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Overview of ML

Machine learning – the intersection of computer science, statistics, linear algebra, and AI to produce learning models that can analyze patterns in a data set and apply those findings to some goal

Three characteristics are important to the success of machine learning – data, pattern recognition and accuracy. A machine learning model cannot operate if it is not first trained on a model data set containing multiple fields of data. A rich data set also gives the learning model a wider opportunity for more confidence in discovering a pattern. Pattern recognition is how a learning model understands the relationships between fields of data, which then allows the learning model to achieve its goal whether that is making the most favorable decision in a scenario or accurately predicting a result of variable based on another variable. A learning model must also be accurate in recognizing patterns so that its actions or predictions are reliable enough to carry real world meaning and application.

Artificial intelligence is vital to machine learning as AIs are the agents that can utilize learning models and thus function autonomously in executing learning models.

Some situations cannot be resolved with traditional programming and must be resolved with machine learning algorithms. One instance is problems that aren’t clearly defined such as

recognition of human faces in images. We as a species have not reached a point where we can exhaustively detail what sets apart a human face from other forms, so without knowing all the rules it is not possible to encode a traditional algorithm that can definitively identify human faces. Instead, a machine learning algorithm can analyze human faces and develop rules for identifying human faces that can be self-modified with training to become increasingly accurate. Another instance suited only for machine learning is when the scope of data is too massive for humans to analyze in time. To develop a traditional algorithm would require a human to discover the meaningful relationships first, which is not humanly feasible when there are millions of entries to analyze. Machine learning can analyze instead and do it far quicker than any human, dramatically speeding up the task to a far more reasonable timescale.

Some vocabulary must be defined before further exploring machine learning; these terms are observations, features, quantitative data, and qualitative data. All these terms pertain to the data that is either trained on or analyzed. Observations, also called examples or instances, are individual points of data that when compiled create the dataset. The variety of data across observations allows a machine learning algorithm to gauge the correlations between features of observations to make accurate predictions. Features, also called attributes or predictors, are the distinct fields of data held in common between observations and can be further divided as quantitative or qualitative. Quantitative features have numerical values that exist on a range of infinite values, while qualitative features have descriptive values that exist in a predefined set of finite values. In either case, features are what machine learning algorithms are interpreting to establish patterns for further actions.

I think machine learning is a powerful domain that will continue to grow as people find more ways to utilize processed data and more types of data towards that purpose. Machine

learning seems to have excellent job security in a degree with already above average baseline of job security. More importantly, machine learning is a way for us to understand ourselves better as we attempt to replicate and surpass our cognitive abilities, which would necessitate further research into neurology and create a synergy of scientific exploration. My specific interests in machine learning are object recognition and any potential applications towards AI in video games.