What does it do? (600 words) What is the state of the art of this new technology?

Machine Learning (ML) is a division of artificial intelligence that teaches computers to make accurate predictions using algorithms that detect patterns in data. These predictions could be determining if an animal in a picture is a monkey or an elephant, personal Netflix movie suggestions or whether an email is spam (Heath, 2020). These algorithms improve themselves by experience without being explicitly programmed to uncover patterns more accurately in the future. These are used to analyse large datasets giving computers the ability to do tasks that are difficult and time consuming for people. Recent progress has achieved what seems to be a human level of understanding and information interpretation (Brenden M. Lake, 2016).

There are 3 different ways to train machine learning algorithms: supervised learning, unsupervised learning, and reinforcement learning. During supervised learning, the training data is labelled, and the goal is for the algorithm to determine a cause-and-effect relationship between the data then correctly predict the output value given unlabelled data. Unsupervised learning involves the input data not being labelled, the goal is to find relationships between the data and find interesting patterns, this may uncover an underlying trend. Reinforcement learning involves a trial-and-error method, the algorithm is given a reward if its outcome is favourable, if it's not favourable the algorithm must repeat until a better solution is found (Fumo, 2017).

Tools used for machine learning problems are high-level languages such as Python or R. Python is primarily used for model building. TensorFlow, PyTorch and Keras are open-source machine learning libraries used for the development of ANN or deep learning (Innat, 2019).

Advancements in algorithms and computing will make machine learning more efficient and the consequences and how it will impact our future are debated. Currently, machine learning is being used in many fields and industries. Such as healthcare, transport, entertainment, education and many more.

Social media is impacted by machine learning. From recognising your face in photos, to the content you see in your notifications and news feed is all curated by machine learning. Every time you view something, comment or like, your decisions are examined by machine learning to give you a better user experience. When you use YouTube or Netflix, machine learning recommends you movies and videos that it thinks you will be interested in based on your previous viewing history (Kaput, 2020).

In the health field, health care providers must review large quantities of information manually before they can diagnose and treat a patient. Using machine learning, they can diagnose quicker and more accurately, develop new treatments and drugs, reduce medical and diagnostic errors and predict adverse reactions (Ahuja, 2019).

Machine learning is a useful tool for businesses, enabling the analysis of large quantities of data faster and more accurately resulting in the identification of profitable business opportunities or potential risks. Data entry and classification tasks that in the past had to be manually done by humans can now be done by computer (Uzialko, 2019).

Currently, aeroplanes use flight management systems to control its position during flight. On average a Boeing 777 pilot only spends 7 minutes manually flying the aircraft (Markoff`, 2015). However, it is still very complicated to make cars self-driving. There are many more obstacles on the road that aircrafts do not have to deal with such as barriers and boundaries to stay on the road and changes in traffic patterns (Hecht, 2020). Nevertheless, self-driving cars are already a reality. These cars use machine learning algorithms to continuously analyse the surrounding environment and

predict possible changes and with further development, we have a great deal to look forward to from these autonomous cars. They even may exceed the safety of human driven vehicles (Dickson, 2018).

What is the likely impact?

Nearly all work industries will be impacted by machine learning. More jobs that have been performed solely by humans will be completed or completed better by computers as machine learning algorithms become more sophisticated. An Oxford Economics report suggests that in the next 20 years as high as 20 million jobs could be lost to robots. This will leave many people in need of work (ABC News).

Some hands-on duties of health care professionals' jobs that are usually manually done by humans are beginning to be done by computers, such as aiding surgeons in less invasive procedures with automated robotic systems, diagnosing cancer from analysing MRI scans and recently an American medical centre launched a robotics controlled automated pharmacy that dispenses prescriptions. Johnson & Johnson has recently produced an FDA approved anaesthesia delivering device, no anaesthesiologist required. As these technologies are tested and more confidently used, more jobs will be taken over (Marr, 2016).

In the financial industry, analysing data and organizing accounts can now be done by algorithms, without needing accountants. The government now uses machine learning to identify potential tax fraud, ATMs have partly replaced bank tellers and soon higher-level bank jobs could easily be replaced by computers. (Marr, 2016).

Teachers jobs have changed with the internet and computers but now studies have shown that algorithms used to customise learning for specific students can be more successful than human teachers. This may eventually eliminate or reduce the need for classroom teachers (Marr, 2016).

How will this affect you?

Many aspects of our daily life will be influenced by machine learning. While it is difficult to predict everything that will be changed some things that I believe will be affected is our commutes to work, as self-driving cars become more common hopefully the risk for car accidents will decrease making our commutes or any travel safer. Everyday uses of machine learning is email filtering, algorithms categorise emails enabling you to quickly see more important emails. Banks using machine learning to prevent fraudulent transactions makes out money safer. Healthcare may become cheaper, more accessible, and more reliable by reducing human error as it becomes automated.

With every advancement in machine learning comes a variety of technological and moral consequences. Machine learning may help humanity, but it may cross a line with it begins to make personal decisions for us. There may be issues with data privacy and machine learning taking jobs with people rely on.

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