Overview of ML

Machine Learning is getting a computer to stare so hard at the patterns in data, that it starts to see them easier and easier. For us humans that's insanity, to computers that's efficient.

Parts of Machine Learning

Machine learning concerns itself with the trying to utilize **data** more effectively then humans can. While we may grasp ethics or how the data is organized, computers can process data much *much* faster than us, hence we feed the data to computers. Specifically, computers are better at **pattern recognition**; given the right data, a computer can find a pattern in important trends like market prices or visual attributes. If a machine can learn to **accurately** predict events based on those patterns, we create valuable tools for various *important* applications.

Is ML Artificial Intelligence?

Artificial Intelligence is the reproduction of human intelligence in computers. Doing so means we can create a data model that can intelligently understand human context computers won't normally be able to interpret. Machine learning doesn't quite refer to such a human like intelligence. While computer systems utilizing ML may learn and adapt to data, they need more structure then an AI and don't mean to emulate the full adaptability of human intelligence.

Examples

Some examples of ML are:

- Motion Sensing: My personal favorite application of ML is utilizing many sensors to memorize patterns in complex movements like human gestures. Programmers would have a hard time creating an algorithm can understand accelerometer data and hall sensors strapped to a person's fingers. But a machine learning model would be able to see the same patterns our brains see given enough iteration and learning
- *Image Recognition:* The classic example is image recognition. You can not establish a simple set of rules to identify what a picture is of given just simple rules. The rules to establish what a hand looks like would be complex. But using ML, a computer can learn from a data set of images to recognize patterns in a human hand.

Categorizing Data

The data we use has to be organized, and we start with a set of terms. In much of ML want a model to recognize a pattern based on a given set of data, and hope it gets a certain result. We call an certain example of some category of data an *observation*, and we can observe many data points of the same *feature* of the data. Features may be things like the heart rate or steps per minute recorded on a fit bit, and each recording of that data is an observation. Those numbers are of some metric, or *quantitative* while others may be *qualitative* or classification of data from a finite set of options. It's important that data be labeled with these terms so an ML model may recognize what data is alike and how to work with it. It may then predict some outcome or find a trend.

Why am I Interested in ML?

Being a CS major feels like working with a set of tools hot off the presses, ready to create a solution to any problem. All of the frameworks are there to solve common problems, and we get paid a lot to apply those tools to those problems. Machine Learning feels like a new tool that is still being invented, it's applications and uses yet to be fully discovered. Specifically, I like the idea of using machine learning to spruce up the custom-keyboard-hobby-space with new gesture based tools, but overall I want to work with the most powerful tool in our arsenal. If one day I get to answer "how do we improve energy distribution", or "Can we make better traffic networks", I think ML is the root of those questions and I want to be there to answer them.