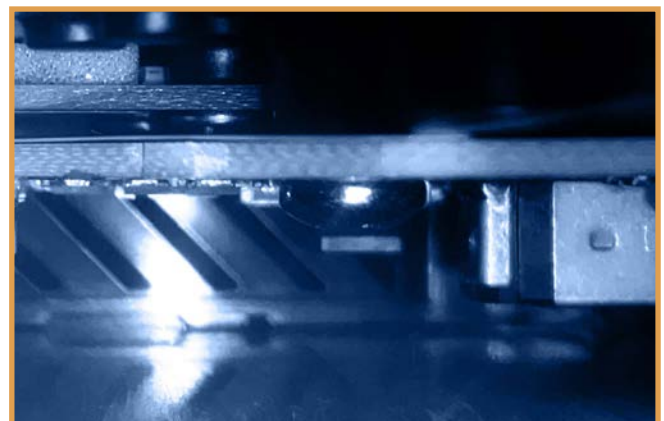
DISADVANTAGES OF AI

Before looking further into AI, let's look at some of the disadvantages of using it.

Unpredictability

Author John Mason, states, "From my perspective, the greatest value of writing is to communicate that which is not predictable. By definition, AI is about creating that which is predictable. I suspect this contradiction gives the human mind advantage over AI. AI may not create diversity in the same way the human mind does – at least not in the foreseeable future. The world is unpredictable, life is unpredictable. Things do not always go the way that they are meant to go. AI can predict certain things, but not everything. This is where the human mind is superior to AI." AI is good at coping with things that are predictable, but may struggle to deal with things that are unpredictable.

Ethical Issues

There is a lot of debate about AI. Some people are worried that AI will take over the world, while others see it as a useful tool to improve technology and education. No matter what your view, there are ethical and technological issues that need to be ironed about with the development of AI.

Bias

UNESCO (The United Nations Educational, Scientific and Cultural Organisation) states that AI can be biased and gives two examples to illustrate this point:

■ Do a search for "greatest leaders" and you will probably get a list of mainly males. Where are the women in this search?

■ If you search "schoolgirls", you will most likely also get sexualised