Lecture 1 - Learning from Data

Aviral Janveja

1 The Essence of Machine Learning

The essence of machine learning has three components. If you have these three components in a problem statement you have in your field. Then you can apply machine learning as a tool to solve that problem.
If you have the following three components, you are ready to apply machine learning :

- A pattern exists.
- It is not feasible to pin it down mathematically.
- We have Data on it.

2 An Example - Credit Approval

Bank needs a system to approve or reject credit application. We don't have a magic formula to decide whether a customer is credit friendly or not. So we use the historical records of previous customers.

2.1 Components of Learning

- Input (Customer data and application)
- Output (Decision yes or no)
- Target Function f
- Data (Historical Records)
- Hypothesis function g

2.2 Solution Components of Learning

The two solution components to the learning problem are :

- The Hypothesis set
- The Learning algorithm

Together, they are referred to as the **Learning Model**.

3 Perceptron - A Simple Leaning Model

3.1 Perceptron Hypothesis Set

3.2 Perceptron Learning Algorithm

4 Types of Learning

The basic premise of learning is to use a set of observations to uncover an underlying process. This is actually what we do in statistics and probability as well.
We are Learning from Data.

4.1 Supervised Learning

4.2 Unsupervised Learning

4.3 Reinforcement Learning

5 References

1. CalTech Machine Learning Course - CS156, Lecture 1.