

Your First Learning Program

Welcome to our first stepping stone in machine learning. In this chapter, we're going to build a tiny supervised learning program. It will be a long haul from this program to our goal of image recognition—in fact, at first it won't have anything to do with computer vision at all. However, we'll improve its code over the next chapters, until it gets sophisticated enough to tackle images.

We'll base the first version of our program on a technique called *linear regression*. Remember what I said in the previous chapter? Supervised learning is about approximating data with a function. In linear regression, that function is as simple as it could be: a straight line.

However simple linear regression is, don't underestimate the challenge ahead. To introduce linear regression, this chapter will touch on many different concepts—so many that you might feel slightly overwhelmed. Take it slow and easy. Even if it looks like we're just writing a short program, we're actually laying the foundation of our ML knowledge. What you learn here will stay useful throughout this book, and beyond. Let's start with a practical problem.

Getting to Know the Problem

Our friend Roberto owns a cozy little pizzeria in Berlin. Every day at noon, he checks the number of reserved seats and decides how much pizza dough to prepare for dinner. Too much dough, and it goes wasted; too little, and he runs out of pizzas. In either case, he loses money.

It's not always easy to gauge the number of pizzas from the reservations. Many customers don't reserve a table, or they eat something other than pizza. Roberto knows that there is some kind of link between those numbers, in that more reservations generally mean more pizzas—but other than that, he's not sure what the exact relation is.

Roberto dreams of a program that looks at historical data, grasps the relation between reserved seats and pizzas, and uses it to forecast tonight's pizza sales from today's reservations. Can we code such a program for him?

Supervised Pizza

Remember what I said back in [Supervised Learning, on page 6](#)? We can solve Roberto's pizza forecasting problem by training a supervised learning algorithm with a bunch of labeled examples. To get the examples, we asked Roberto to jot down a few days' worth of reservations and pizzas, and collected those data in a file. Here's what the first four lines of that file look like:

02_first/pizza.txt

Reservations	Pizzas
13	33
2	16
14	32
23	51

The file contains 30 lines of data. Each is an example, composed of an input variable (the reservations) and a numerical label (the pizzas). Once we have an algorithm, we can use these examples to train it. Later on, during the prediction phase, we can pass a specific number of reservations to the algorithm, and ask it to come up with a matching number of pizzas.

Let's start with the numbers, like a data scientist would.