IT Technologies - Machine Learning

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What does it do?

Machine learning is considered a branch of Artificial Intelligence where computers can learn and improve upon their own performance by incorporating and building upon the data it acquires, using algorithms and statistical models to draw inferences from patterns in the data it holds (Machine Learning, 2021). More simply, machine learning is a subset of AI in which computers learn from experience and discovery, inferring concepts and conclusions through patterns and data without the need for human instruction or interference (Casey, 2019).

Machine learning is probably the most common form of AI we use today and is more pervasive and widespread than many believe it to be (Casey, 2019). Machines learn through the use of past examples and historical trends. New models can then be developed and used to predict new values based on previous experiences (Bansal, Singh and Kaur, 2019). It can be used where data and questions are too substantial to be solved naturally, finding answers to questions by analysing the data it is supplied with (Bansal, Singh and Kaur, 2019).

Machine learning algorithms are broken up loosely into three broad areas of learning. Although there are more, the main three are supervised learning, unsupervised learning, and reinforcement learning. Supervised learning is the type of machine learning where data scientists supply both the variables and the labelled training data for which the algorithm uses to determine any correlations. Both the input and the output are specified for the algorithm being used (Loukas, 2020).

Unsupervised learning is when the machine learns through algorithms that do not require data to be labelled. The algorithm searches through the data provided for any significant connections and sorts it into subcategories are required. The training data and the predictions and recommendations they output used by the algorithm are all predetermined (Loukas, 2020).

Reinforcement learning is generally used to teach a machine a multi-step process, for which there are clearly defined rules and a definitive goal to be reached. The algorithms are programmed to complete a task, and positive or negative cues are reinforced as it works towards achieving the objective. For the most part, the algorithm decides which steps to follow along the way, but it is programmed to seek out the positive cues it receives for performing actions that are beneficial to reaching the goal and not the negative cues that reinforce its actions are taking it farther from its objective (Loukas, 2020).

Common uses for machine learning include recommendation engines (an information filtering system that suggests information, products and services to its users based on data analysis from themselves and the behaviour of similar users), malware detection software, image and speech recognition software, online fraud detection, virtual personal assistants (Siri, Alexa, etc.) medical diagnosis and location services (such as Google Maps) (Applications of Machine Learning, 2021).

Machine learning has applications in many different fields. In healthcare, it can discover new medications and allow doctors to predict the evolution of diseases before they occur, speeding up diagnosis and treatment for patients (Bansal, Singh and Kaur, 2019). Machine learning is also helpful in social media and marketing. It can be used to discover trends and patterns in behaviour according to different specifications (gender, age, location etc.) and analyse purchases to determine developments in style, quality, and value and apply them to market research and consumption (Bansal, Singh and Kaur, 2019). There are even benefits to the economic sector, with machine learning able to work alongside fraud detection software to determine if transactions are genuine, spam and malware filtering, and search engine result refining.

What is the likely impact?

Artificial intelligence, and therefore machine learning, in turn, might be one of the most significant innovations seen in the tech industry. After a relatively slow start (decades of development and waiting for businesses to understand just what AI and machine learning could do for them), the innovation within the industry has ignited and continues to grow daily. One of the reasons for this is necessity. For society to keep up with the continuous growth of infrastructure and data that we are acquiring and discovering, we need a system that adapts as we continue to grow. AI and machine learning help bridge this significant delay in our current processes and continuously move forward.

As information is fundamental to our position within society, it is essential for our growth as individuals, in business, and on a larger scale, as a civilisation. The amount of data we develop and consume continues to grow every minute. Data-driven decisions are the difference between one individual, business, or country keeping up with each other or falling further and further behind. Machine learning is a valuable tool in this case. It helps determine patterns based on trends and predictions, shuffling through an abundance of data and allowing the individuals who would typically be puzzling over the information to focus on other matters while solving the problem at hand.

According to the industry professionals interviewed in Pickell's article What is the future of Machine Learning? (2019), we can expect to see continuous improvement and innovation in machine learning. Precise machine learning algorithms that can effectively sort and categorise different varieties and volumes of data meticulously and quickly become more cost-effective, accurate, and profitable to users. These users then save time and avoid any unknown risks they could have otherwise missed in the mountains of data. Machine learning could progress toward the optimisation of search engines by tailoring results based on past interactions and learned user data without the need for manual configuration (Pickell, 2019). Personalisation between corporations and consumers, to inform upon their target audience and create customised products, marketing and sales based on data learned and examined is also a route machine learning could continue to advance (Pickell, 2019).

How will this affect you?

Considering that machine learning is found in technologies all around us, and it will come as no surprise that it has already influenced our lives. With application functionality in areas including healthcare, fraud detection, resource management systems, recommendation engines, map and geolocator software, virtual assistants, social media, and video games, machine learning is comprehensively integrated into society as we know it (Casey, 2019).

On an individual note, I think machine learning will affect my day-to-day life immensely. I currently work in retail, and the ability to upsell and cross-channel market between our target audience

through social media platforms, newsletters, and the website itself would increase sales significantly for the company I work for, including many others. Advances in healthcare and life sciences would aid doctors in discovering treatments and medicines quicker and more accurately for not only the neurological condition I have but for thousands of other illnesses many experience. With advancements in machine learning and data management within the financial sector, I can be sure that risk and security regulations are being developed and applied accurately and promptly, ensuring my finances are secure, despite risks online banking services and contactless payment terminals can present.

AI and machine learning have progressed rapidly over the last fifty years and will continue to innovate technology throughout many different industries in the future. The results are seen throughout all of our products, systems, and services. Encyclopedia information and instant communication services are taken for granted, with the knowledge available at our fingertips. The increase in our productivity is extraordinary, and the lifestyle we hold are now very different to those living in years prior, and it will only continue to advance.

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