

## Overview of Machine Learning

Machine learning is a technique used to train computers to accurately recognize patterns in data, mostly for the purposes of data analysis, prediction, and action selection by autonomous agents. Some of the fields that are closely related to machine learning include artificial intelligence, probability, statistics, and computer science, and these fields all contribute to the origin of machine learning. A key difference between machine learning and traditional programming is that ML uses its input data to train an algorithm and then outputs a model, while traditional programming processes the input data using an algorithm and simply outputs the results.

Data is necessary in order to learn. Collecting the data or using already existing data requires some ethical considerations, so both the collection of data and the process of organizing it to get it in the desired form takes a substantial amount of time. Therefore, data is important since without it we are unable to learn from it. After you have organized your data, you can use it to find patterns in the data from which you can learn. Since computers are better at recognizing patterns on narrowly defined tasks, their ability to recognize patterns in the data enables algorithms to learn things. Lastly, the accuracy of machine learning is very important since if a prediction is not accurate, it is useless. Therefore, different metrics are used to measure the accuracy of the model and to evaluate its performance, with a predetermined baseline typically being employed.

Artificial intelligence and machine learning are two closely related fields. Machine learning helps build models that the computer can use to learn, which AI can then use to perform tasks on its own. Overall, machine learning is a subset of artificial intelligence, where ML develops models of data for the computer to learn from, which the AI can then use to simulate the thought process and decision-making of a human.

There are many applications of machine learning in our modern world. Product recommendation, where your search history is used to determine which ads are displayed to you, is an example of a modern machine learning application. Here the algorithm learns from the products you searched for on one application and later displays ads relating to those products on your other applications. Another example

of a modern ML application is personalized social media features, where the data gathered about the posts you spend more time looking at, what you like, comment on, and so on is then used to make friend suggestions and show you posts more related to your interests. Both of these applications wouldn't be possible to build with traditional programming because a person's interests change over time so the algorithm would have to continuously learn, which is not possible with traditional programming where the algorithm is built ahead of time to output the answer. Since the "answer" can change, traditional programming cannot be used for applications such as those discussed above.

There are a few terms used in machine learning to describe data. Observation refers to a sample data point (a row) and a feature refers to something that describes that data point (a column). Quantitative data is data that is numeric and qualitative data is data that is categorical, meaning it can only take on one of a finite set of values. Observations and features are important because they help define the data sample and the features we want to look at when learning from the data. It is important to know what sort of data you are working with, and quantitative and qualitative data help categorize two distinct types of data.

Personally speaking, my interest in machine learning stems from my interest in artificial intelligence. I only know very basic things about AI, and I thought that to broaden my understanding of it, I should first start by learning about ML which would help me grasp the fundamentals. I am still unsure of whether I would like to pursue machine learning in my professional career, but I believe that only through learning about it can I truly know whether I would like to pursue it or not. I would like to enrich my knowledge in machine learning both to have a better idea of what I would like to do in my career and because I find the field itself very interesting.

## Works Cited

Mazidi, Karen. *Machine Learning Handbook Using R and Python*. 2<sup>nd</sup> ed., 2020.