CHAPTER 1

Introduction to Data Visualization

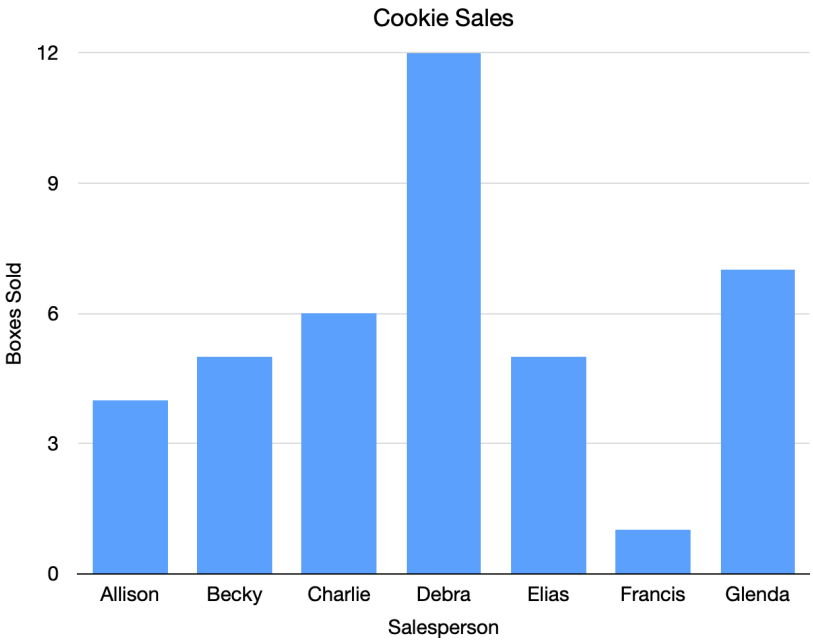
It is difficult for the human mind to look at a list of numbers and identify the patterns in them, so we often make pictures with the numbers. These pictures are called *graphs*, *charts*, or *plots*. Often the right picture can make the meaning in the data obvious. *Data visualization* is the process of making pictures from numbers.

1.1 Common Types of Data Visualizations

Depending on the type of data and what you are trying to demonstrate about it, you will use different types of data visualizations. How many types of data visualizations are there? Hundreds, but we will concentrate on just four: The bar chart, the line graph, the pie chart, and the scatter plot.

1.1.1 Bar Chart

Here is an example of a bar chart.



Each bar represents the cookie sales of one person. For example, Charlie has sold 6 boxes of cookies, so the bar goes over Charlie's name and reaches to the number 6.

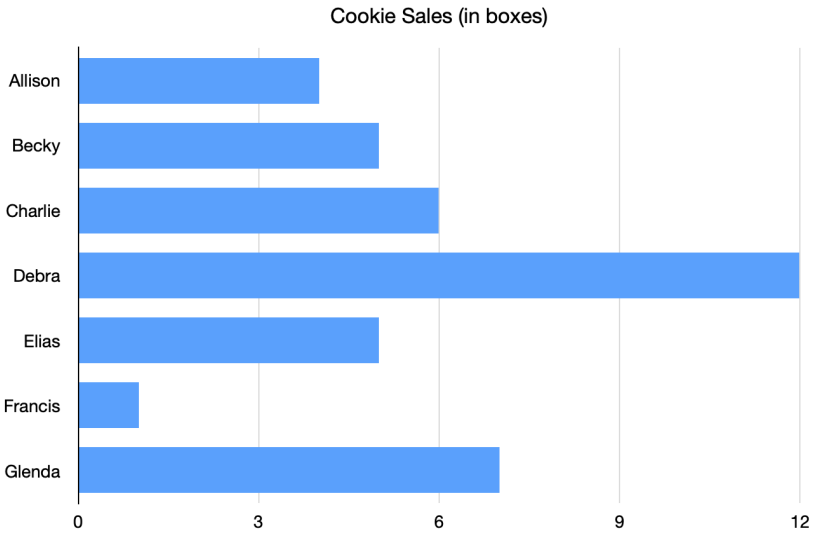
Looking at this chart, you probably think, "Wow, Debra has sold a lot more cookies than anyone else, and Francis has sold a lot fewer."

The same data could be in a table like this:

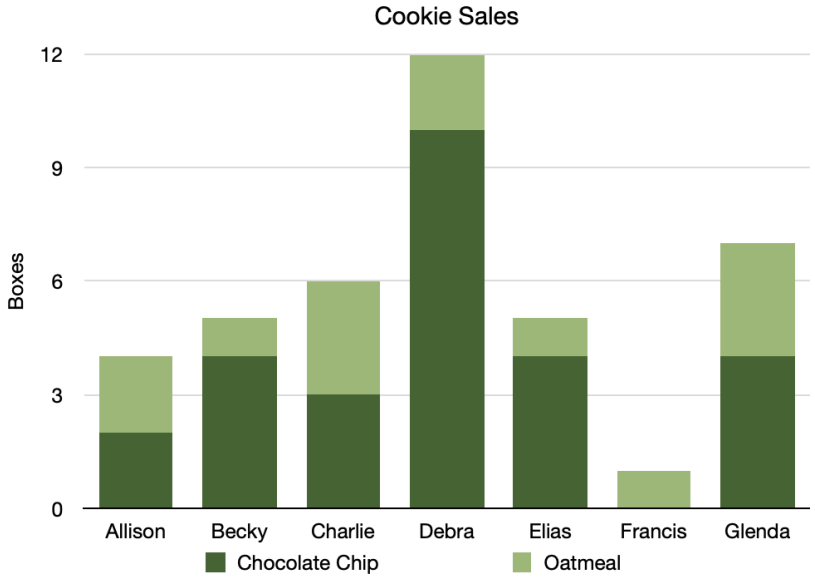
Salesperson	Boxes Sold
Allison	4
Becky	5
Charlie	6
Debra	12
Elias	5
Francis	1
Glenda	7

The table (especially a large table) is often just a bunch of numbers. A chart helps our brains understand what the numbers mean.

Bar charts can also go horizontally.



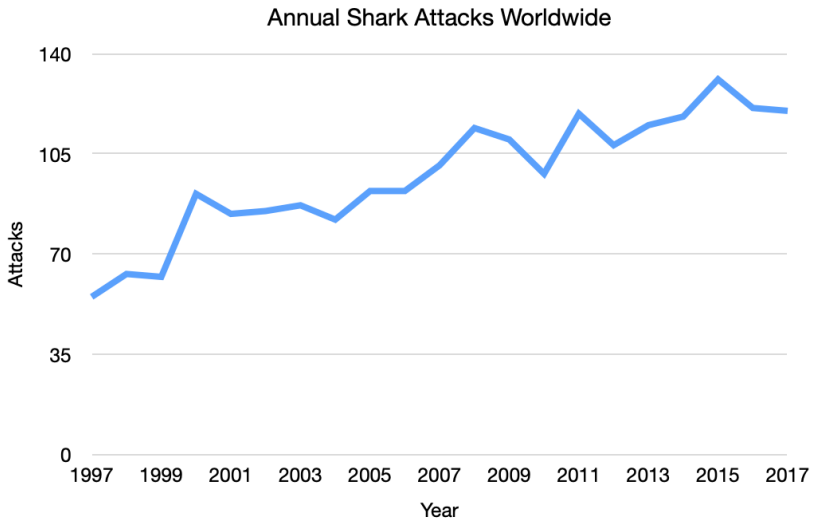
Sometimes we use colors to explain what contributed to the number.



This tells us that Becky sold more boxes of chocolate chip cookies than boxes of oatmeal cookies.

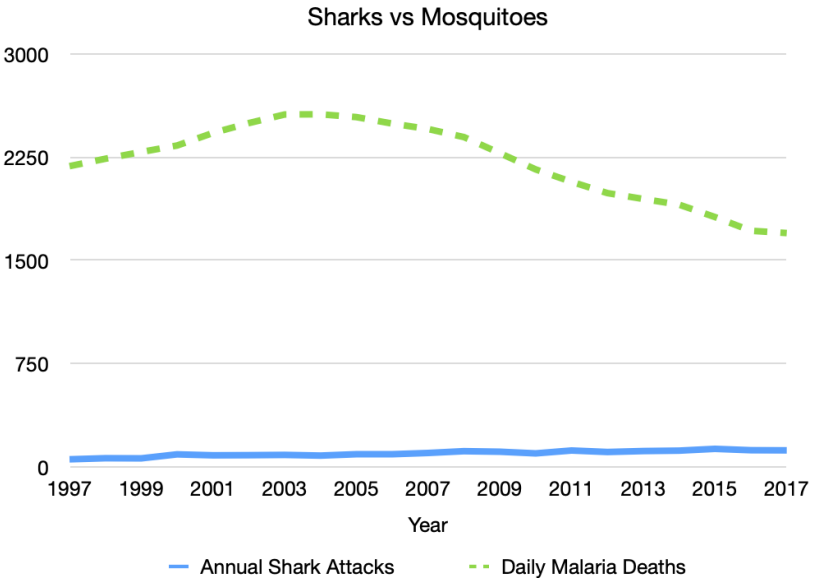
1.1.2 Line Graph

Here is a line graph.



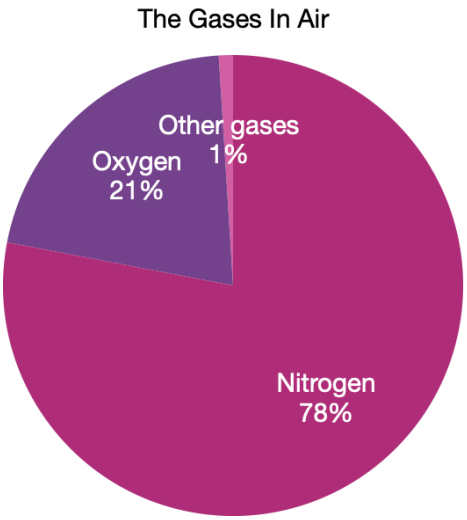
These are often used to show trends over time. Here, for example, you can see that the number of shark attacks has been increasing over time.

You can have more than one line on a graph.



1.1.3 Pie Chart

You use a pie chart when you are looking at the comparative size of numbers.



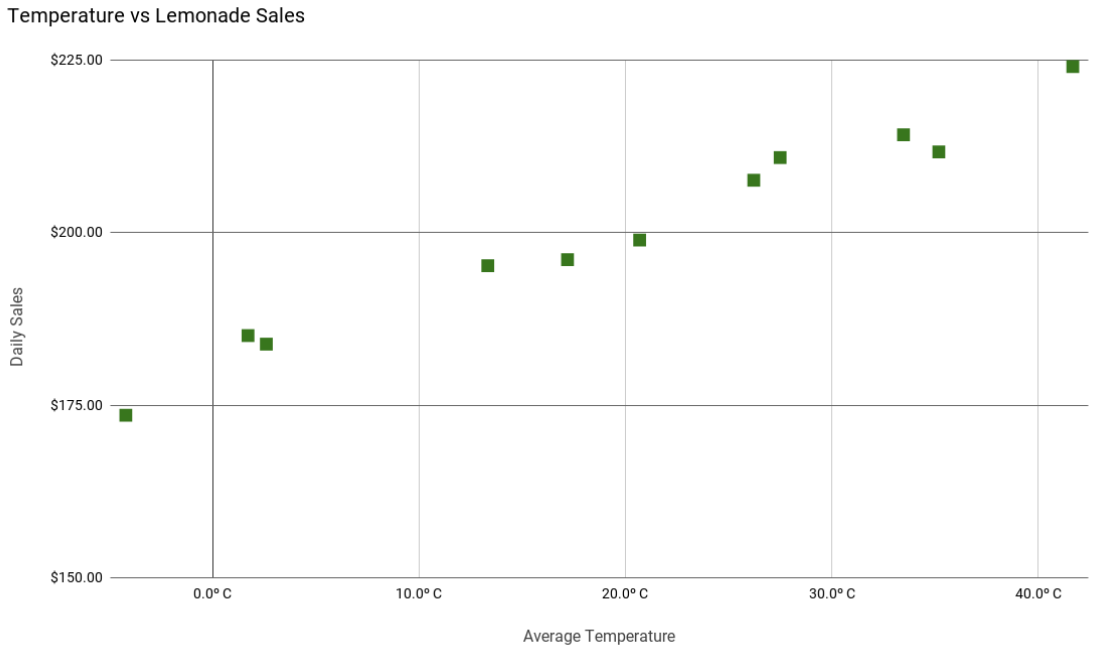
1.1.4 Scatter Plot

Sometimes you have a bunch of data points with two values and you are looking for a relationship between them. For example, maybe you write down the average temperature and the total sales for your lemonade stand on the 15th of every month:

Date	Avg. Temp.	Total Sales
15 January 2022	2.6º C	$183.85
15 February 2022	-4.2º C	$173.56
15 March 2022	13.3º C	$195.22
15 April 2022	26.2º C	$207.61
15 May 2022	27.5º C	$210.88
15 June 2022	31.3º C	$214.18
15 July 2022	33.5º C	$215.23
15 Aug 2022	41.7º C	$224.07
15 September 2022	20.7º C	$198.94
15 October 2022	17.2º C	$196.10
15 November 2022	1.7º C	$185.10
15 December 2022	0.2º C	$188.70

And you think "I wonder if I sell more lemonade on hotter days?"

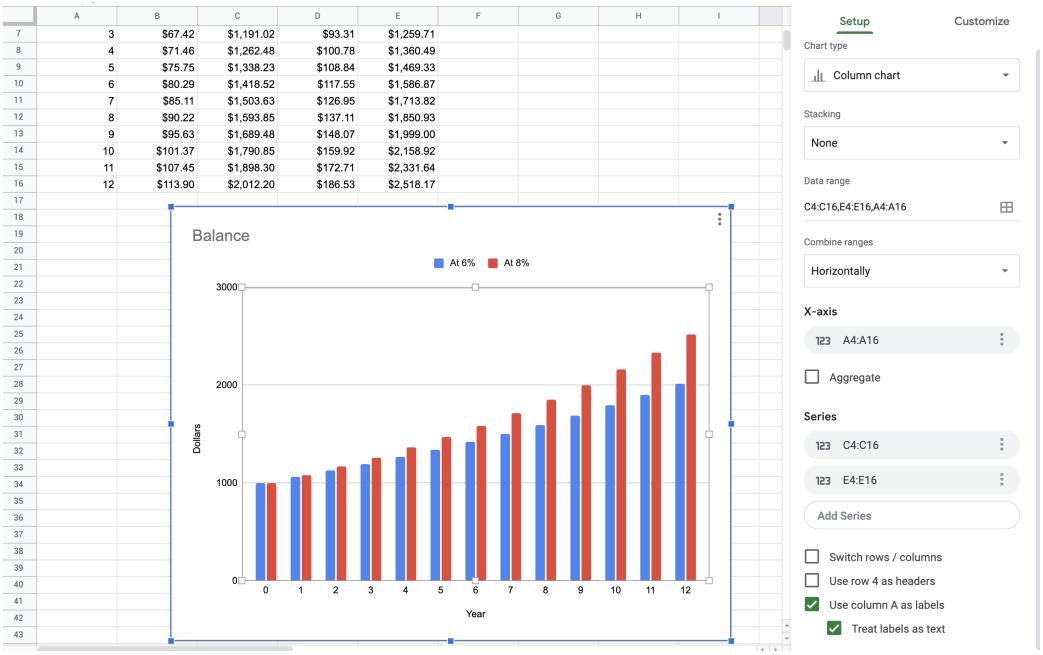
You might create a scatter plot. For each day, you put a mark that represents that temperature and the sales that day:



From this scatter plot, you can easily see that you do sell more lemonade as the temperature goes up.

1.2 Make Bar Graph

Go back to your compound interest spreadsheet and make a bar graph that shows both balances over time:



	A	B	C	D	E
7	3	$67.42	$1,191.02	$93.31	$1,259.71
8	4	$71.46	$1,262.48	$100.78	$1,360.49
9	5	$75.75	$1,338.23	$108.84	$1,469.33
10	6	$80.29	$1,418.52	$117.55	$1,586.87
11	7	$85.11	$1,503.63	$126.95	$1,713.82
12	8	$90.22	$1,593.85	$137.11	$1,850.93
13	9	$95.63	$1,689.48	$148.07	$1,999.00
14	10	$101.37	$1,790.85	$159.92	$2,158.92
15	11	$107.45	$1,898.30	$172.71	$2,331.64
16	12	$113.90	$2,012.20	$186.53	$2,518.17

The year column should be used as the x-axis. There are two series of data that come from C4:C16 and E4:E16. Tidy up the titles and legend as much as you like.

Looking at the graph, you can see the balances start the same, but balance of the account with the larger interest rate quickly pulls away from the account with the smaller interest rate.

This is a draft chapter from the Kontinua Project. Please see our website (https://kontinua.org/) for more details.

Appendix A

Answers to Exercises

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