Alekhya Pinnamaneni

CS 4375.003

Overview of ML

1. Machine learning refers to the practice in which software uses known data of past outcomes to make predictions about the unknown. An example of machine learning could be an application that uses data about the number of births in the U.S. every day for the past 10 years to predict the number of births that will occur in the U.S. tomorrow.
2. Data is a vital part of machine learning because it serves as the foundational knowledge that the machine uses to "learn" and predict outcomes. Machine learning involves a software application making a prediction without being told what the prediction should be. Without any data, the prediction the software makes will be as good as a lucky guess and the accuracy of the prediction would be extremely low. Pattern recognition is another necessary part of machine learning because it serves as the link between data and accuracy. The machine must be able to study the data and notice patterns, links, and correlations in order to make an accurate prediction. For example, a software needs to be able to recognize the pattern that most births occur in August to make a more accurate prediction for the number of births that will occur on a given day in August. Data is useless if the software cannot recognize the patterns within it. Finally, accuracy is the final important component of machine learning. The goal of machine learning is for the software to make more accurate predictions as time goes on. Without accuracy in the software's predictions, the software cannot improve its performance and "learn" as it is supposed to.
3. Artificial intelligence refers to the mimicry of human intelligence by machines. Machine learning is a type of artificial intelligence that mimics human intelligence by using sample data to predict future outcomes. Therefore, machine learning is a subset of artificial intelligence.
4. One example of a modern machine learning application is image recognition. Google Photos recognizes images and sorts them into different albums, such as "Mountains", "Wedding", "Birthday", "Cars", "Flowers", etc. This application could not be built with traditional programming, because computers can not distinguish between or recognize images on their own. It is impossible for a computer to recognize on its own that a cake, candles, a birthday hat, balloons, and presents indicate a birthday. It is through the observation of several birthday photos and recognizing patterns that the computer is able to recognize birthday images. Another example of a modern machine learning application is recognizing fraudulent purchases on a credit card. This application would not be possible with traditional programming because there is now way for computers to recognize whether a purchase is out of the ordinary without previous data about past purchases and the ability to recognize purchasing patterns.
5. An observation is the act of noticing occurrences or events in order to gain information. An observation in machine learning is one instance/example of data, and is usually a row in a table of data. For example, if the machine uses data about how many births and deaths occur every day, an observation is one date and the number of births and deaths on that date all together. A feature is a trait or aspect of something. In machine learning, a feature can also be called an attribute or target, and it represents a column in a table of data. For example, if the machine

uses data about the amount of births and deaths that occur every day, a feature could be the date, the number of births on that date, or the number of deaths on that date. Quantitative data is numerical data and is important in machine learning because numeric data can be used to make more accurate predictions. Qualitative data is categorical data and is important in machine learning because it allows the software to recognize patterns by grouping observations with data in the same category.

6. My personal interest in machine learning began with a team project I worked on this past summer. The project involved making a recommendation engine that recommended potentially useful products to a company's employees based on the employee's role. Although there wasn't enough time during the summer to implement machine learning aspects, our team discussed future development of our work. In the future, adding aspects of machine learning to our project could make the application much more useful to the user by improving the accuracy of our recommendations. This sparked my interest in exploring the possibilities that machine learning would allow. I would like to learn more about machine learning and how it can be used to make applications such as recommendation engines more efficient and accurate.