

CHAPTER 3

Classification

In [Chapter 1](#) we mentioned that the most common supervised learning tasks are regression (predicting values) and classification (predicting classes). In [Chapter 2](#) we explored a regression task, predicting housing values, using various algorithms such as Linear Regression, Decision Trees, and Random Forests (which will be explained in further detail in later chapters). Now we will turn our attention to classification systems.

MNIST

In this chapter, we will be using the MNIST dataset, which is a set of 70,000 small images of digits handwritten by high school students and employees of the US Census Bureau. Each image is labeled with the digit it represents. This set has been studied so much that it is often called the “Hello World” of Machine Learning: whenever people come up with a new classification algorithm, they are curious to see how it will perform on MNIST. Whenever someone learns Machine Learning, sooner or later they tackle MNIST.

Scikit-Learn provides many helper functions to download popular datasets. MNIST is one of them. The following code fetches the MNIST dataset:¹

```
>>> from sklearn.datasets import fetch_mldata
>>> mnist = fetch_mldata('MNIST original')
>>> mnist
{'COL_NAMES': ['label', 'data'],
 'DESCR': 'mldata.org dataset: mnist-original',
 'data': array([[0, 0, 0, ..., 0, 0, 0],
                [0, 0, 0, ..., 0, 0, 0],
```

¹ By default Scikit-Learn caches downloaded datasets in a directory called `$HOME/scikit_learn_data`.