Machine Learning

What does it do?

Machine Learning (ML) is a form of artificial intelligence. It uses different methods or algorithms to do a job that would otherwise be more difficult and time consuming for a human to do manually. It processes large amounts of data and looks for patterns in that data. Using these patterns ML can learn for itself without being told/ programmed repeatedly to do so. It achieves this by two main methods which are detailed below.

Supervised Learning

This process involves the analysis of a pre-determined data set and then makes predictions of what a future event might be. The prediction that the machine makes is then compared with the actual event output and used to find any errors that might have occurred and use them to modify the system accordingly. Some examples of this are automated trading, credit scoring and facial recognition.

Unsupervised Learning

The algorithm processes unlabeled data and looks for hidden structures within there to make inferences about a potential output. It does not decide the correct output but describe the hidden structures or clusters from unlabeled data. Examples of the use of unsupervised ML are market research, robotics and gene sequencing.

State of the art of ML

Machine Learning has unlimited potential for helping humans deal with complex problems. One of the most important areas of this advancement is in the medical sector. Machines are being utilized to discover patterns within complex datasets that is beyond human perception. Brain tumors remain one of the deadliest diseases in the human body. Recent advancements in treatments have paid dividends for doctors and researchers. Getting to those treatments in a timely fashion is key to the success of those treatments. Advances in ML is having a positive impact on brain imaging and helping practitioners discover new tumors quickly.

What Can Be Done Now?

There are many applications of ML in our everyday life. Advancements in the use of ML algorithms are currently being tested in amputees. Patients are implanted with electrodes to nerve sites which can send signals. The algorithms are then used to turn these signals into movements of the prosthesis. More testing is needed but this is just one example of how machine learning algorithms are helping the medical sector to give freedom back to such patients. Another example is something that has been around for a while now. Facial recognition and speech recognition. This technology is being used in day to day life by millions of people around the world. Growing in popularity in recent years, applications such as Siri to finding you something on the internet by just asking a few questions. Anything from “find the nearest restaurant” to “navigate home”. Siri can then integrate with other applications like maps to complete the desired function of the user. The maps application can open and select the fastest route to your destination from your current location. Machines

are even beginning to be able to predict what we need over time, like suggesting words that we might be typing as we are typing them. Words that are used commonly can be predicted when you have only typed a few letters.

What's Next?

Non-human pattern recognition is set to grow in the coming years. Computers can replicate certain situations and test them for themselves without needing human interaction. Simulating and recognizing patterns that it creates itself by internally testing the data. Quantum computing for drug testing and discovery. At present researchers must rely on older methods to come up with hypotheses to experiment and try out a range of new drugs to test these hypotheses. Quantum computing on the other hand could transform this process, to make it simpler and most cost-efficient in the future.

Impact of This Tech

The potential impact of this technology could be huge. In the case of automated vehicles, it could potentially lower the death toll on our roads. Diver-less vehicles are already in action, airplanes are 90% automated now with the pilot of a commercial airline only manually flying about seven minutes on average. Mostly for takeoff and landing. Autonomous vehicles, however, have a major hurdle that airplanes don't, traffic. Not only traffic, but obstacles as well like human pedestrians. This development will change the way we use the road and in time make it a lot safer place for everyone. Removing the human error aspect will dramatically reduce the cause of most accidents. Every good development with machine learning and AI comes with a downside. By utilizing computers to complete these tasks it will affect a lot of people. Many humans would then lose jobs

to the emerging technology. For example, bus drivers, taxi drivers and train drivers are just a few of the people that would be impacted by these changes. Unless some could be re-trained to supervisory roles to maintain the systems of these automated vehicles. Not all would be required to maintain and supervise these machines as they would be quite efficient and reliable. Some areas will benefit, like maintenance companies as they would still need to be maintained and refitted with electrical components as needed.

The Personal Effect

New technology affects everyone in different ways. This may be either for better or for worse. This new technology would affect me in how I go about my everyday life. Automation of vehicles would be a blessing for people who don't want to or can't drive any further on a long trip. However, it may also make a lot of our jobs redundant. Me personally, I am a truck mechanic and this technology would reduce the need for as many of these job roles as there are now. Without the human interaction and errors that come from things like fatigue a lot of the maintenance would be minimized. Failures would potentially become a thing of the past thus minimizing the need for many mechanics to be available for such repairs. However, this would also produce new opportunities to re-skill in the area and maybe force some people to get into the computer side of things. To be able to determine potential problems with systems and programs and rectify them before there are situations of complete failures of systems. Like many things there are upsides and there are downsides to new tech. While things can be made easier and more efficient to use. The other side is that there are people that will potentially lose employment due to a computer doing their job for them.[i]

Anon, 2020. *15 Ways Machine Learning Will Impact Your Everyday Life*. [online] EliteDataScience. Available at: <https://elitedatascience.com/machine-learning-impact> [Accessed 13 Apr. 2020].

Anon, 2020. *An implant uses machine learning to give amputees control over prosthetic hands*. [online] MIT Technology Review. Available at: <https://www.technologyreview.com/2020/03/04/905530/implant-machine-learning-amputees-control-prosthetic-hands-ai/> [Accessed 12 Apr. 2020].

Anon, 2020. *Automated Vehicles for Safety*. [online] NHTSA. Available at: <https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety> [Accessed 13 Apr. 2020].

Chris Fisher, E., 2020. *IBM | What is Quantum Computing?*. [online] IBM Quantum. Available at: <https://www.ibm.com/quantum-computing/learn/what-is-quantum-computing/> [Accessed 13 Apr. 2020].

Anon, 2020. *Google Voice Explore*. [online] Google Trends. Available at: <https://trends.google.com/trends/explore?date=all&q=%2Fm%2F02q0knk> [Accessed 13 Apr. 2020].

Peter H. Diamandis, M., 2020. *5 AI Breakthroughs We'll Likely See in the Next 5 Years*. [online] Singularity Hub. Available at: <https://singularityhub.com/2019/04/26/5-ai-breakthroughs-well-likely-see-in-the-next-5-years/> [Accessed 13 Apr. 2020].

Anon, 2020. *State of the Art: Machine Learning Applications in Glioma Imaging : American Journal of Roentgenology: Vol. 212, No. 1 (AJR)*. [online] Ajronline.org. Available at: <https://www.ajronline.org/doi/10.2214/AJR.18.20218#> [Accessed 13 Apr. 2020].

Anon, 2020. *Supervised Learning*. [online] Au.mathworks.com. Available at: <https://au.mathworks.com/discovery/supervised-learning.html> [Accessed 12 Apr. 2020].

Anon, 2020. *Unsupervised Learning*. [online] Au.mathworks.com. Available at: <https://au.mathworks.com/discovery/unsupervised-learning.html> [Accessed 12 Apr. 2020].

Anon, 2020. *What is Machine Learning? A definition - Expert System*. [online] Expert System. Available at: <https://expertsystem.com/machine-learning-definition/> [Accessed 12 Apr. 2020].

i