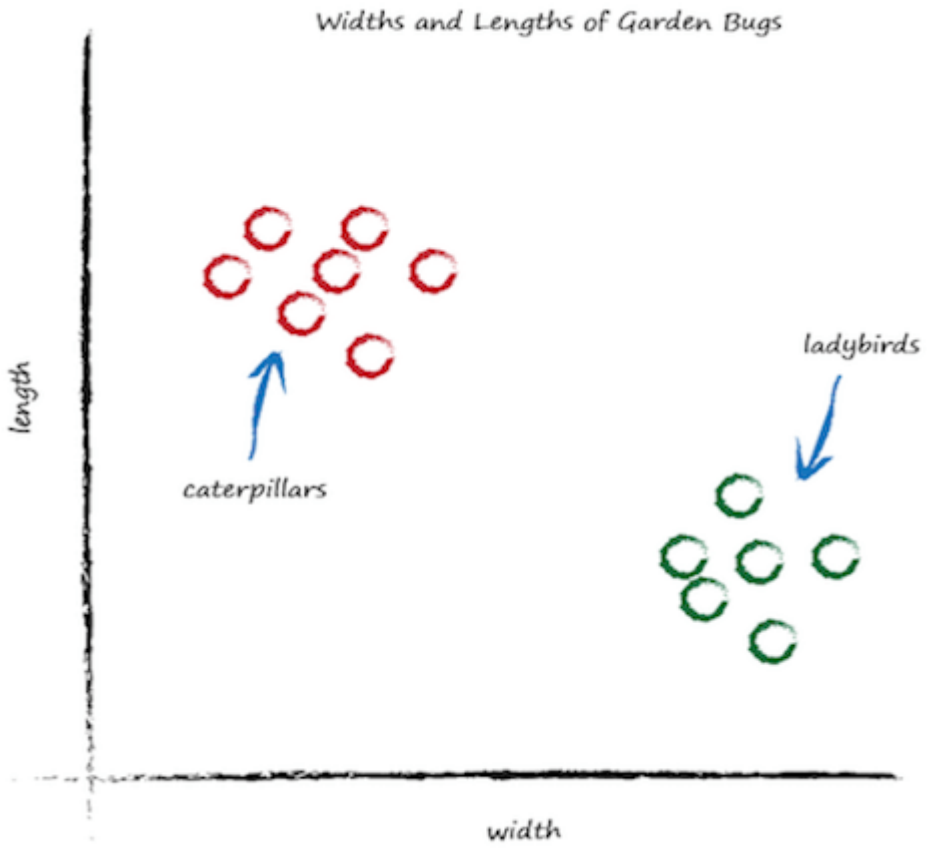
Classifying vs. Predicting

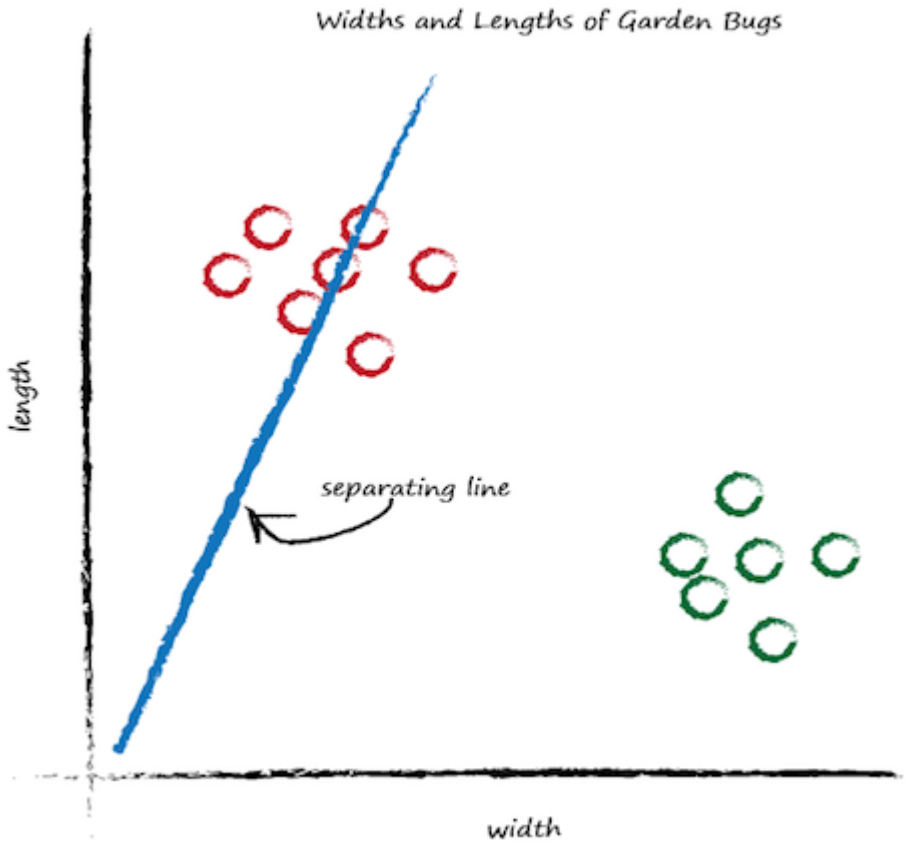
This lesson is a comparison between Classification and Prediction. Are they same or is there really is a difference between them? Let's find out!

The model that we built in the previous lesson, we called it a *predictor* because it takes an input and makes a prediction of what the output should be. We refined that prediction by adjusting an internal parameter, informed by the error we saw when comparing with a known-true example. Now, look at the following graph showing the measured widths and lengths of garden bugs.



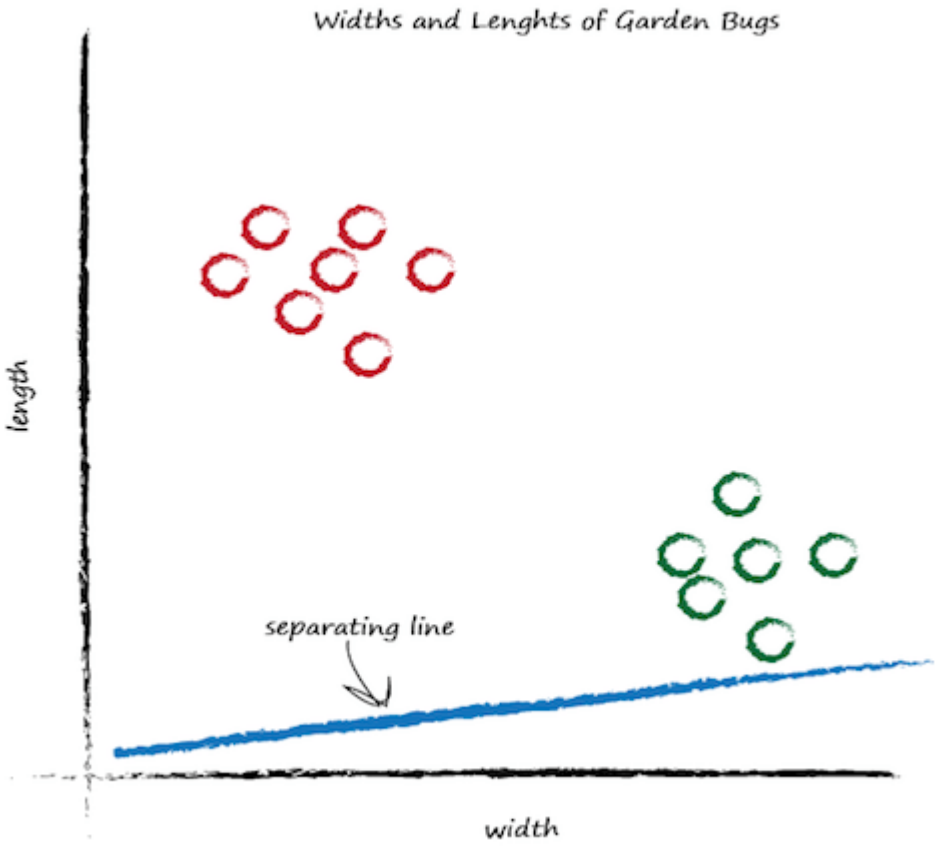
You can clearly see two groups. The caterpillars are thin and long, and the ladybirds are wide and short. Remember the predictor that tried to work out the correct number of miles given kilometers? That predictor had an adjustable linear function at its heart. Remember, linear functions give straight lines when you plot their output against input. The adjustable parameter **c** changed the slope of that straight line. What happens if we place

a straight line over that plot?

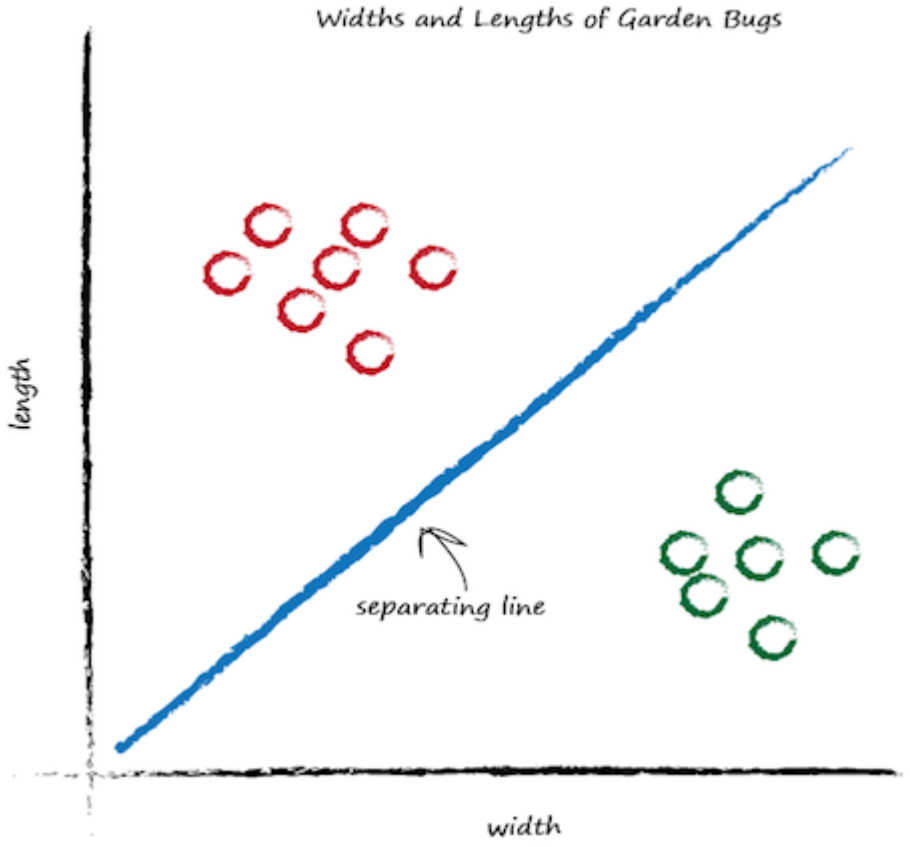


We can't use the line in the same way we did before - to convert one number (kilometers) into another (miles), but perhaps we can use the line to separate different kinds of things.

In the plot above, if the line was dividing the caterpillars from the ladybirds, then it could be used to *classify* an unknown bug based on its measurements. The line above doesn't do this yet because half the caterpillars are on the same side of the dividing line as the ladybirds. Let's try a different line, by adjusting the slope again, and see what happens.

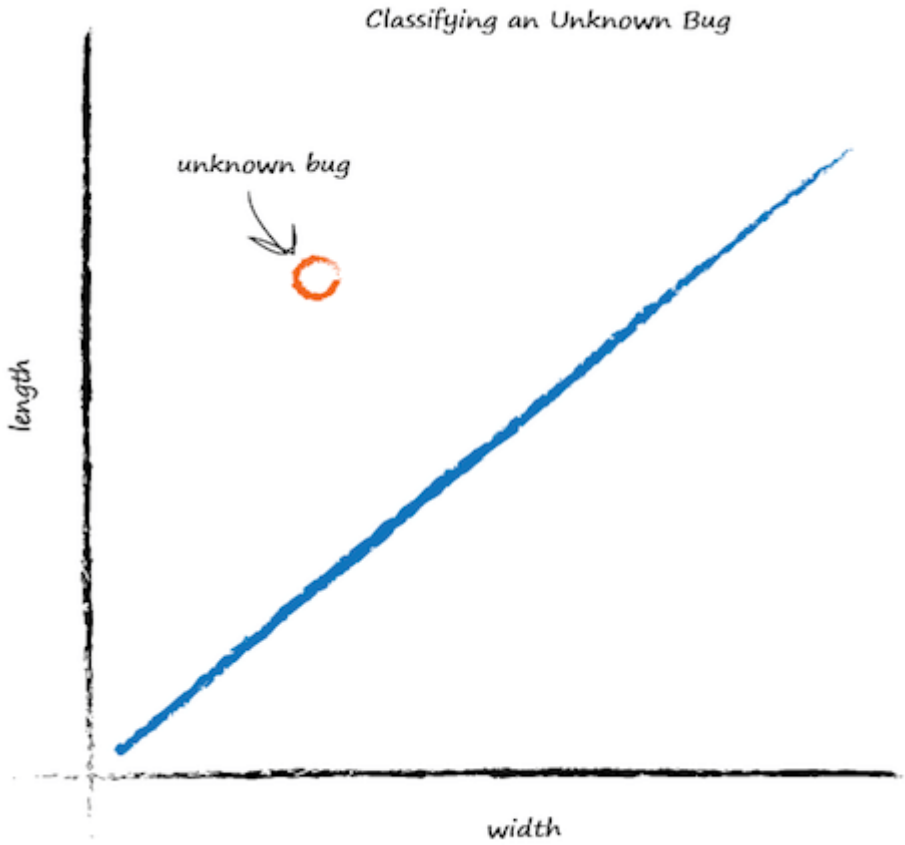


This time the line is even less useful! It doesn't separate the two kinds of bugs at all. Let's have another go:



That's much better! This line neatly separates caterpillars from ladybirds. We can now use this line as a *classifier* of bugs.

We are assuming that there are no other kinds of bugs that we haven't seen — but that's ok for now, we're simply trying to illustrate the idea of a simple classifier. Imagine next time our computer used a robot arm to pick up a new bug and measured its width and height; it could then use the above line to classify it correctly as a caterpillar or a ladybird. Look at the following plot; you can see the unknown bug is a caterpillar because it lies above the line. This classification is simple but pretty powerful already!



We have seen how a linear function inside our simple predictors can be used to classify previously unseen data. But we've skipped over a crucial element. How do we get the right slope? How do we improve a line we know isn't a good divider between the two kinds of bugs? The answer to that is again at the very heart of how neural networks learn, and we'll look at this next.