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How Machine Learning Will Change Our World: How Machine Learning Can Make Life Easier - And a Bit More Complicated

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Machine learning. Recently, we have heard tons of buzz about the topic, but what is it? How can it help us solve problems? What does it mean for the future of science and technology? And how does it affect each of us?

Artificial intelligence, in contrast, is the technology that can imitate human thinking behavior, including carrying out complex processes like problem-solving, planning, and learning. A particularly exciting type of artificial intelligence is machine learning. Machine learning, as the term suggests, is when a program learns from the data it is given in order to make accurate predictions or create insights about that specific dataset. So, a machine can "learn" from the past data without additional explicit programming. For example, given a chest X-ray, the algorithm would be able to tell whether this X-ray was normal or abnormal and classify the image as such. Or, given a person's genetic information, an algorithm might design a drug that specifically binds to abnormal enzymes. Machine learning is a powerful tool that can be used to make powerful inferences and predictions. Machine learning and artificial intelligence are changing the world as we know it. From healthcare to transportation, almost every industry is being influenced by these tools.

Transportation

Completely driverless cars are just around the corner. Tesla Autopilot, an advanced driver-assistance program, is a topical example of the implementation of machine learning, as Autopilot is able to make decisions about personal safety based on sensors that constantly take in data. Of course, the creators of Autopilot train the algorithm before allowing it to make these decisions on its own. In order to do this, they give the algorithm some data about the distance from other cars, current speed, speed limit, etc., and allow it to make a decision on its own. Its decisions will be relatively arbitrary the first few times it makes a guess, but the algorithm will then adjust the weights of each of the variables, allowing each one to play more or less of a role in the overall decision. Over time, the algorithm becomes increasingly better at making decisions about traffic and safety, eventually working well enough to be used by the general public.

Education

Imagine a system in which teachers could spend more time with individuals and less time creating lectures, powerpoints, and worksheets that only help a small subset of students. Some algorithms are already doing this. Based on a student's grades, attendance record, learning style, and more, algorithms can design specific plans for students to learn. A teacher can then use this recommendation for differentiating a student's lesson to accommodate their learning needs and/or challenges. While this technology cannot, and should not, replace teachers, it could prove to be useful for teachers. Teaching is an intrinsically human profession, in part because teachers must understand compassion — something computers cannot do. However, it is likely that tools like these will begin to influence teaching and learning to help students reach their full potential.

Healthcare

Machine learning is already having a significant impact in the healthcare field. Radiologists are being overtaken by algorithms because computers are fairly good at image analysis and processing. For instance, looking at an anomaly detection software, in which the algorithm knows exactly what a normal chest X-ray looks like. Anything outside of the normal range will flag the doctor for further inspection. While algorithms are not replacing radiologists yet, it is fairly likely that increased data on different diseases will enable the algorithms to distinguish different diseases from one another.

What do all these changes spurred by machine learning mean for us as consumers? Companies like Netflix use machine learning-based recommendation systems to influence you to stay on their site longer. With sections like "Suggested for you" and "Because you watched…," Netflix creates recommendations that encourage you to watch more, creating revenue for the company.

Companies like Facebook, now known as Meta, dig through your online data to create targeted advertisements that you are more likely to click on. Cookies allow websites to track you as you traverse other websites so that the next time you return, they can give you advertisements that are more relevant to you. In this world, data is more valuable than gold, as someone can learn your preferences and create a user experience tailored to you that is profitable for companies. Hence, if you and a friend search the same thing on Google, you will likely get two different sets of results.

Apple has allowed users to hide their data from websites so that companies cannot take data without the individual specifically consenting. This has put some power back into users' hands, but realistically, our data is already all over the internet. This is a change that should have been implemented years ago in order to protect online privacy.

With this jump into a data-driven world, we need to be better prepared to live our lives publicly. Most of our data is already available online. Nearly all social media sites can track your birthday, gender, and location. This allows advertisements to be curated specifically for the user. Not only that, but based on the Wi-Fi network that you are connected to, algorithms can target you with advertisements for things that someone on the same network has viewed. In the next decade, it is likely that our lives will be dictated by data and insights made by machine learning algorithms.

While machine learning can greatly enhance our standard of living by automating processes, making life safer, and creating insights that we may not have seen before, there are implications of these tools that need to be seriously considered. As these new tools and technologies emerge, we are left with a wrenching question: where do we draw the line of privacy? ● ● ●