**What does it do?**

Machine Learning is the process whereby an algorithm learns without being explicitly told what to do. Machine Learning is distinguished from the other sub-fields of Artificial Intelligence by being more “dependent on human intervention to learn”, IBM Cloud Education (2020). This prerequisite includes processes such as cleaning the dataset to be used and determining the featured variables to be used by the algorithm. The main purpose of Machine Learning is to form patterns by using data, and consequently, make recommendations and predictions for future outcomes.

Before we discuss the state of Machine Learning today, looking back on some of the history can provide an insight on how for this field of study have come. Machine Learning was considered a part of Artificial Intelligence until the late 1970’s, (Foote, 2019), and was primarily used by researchers to train an Artificial Intelligence program. Since then, Machine Learning has shifted focus to solving practical problems by utilizing statistics and probability.

There are 3 types of machine Learning: Supervised Learning, unsupervised learning, and reinforced learning.

Supervised Learning is whereby the algorithm is trained on labelled data, such as the name of the column or feature and would learn based on the training data that is given. Supervised learning is primarily utilized in classification and regression problems such as predicting the prices of homes. In other words, supervised learning is the process of using labelled data, and outputting a prediction of known labels.

Unsupervised learning is where the algorithm is trained with unlabelled data and is subcategorized into being a clustering model or dimensionality reduction model. The algorithm associates the similarities between data and groups them together based on these assumptions. For example, our model can filter between a non-fraudulent and a potentially fraudulent bank account based on their transaction histories.

Lastly, Reinforcement Learning is where an agent is defined, and based on the actions of this action in an environment, it is rewarded or punished. This type of learning allows for the algorithm to learn based on trial and error and attempts to guide the agent to an optimal solution. An example is OpenAI Five, which is a Dota 2 AI that has learnt from reinforcement learning and has beaten the championship team 2-0.

The current state of Machine Learning can be categorised into the following lists (Foote, 2019):

* Analysing Sales Data
* Real-Time Mobile Personalization
* Fraud Detection
* Product Recommendation
* Learning Management Systems
* Dynamic Pricing
* Natural Language Processing

As the amount of data generated everyday increases, the demand by companies to capture and utilize this will also be expected to increase, with it being estimated that “48% of companies use data analysis, machine learning, or AI tools to address data quality issues” (Georgi Todorov). Businesses, small and large, are finding the increasing need to employ Machine Learning to better their business practice and to meet the changing customer needs.

The current practice in the field of Machine Learning is to build different models depending on the problem. This process involves building the algorithm as well as collecting and processing data from scratch. This means that the deployment of a new machine learning model is expensive and time consuming. The lead of Google’s AI division, Jeff Dean believes that the “future of [Machine Learning] lies in a great big model, a multi-functioning model that can do plenty of things” (Benedict Neo, 2019). This concept revolves around the idea of training just a single model and training it do perform in different circumstances instead of the current practice of having an algorithm paired to a problem.

Another development that may come to fruition in the future is the practice of using “Federated Data” (Bhagat, 2021) where the data used as the learning input for the algorithm is kept private. The current protocol for a Data Science Team is to use data from a centralised server such as the cloud. The negative implications of using the cloud to deploy machine learning models is that the models are accessing a database that also stores sensitive user information. The process of Federate Learning is facilitated by having your device download the model that you want to pass data into, and having the model learn from the data that is stored locally on your device, and not the data that is stored in the database.

There are also other revolutionising technologies being developed that will affect the Machine Learning field such as Quantum Computing, where it would increase the efficiency of processing large amounts of data.

**What is the likely impact?**

The advent of new technologies always brings forward a betterment towards some aspect of society. Likewise, there will always be some level of concern and criticism towards new advancements. Machine Learning is no different. The positive impacts on society that Machine Learning may have includes areas such as Education, Smart Homes, and Business.

To elaborate further, having smart classrooms and systems where reports can be “customized [and] report their specific needs” (Vijay Singh, 2020) helps with making education more personal to an individual and ultimately, teachers can teach the set curriculum alongside assisting in areas that students may find difficult. Using these types of Machine Learning tools in school would create jobs such as having a database administrator. The adverse implications of such tools in the classroom would include concerns such as the possibility of reducing the need for teacher assistants and consequently, may have unintended consequences to the supply of teachers, especially in places that report a shortage of teaching staff.

Smart technologies within the home such as virtual assistants, light automation or automatic heating and cooling units, are becoming more popular and integrated within the household. Although they provide convenience and security, these devices are not free of concern. Having a virtual assistant hacked would be very problematic such as listening to private conversations or having credit cards and other accounts linked to the device stolen.

In a business context, a company may decide to implement machine learning to help improve efficiency and better optimize the workplace. This would create opportunities for IT professionals such as data analysts, data scientist and database engineers. From a managerial perspective, this type of technology would be a non-issue, however, ethical problems may arise such as discriminatory outcomes or the lack of privacy. This could be weaponized by someone in HR with malicious intent, and wrongly terminate an individual.

Additionally, another area where Machine Learning can improve the lives of people is public transportation. By using Machine Learning to predict what time a train, or other mode of transport arrives at a particular destination allows for better planning of transport timetabling. It could reduce the waiting time and travel time when commuting by bus or train, as well as taking optimal roads to avoid congestion. This would ultimately, increase the number of jobs for public transport operators.

Although there are many great outcomes that can be harnessed using Machine Learning, controversial developments in the field are quite common. An example is China’s social credit system, and its reinforcement through Machine Learning enabled technology such as cameras and other monitoring devices. Punishing bad behavior such as jaywalking or not paying one’s bills on time are all monitored and consequently, an individual’s every action is rewarded or punished. This type of utilization incites concern over one’s privacy and data protection issues such as the concern of being constantly surveilled, possibly even in a private environment such as one’s home. Although the crime rate in such an environment would be expected to drop, the associated payoffs in one’s livability would also plunder.

**How will this affect you?**

There are many developments in the Machine Learning field that have piqued our interest, such as smart homes or optimizing in the public transportation system. Optimization in public transport, development of smart homes and personalization are just a few developments that would improve one’s life. As a student, it would allow for better planning in travel when using public transport, better learning experiencing and opportunities to improve my abilities in school, as well as improvements in convenience that is brought by automation.

Regarding what would be different in wake of Machine Learning being implemented in my daily life, I believe that most of the changes would revolve around convenience, security, and personalization. In Australia, it is fortunate that there are huge emphasizes on ethical and practical applications of new technologies. They should comply with existing laws and regulations. Therefore, although there exists some concern with security and information privacy, they are mainly “what if” hypotheticals.

Machine Learning brings about an opportunity for companies to maximize their profits and ensure a better alignment with customer demands. From the employee perspective, it incites fear or making one’s own skillset and knowledge obsolete and being replaced or made redundant. This sentiment is mostly felt throughout low-skilled jobs such as truck drivers, factory workers and others. Having some friends and family in this category makes me anxious for their future in the industry.

Other friends and family in the business and tech industry are not invulnerable to the changes that machine learning can bring to the workplace. The positive changes revolve around the idea of utilizing new technologies in Machine Learning to automate some aspects of their lives, such as a Data Scientist automating the data processing tasks, which in turn, allows for time to be reallocated to address business solutions. Conversely, people who are affected by machine learning in business, should expect that their roles are business professionals to evolve along with this change. Therefore, there may be concerns of some positions merging with others to produce a new role, which effectively makes a two-person job into one. For instance, the employment of Automated Machine Learning could potentially result in the data analyst role removed entirely, and its responsibilities to be conferred onto the data scientist.

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