1   Training and Testing

Lets say we have sample images of fruits, vegetables and animals which we feed into a model. The model "learns" how to identify the different entities. That is, the model figures out a combination of features that together determine the classification of the item – in this case some combination of features is available to distinguish a fruit and a vegetable, a fruit and an animal and a vegetable and an animal. This is called the training phase.

Now, we show a new image which is unseen by the model. The model should able to correctly identify (predict) the class the image belongs to. This is the testing phase.

More formally,

Training given a set of labeled examples $(x_1, y_1), \ldots, (x_N, y_N)$, estimate the prediction function f by minimizing the prediction error.

Testing apply f to a never before seen test example x and output the predicted value $y = f(x)$

$$y = f(x)$$

The above representation consists of three things:

- x is a labeled data on which

- a prediction function f is applied to produce

- the output y.

In the training phase we start with some f estimate $f(x)$ and check if the y we got is the same as the actual label and based on that keep modifying f so as to reduce the misclassification.

The following figure gives an idea of steps involved of how the training and testing works on the available data.
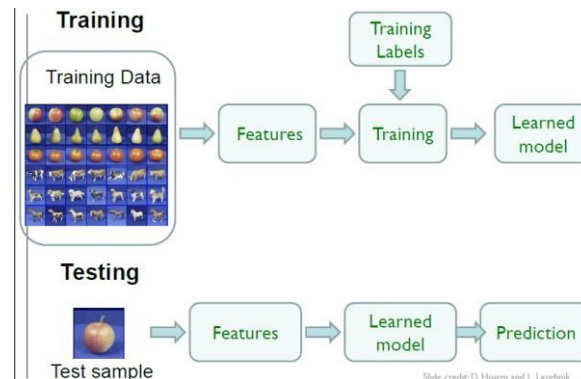

Figure 1: Training and Testing

In other words, training is the process of making the system able to learn. Implicit in this scenario is the assumption that training set and testing set come from the same distribution and are representative of the universe.