Machine Learning

As taught by Andrew Ng, Stanford University

# Introduction

## Definition of Machine Learning:

**Original Definition by Arthur Samuel:**

*The field of study that gives computers the ability to learn without explicitly being programmed*

**Modern Definition by Tom Mitchell:**

*A computer is said to learn from experience E with respect to task T by a performance measure P when its performance at task T improves with experience E as measured by P*

## Types of Machine Learning Algorithms:

### 1. Supervised Learning Algorithms:

In this type of machine learning, a computer is given a set of input data where we already know what our output should look like, given that there is some relationship between the input data and the output.

The problems which deal with Supervised Learning are of two further varieties:

#### a. Classification Problems:

Here, we try to ‘predict’ or map input variables into distinct discrete groups.

e.g. trying to predict whether a tumor is malignant or benign based on size, age, cell size, etc. given a large data set of known malignant and benign tumors and their respective parameters (size, age…).

#### b. Regression Problems:

Here, we try to predict an output for a continuous input.

Most commonly, we try to fit a line into the input to predict the output, though other functions are also used.

e.g. trying to predict the cost of a house based on its size in sq. ft. given the prices of various houses and their respective sizes.

### 2. Unsupervised Learning Algorithms:

In this type of machine learning algorithms, a computer tries to make sense of unmarked or un-categorized data. Here, there is no feedback given to the computer to change its output.

The problems which deal with Unsupervised Learning are of various varieties, two of which are mentioned below:

#### a. Clustering:

Here, a computer tries to group various items of different types into similar categories.

e.g. Google News automatically groups together news articles which are about the same thing but deal with different aspects of it.

#### b. Filtering:

Here, a computer tries to filter out various samples into some similar parts.

e.g. A Cocktail-party algorithm which separates the various partygoers’ voices speaking together into separate voices.

This list is not exhaustive but gives some examples of Unsupervised Learning Algorithms.