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Overview of ML

Machine learning (ML) is a subsect of artificial intelligence (AI) that uses algorithms and data to help better the accuracy of models.

Data is very important in machine learning because that is what we use to train the models and increase accuracy. The more data available, the better that a model can perform and predict future outcomes. Pattern recognition is often done best by humans, but when it comes to more "narrowly defined tasks" a computer can have us beat [1]. This skill allows algorithms to make accurate future judgements by applying the pattern to future data, which is crucial to machine learning. This serves as a great transition to the next important aspect of machine learning which is accuracy. Without it, predictions "are not predictions but random guesses" [1]. Accuracy is crucial to the process of machine learning due to the performance of the entire algorithm being dependent on how accurate its future predictions are.

As I mentioned earlier, machine learning is a subsect (or application) of artificial intelligence. Essentially artificial intelligence refers to the act of using computers to emulate the actions of humans. Machine learning is the specific section that deals with the identification of patterns and predictions about the future using large amounts data that train the algorithms. These algorithms better themselves over time through analysis of more data and adjustments in predictions.

One example of a modern machine learning application is product recommendations through advertisements when shopping online [2]. The system tracks your browsed items, purchases, as well as which ads you click on and presents further recommendations based on the collected statistics [2]. This could not be achieved through simple traditional programming as it requires the algorithm to internally better itself as more data is acquired. Another example of a modern machine learning application is transportation and commuting, including Ubers [3]. The apps use machine learning to improve their accuracy of estimated times of arrival (ETAs) based on the usual traffic along the route and other external factors. They also improve accessibility by providing the fastest routes to locations that frequented by the user [3]. This could be achieved through simple traditional programming because of the same reason as the other example. The process of learning and improving internally is not one that can be built with traditional programming.

The data used to train algorithms can come in many different forms, and one of them is tables. When analyzing tables, there are some terms that we need to be familiar with. An observation, also called an example or an instance, is a row within a table [1]. A feature, or predictor, is a column in a table [1]. These two terms are important in machine learning because they can help us obtain specific data from tables, which is also referred to as the target or response that we are trying to get. There are also two types of data that you can be presented with within these different forms, which are quantitative and qualitative data. Quantitative data, or numerical data, deals mostly with numbers, as the name shows, and usually has an infinite set of values that it can hold [1]. Qualitative data, or categorical data, deals with non-numeric values

and can “only take on one of a finite set of values” [1]. Both types of data are very crucial to machine learning as each can help make different types of predictions.

I have personally been interested in ML since I started coding which was back in my junior year of high school. I have always found this particular area of AI to be very interesting as it can be used to mimic the decision-making process of a human. As mentioned in the book by Professor Mazidi, the “best general pattern recognition machine is the human mind” and the fact that we can partially replicate that through technology is fascinating to me [1]. I would love to take on a few research projects to learn about the full potential of ML and where it could take us in the future.

References

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[2] N. Duggal, “Top 10 Machine Learning Applications and Examples in 2023,” Simplilearn.com, 11-Jan-2023. [Online]. Available: https://www.simplilearn.com/tutorials/machine-learning-tutorial/machine-learning-applications. [Accessed: 26-Jan-2023].

[3] K. Keshari, “Top 10 applications of Machine Learning: Daily Life Applications,” Edureka!, 27-Dec-2022. [Online]. Available: https://www.edureka.co/blog/machine-learning-applications/#vpa. [Accessed: 26-Jan-2023].