Coursera Machine Learning Specialization

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> *"(Machine Learning) The field of study that gives computers the ability to learn without explicitly being programmed."*
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> – *Athur Samuel, 1959.*

These are course notes for Deeplearning.ai's Machine Learning Specialization, taught by Professor Andrew Ng. Credit for the template goes to Tyler Zhu.

Contents

1 Supervised Machine Learning

1.1 Week 1

Supervised machine learning refers to algorithms that learn $x \rightarrow y$, or input to output mappings.

The key characteristic of supervised learning is that you give your learning algorithm examples to learn from. This includes right answers (correct label y for given input x). It is by seeing correct pairs of input x and desired output label y that the learning algorithm eventually learns to take *just* the input alone without the output label, and gives a reasonably accurate prediction or guess of the output. An example of a supervised learning algorithm is *regression*, where the task is to predict a number. A second example of a supervised learning algorithm is *classification*, where the task is to predict categories. Classification is different from regression because it only has a small number of possible output, unlike regression, which has infinite. Additionally, classification algorithms can take two or more inputs. Typically, the more complex the problem, the more inputs you will need to use.

1. Supervised learning learns from data labeled with the "right answers."
2. Unsupervised learning finds something interesting in unlabeled data. In Unsupervised learning, data comes with inputs x, but not output labels y. The algorithm has to find structure in the data. For example,
   a) Clustering: Groups similar data points together
   b) Anomaly detection: Find unusual data points
   c) Dimensionality reduction: compress data using fewer numbers

Terminology & Notation

1. **Definition** (informal) Training Set: Data used to train the model.
2. x = "input" variable
3. y = "output" variable / "target" variable
4. m = number of training examples
5. (x, y) = single training example
6. $(x^{(i)}, y^{(i)})$ = ith training example (e.g., 1st, 2nd, 3rd, etc)
7. w = weight (parameter)
8. b = bias (parameter)
9. f = function / model, also represented by $f_{w,b}(x) = wx + b$

We will define the **cost function** to be