

Machine Learning

Monday, July 15, 2019 10:28 AM

What does machine learning mean?

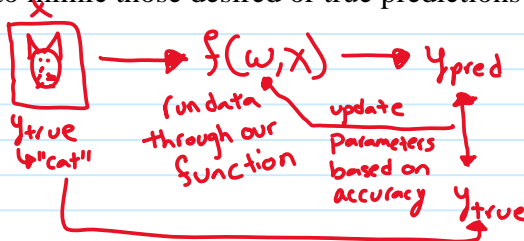
It means to make decisions/predictions based on data via some algorithm

There are 2 major problems we are trying to solve using machine learning:

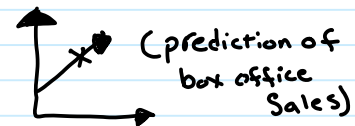
- Estimation
 - Data (for example pictures of dogs and cats) are noisy, or imperfect representations of various concepts
 - Given some imperfect representation of a concept, we want to recognize a similar object in any setting
- Generalization
 - How can we make good predictions of data that we have never seen before?
 - For example, how would we identify a black swan if we have only taken photos of white swans?

Types of Machine Learning Problems

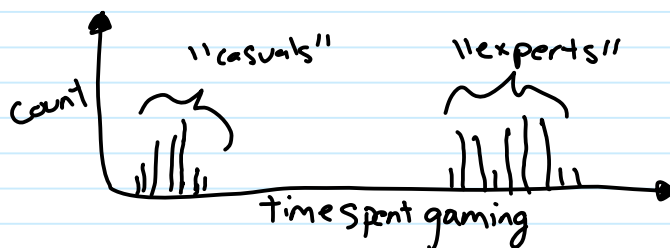
- Supervised Learning
 - Our learning system is provided with data and associated desired predictions. It then uses this to learn to mimic those desired or true predictions
 - Ex.)



- Classification
 - When you have few/finite number of possible y_{true} values (are you a dog, cat, or a bird?)
- Regression
 - When there are an infinite number of possible y_{true}



- Unsupervised Learning
 - Find patterns/structures inherent to data
 - Suppose we have a bunch of photos of dogs and cats, but do not know which are dogs and which are cats, we want to be able to group all the dogs and cats together regardless of whether we have the labels
 - Clustering / Partitioning data



- Dimensionality Reduction
 - An example is the Spectrogram reductions we performed last week

