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The Rise of Machine Learning and its Long-Term Effects

This paper will examine the concept of machine learning (ML) and its positive and negative effects on our day-to-day life. The purpose of this research is to show benefits of ML in our current technology and to point out some disadvantages that need to be further worked on to improve ML and its implementation into systems. With advances in the artificial intelligence (AI) world, machine learning is being heavily focused on. Not much is thought when it comes to technology except that it will make some aspects of our life easier, but it is important to know the positives and negatives. Furthermore, learning more about how ML works, we can see that it may have negative effects such as the issue of privacy.

Essentially ML is a class of AI in which algorithms are used that enable computers to learn based on data. The focus of ML is to improve accuracy by altering their actions based on the collected data from previous runs. The term was first coined by Arthur Samuel in 1959 in which it is defined as a study that allows computers to have learning capabilities without being explicitly programmed. (Jafar Alzubi et al. 2018). There are different learning techniques which use different algorithms depending on the task. In the case of supervised learning algorithms, a model is trained based on a known set of input and output data where reasonable predictions are drawn for future input data. An unsupervised learning model finds patterns or trends in data and is used to draw conclusions from input data that do not have labeled responses (Mathworks). Reinforcement learning trains systems establish a reward system by a trial and error method to take the best action. Examples of reinforcement learning models can be seen in games and

autonomous vehicles where the machine can tell when a right decision is made. This helps the model learn over time which actions should be taken (Brown, 2021). There are many industries and platforms that use ML such as Google, Facebook, Twitter, and Pinterest. These companies implemented ML algorithms that focus on content search and recommendations to provide the best feed for each user. Twitter uses its ML to analyze tweets in real-time and present the best tweets based on scoring. In the past Twitter's ML technology has helped combat more than 300,000 terrorist accounts. The most known form of ML is Google's search engine, which auto suggests searches and even corrects misspelled words (Romanova & Sendulskyi, 2020). Besides the business industry, ML is also used in healthcare systems and such examples include Smart Recordkeeping, Personalized Medicine, and Medical Imaging.

As we know, Machine learning is commonly used in AI. The attraction towards using ML in AI comes from the many benefits it provides when we think of autonomous systems and machines. Being able to data mine to find trends and patterns by shifting through large volumes of data is a powerful tool that can extract meaningful information through vast data. One of the main highlights of incorporating ML into a system is that less developers and analysts are needed to perform basic tasks that can be accomplished by ML algorithms (McGee, 2019). Since ML can make predictions and even improve the algorithms on their own, it can accelerate growth in the tech industry by freeing up developers to work on tasks that are more complex. ML algorithms' strong point lies in their capability to improve over time. Typically, ML systems can improve efficiency and accuracy as more and more data gets processed. By running through large volumes of data, the program gets more experienced to better execute decisions and output more accurate predictions. Weather prediction models are one of the examples in which ML can forecast conditions by looking at past patterns and events. Again, the more data there is in the

data set, the greater the accuracy of forecasts. The same principle applies for algorithms that are used to make decisions or recommendations (McGee, 2019).

With the many benefits of ML, there are also some disadvantages that can make it a difficult method to implement in some scenarios. As ML heavily relies on datasets, it can be demanding to acquire such a volume of data, especially when it comes with a cost. Simply obtaining data does not always mean the output will be accurate, because the data must be inclusive or unbiased for the system to give proper outputs. Survey data might contain large amounts of biased data which might skew the data, leading to poor accuracy of outcomes. As such, it is important to get not only bulk data, but to ensure that the data is relevant to the task (Ivy Professional School, 2020). Even with good datasets, the system could still be prone to error. As ML requires minimal input from a human, it is like any program prone to errors. Due to its autonomous nature ML, errors can go unnoticed for a longer time than if a human were to monitor the program. The computer would be unable to tell if an error does occur and unrelated outputs are created, then mistakes in the program will need to be pinpointed through error analysis. Since ML is built upon continuous improvements, and exposure to large data sets, it may take time to develop an efficient system. Computing power also plays a role, as making a working, useful system along the way can generate quite the cost in combination with the time it takes to get to that point (McGee, 2019). Although ML can be very beneficial in the long run, it takes quite a lot of time and resources.

The nature of ML is that it is always improving based on the data, we could reach a point where it completely takes over a human role. For example, at a workplace a person's job is to analyze a set of data to better assist the business model. At some point that business will look at implementing a ML algorithm and automate this process to make it more accurate. This process

caused a person to lose their job. Therefore, Machine Learning could also be classified as human destructive in the tech world. Depending on how reliable we become on ML, we must make sure that the data given is good and accurate. Not having that could cause harm to the process that we are trying to automate using machine learning. Not having accurate and good data is one of the biggest concerns of ML that is being worked on. Privacy is one of the biggest factors in people's lives. ML does a lot of tracking and collecting of data on the backend while a user is surfing a web or doing any day-to-day task. It collects all the data and then provides the user with ads based on their recent searches. Similar ML features are also implemented in speech recognition devices such as Alexa and google home. If they are plugged in and activated, they are actively listening to your conversation. While they are not recording your conversation, it is still an invasion of privacy in a way.

After researching how ML works and some of the positive and negative aspects of the method, I believe it can do more good than harm for the tech world. The future of AI is looking promising due to more capable ML systems that have been worked on for years. By picking which type of learning is needed for the task, such as supervised, unsupervised, or reinforcement, the algorithms are written accordingly. Due to the autonomous nature of the program, it does not require developers to monitor as closely as other complex systems, because the computer is able to learn from previous datasets. By analyzing patterns and trends from the input, the system with ML would be able to generate an appropriate response. As such data mining is another task that ML can easily take on to reduce workload time and increase efficiency. Some of the downsides to ML include acquiring large volumes of data to train the method to successfully generate the correct responses or take proper actions. Much like other programs and systems, systems with ML implementation can also create errors, in which corrective measures must be taken by a

human to prevent damages results from incorrect outputs. Time and resources such as computing power are also needed for the initial development of a ML system. As the system gains experience with data, time is the main factor that will contribute towards a more accurate program. Within recent years, companies and industries have invested time and resources to perfect ML implementation in systems to better tailor to the customers' needs.

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