Overview of ML

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CS4375 - Introduction to Machine Learning

- Define ML in your own words
    - Scientists use Machine Learning to train computers to recognize patterns and trends to predict the outcome/trend of newly cleaned data.
- In a paragraph, summarize the importance of data, pattern recognition, and accuracy in machine learning
    - Without data, you can't reliably predict trends. We analyze data in order to discover trends and/or patterns. Although the human mind is amazing in recognizing patterns, computers can beat the performance of our minds more efficiently. For example, a data set with over 1000 values would take a long time to analyze manually; however, computers make this task much simpler with just several commands. It is still up to the scientists to analyze the output correctly. The difference between predictions and random guesses is the accuracy. Although it may never be possible, objectively with each approach, we should grow closer to a 100% accuracy. Overall. ML uses many methods in order to "gauge accuracy" as well as "evaluate performance of algorithms."
- Describe the relationship between AI and ML
    - According to Figure 1.1, Artificial Intelligence is only one of four components that make up Machine Learning. The other components include Statistics, Probability, and Computer Science.
- List at least 2 examples of modern machine learning applications, and explain why these application could not be built with traditional programming
    - Face and/or Image Recognition
        - Our minds do not even know what we use to recognize faces, and ultimately, it's impossible to encode such rules; However, we can train computers to recognize key features that are likely to be facial features.
    - Sentiment Analysis
        - Sentiment Analysis is an observational study of a piece of text in order to determine the writer's attitude and/or mood of the subject of text. For example, I did a small sentiment analysis project on Amazon Reviews. Realistically, it would be impossible to go through every review manually and label it as "Positive" or "Negative." Instead, with the help of Machine Learning we are able to extract such patterns very quickly; even for large data sets.
- In a paragraph, define the terms observation, feature, quantitative data, and qualitative data and discuss their importance in machine learning

    - Observation is another word for an example or an instance. In informative algorithms, we input data **observations** in order to receive an output of the model of the data that can ultimately be used to predict new outcomes for new data that is used with the model. A Feature, also known as an attribute or a predictor, is present in columns of the data table. In regression, the target is quantitative while in classification, the target is qualitative. Quantitative is to predict specific values while Qualitative is to predict the quality. Both need other data in order to be predicted.
- Write a paragraph describing your personal interest in ML and whether/how you would like to learn more about ML for personal projects and/or professional application
    - I think Machine Learning is the future of society, and I, professionally, would like to contribute to the study in any field that is available. I have already created my own Sentiment Analysis based on Amazon Reviews and it's truly interesting to be able to see the process of training and getting an output. I would love to be a part of a team that contributes to seeing a better future for humans.
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