Lab 1. Tableau Software

In this lab, we will cover the following recipes:

- Connecting to the data
- Building a bar chart using Show Me
- Building a text table
- Adding filters
- Adding color
- Building a tree map
- Building a map
- Customizing tooltips
- Building a dual axis map

To complete the recipes in this lab, we will be using data on baby names in the US, which have been collected by the US Federal [**Social Security Administration**] ([**SSA**]). The `Baby_names.csv` dataset contains the most popular baby names (that have 100 or more registered appearances) in the US, from 2010 through 2017. The dataset contains information about the state, gender of the name, name itself, year, and number of babies with said name.

Connecting to the data

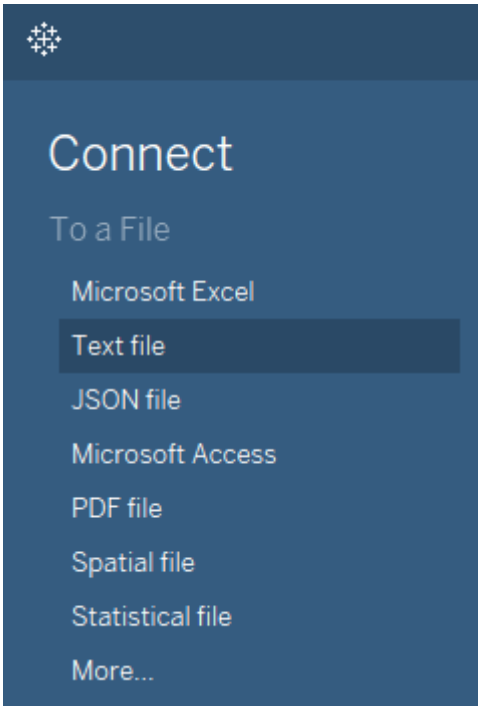
In this lab, we will go through the basics of connecting to a data source. The first step you must take when you open Tableau, before you create any visualizations, is to connect to a data source. You will then use that data source to create your views and dashboards.

Getting ready

In this lab, we will be using the `Baby_names.csv` dataset. Make sure that you have a local copy of the dataset saved to your device.

How to do it...

1. Open Tableau.
2. From the **`Connect`** pane on the left-hand side, choose the **`Text file`** option:

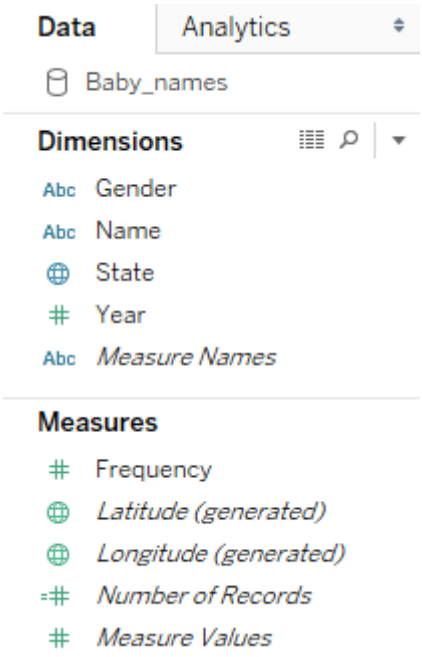


3. A new window will open. Navigate to your local copy of the `Baby_names.csv` dataset, select it, and click **`Open`**.
4. Tableau has now opened the **`Data Source`** page for you, where the file you loaded has been selected as the data source, and where you can also preview it.
5. To begin making your first visualization, just click on the **`Sheet 1`** tab in the bottom of the workbook. You are all set!

How it works...

Tableau reads the file you connected to and recognizes fields and their respective data types. There are the following data types in Tableau:

- Number (decimal)
- Number (whole)
- Date and time
- Date
- String
- Boolean After you have connected to the data source and you click on **`Sheet 1`**, you will see the **`Data`** pane on the left-hand side of the workspace, with all the fields from the data source listed, and their respective types marked by small symbols to the left of their names, as shown in the following screenshot:



The globe symbols in front of **`State`**, **`Longitude`**, and **`Latitude`** denotes the geographical roles of these fields, which are important when building maps. On the other hand, the **`Abc`** symbol signifies strings, while the **`#`** symbol denotes numerical values.

There's more...

Tableau allows users to connect to a wide range of data. You can connect to different types of files that are stored locally on your device, or data stored on the cloud or in relational or multidimensional databases. You can connect to the list of data that is available on the **`Start`** page, which opens when you launch **`Tableau Desktop`**, under **`Connect`**.

Building a bar chart using Show Me

In this lab, we will build a bar chart using **`Show Me`**. The **`Show Me`** option is a handy way to get started with building Tableau visualizations. To make a visualization, you don't need to know exactly how to do it, you just need to know what fields from your data source you would like to include in it. Tableau will suggest the appropriate visualizations.

Getting ready

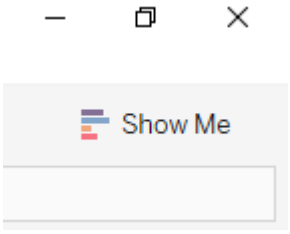
To complete this recipe, you need to connect to the `Baby_names.csv` dataset and open a new blank worksheet.

How to do it...

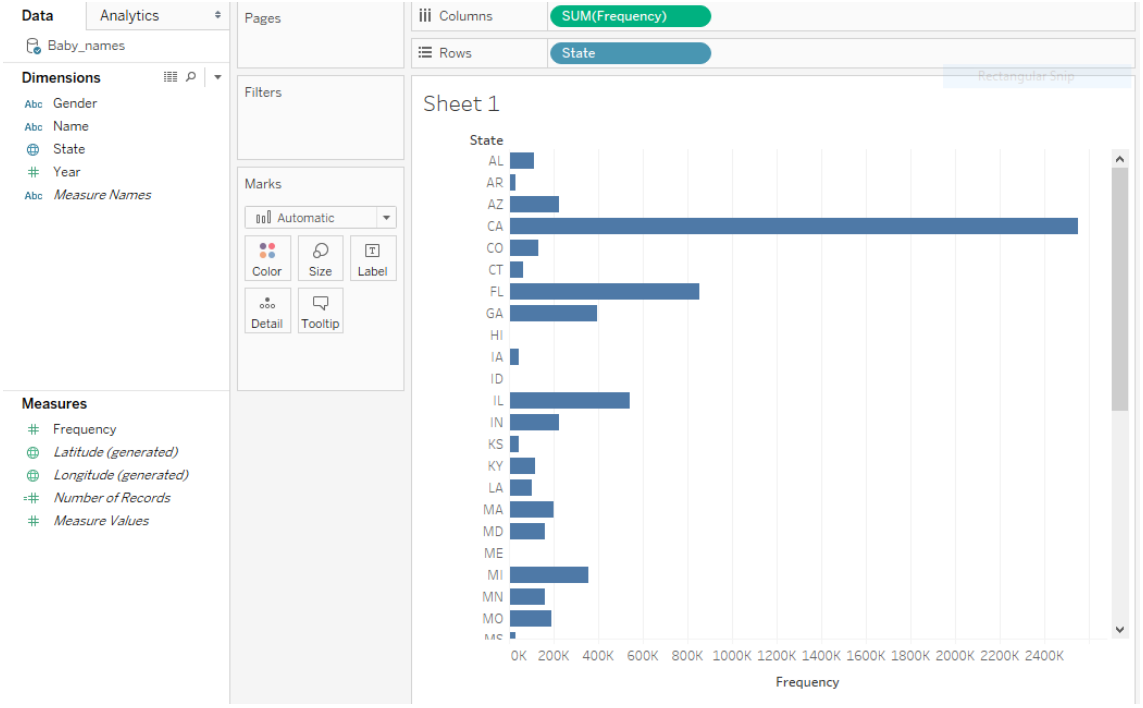
We will now create the bar chart using the **`Show Me`** option, while referring to the given steps.

Creating a chart using Show Me

1. Hold the [*Ctrl*] key on your keyboard, then on **`State`** under **`Dimensions`**, and then choose **`Frequency`** under **`Measures`**.
2. Release the [*Ctrl*] key and click on **`Show Me`** in the top-right corner of the workbook:

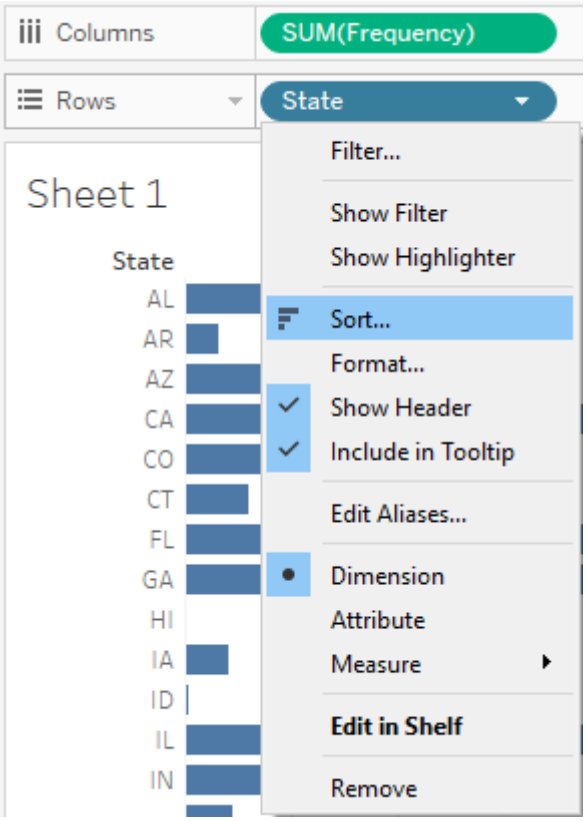


3. A menu will open, offering various visualizations that are suitable for your data. Choose **`horizontal bars`**. You have just created your first visualization! Now, let's make it tidier and easier to read:

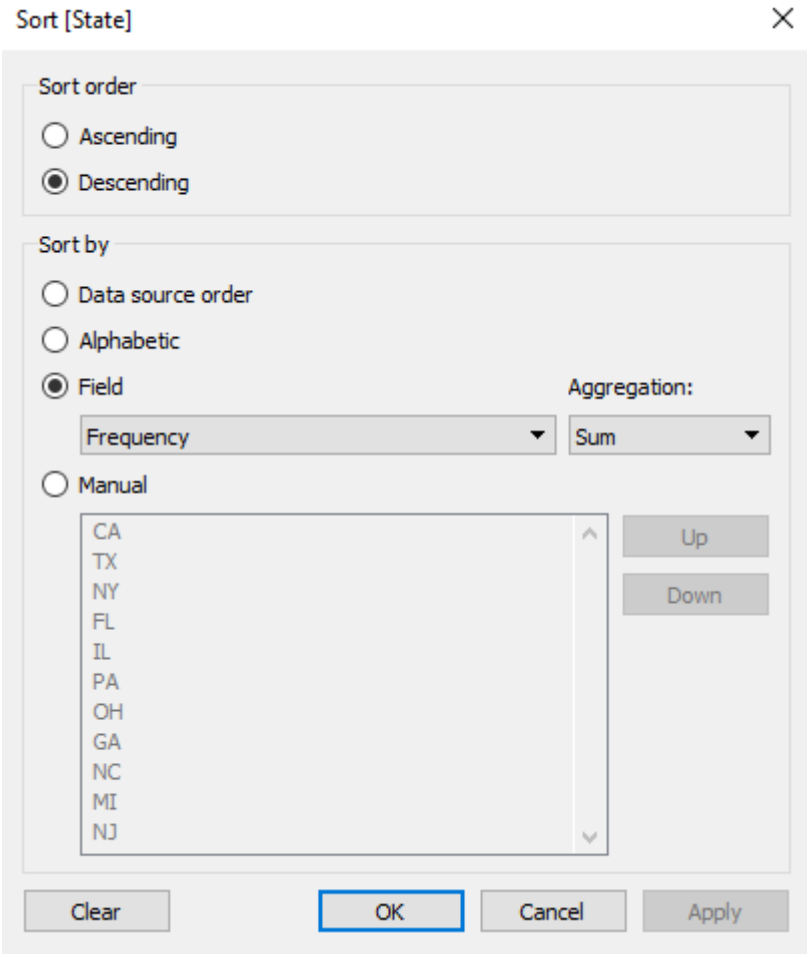


Sorting the chart

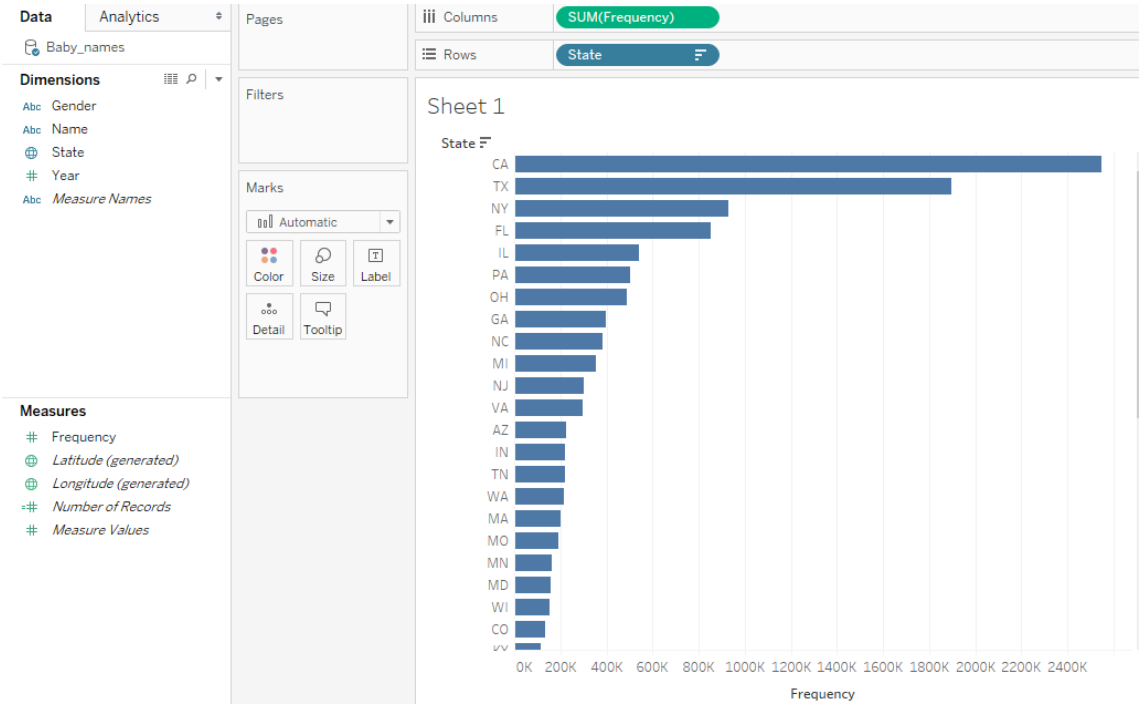
1. Hover over the **`State`** pill in the **`Rows`** shelf so that a white arrows appears on it. Click on the arrow and select **`Sort...`**:



2. Under **`Sort order`**, choose **`Descending`**.
3. Under **`Sort by`**, select **`Field`**:



4. Click on **`OK`**. The states are now sorted in descending order, by the value of **`Frequency`**, as follows:

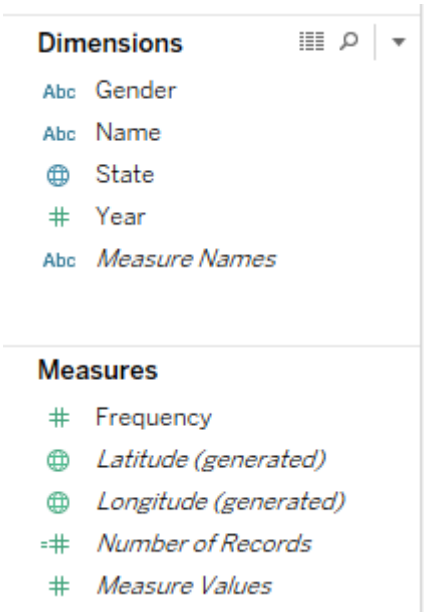


How it works...

Tableau classifies the fields from a data source you connect to into two main types:

- `Dimensions`: This section includes qualitative and categorical values, such as dates, strings, or geographical data
- `Measures`: This section includes quantitative and numerical values

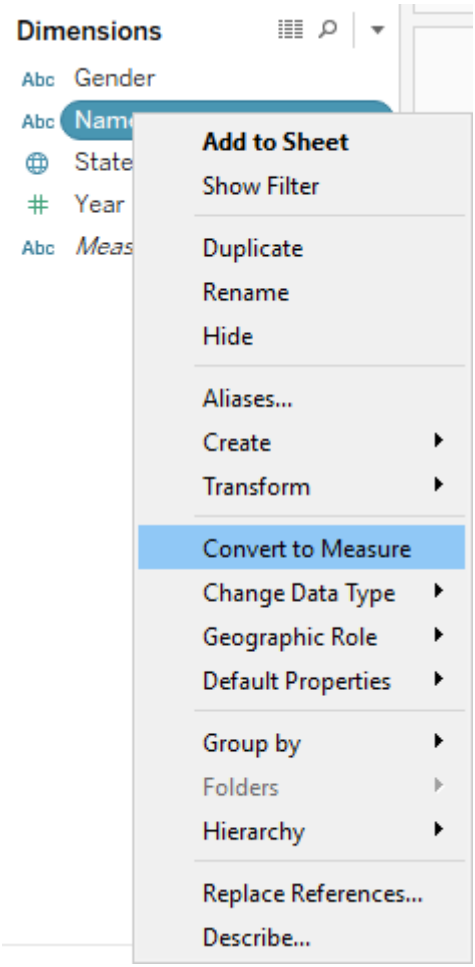
`Measures` and `Dimensions` can be both continuous, which means that they add axes to a view, and discrete, meaning they add field headers to a view. Continuous fields are marked with a green color, and discrete are marked with blue. However, you will notice that `Measures` are mostly continuous, while `Dimensions` are discrete:



When you select some measures and dimensions and click on `Show Me`, Tableau presents you with a range of basic visualizations that require the particular combination of measures and dimensions you selected.

There's more...

When you connect to a data source, Tableau automatically assigns type (measure or dimension) to each field in your data source. However, you can always change them manually by right-clicking on the field name under `Measures` / `Dimensions` and selecting `Convert to Dimension` / `Convert to Measure`:



Building a text table

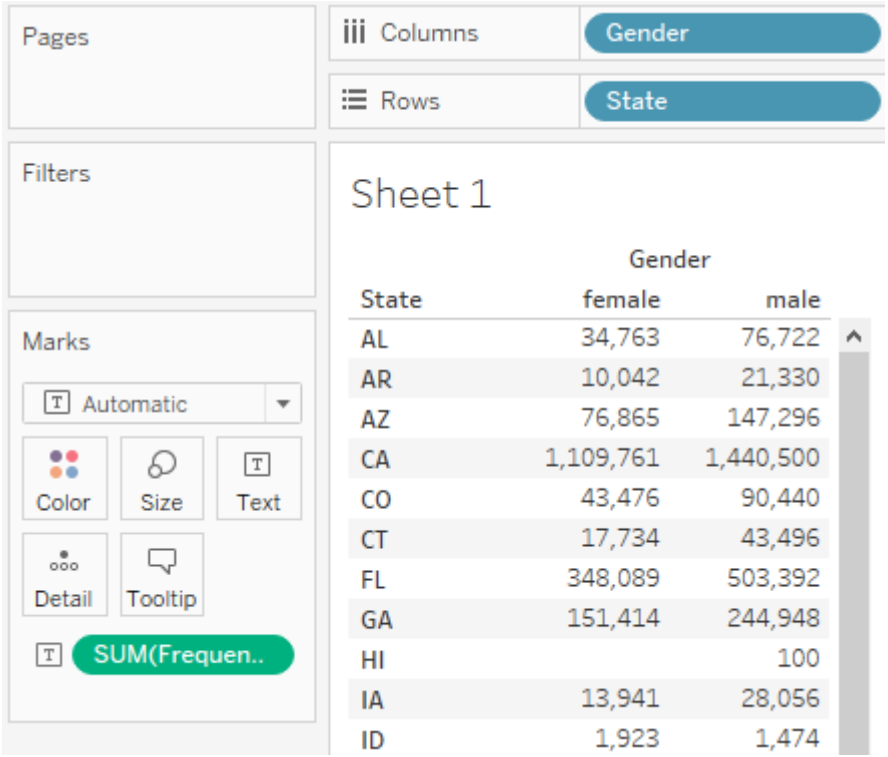
In this lab, we will build a simple table that includes two dimension, and one measure. Dimensions will define the column and row headers, while the measure will be aggregated.

Getting ready

Connect to the `Baby_names.csv` dataset and open a new worksheet.

How to do it...

1. Drag and drop **`State`** from **`Dimensions`** into the **`Rows`** shelf.
2. Drag and drop **`Gender`** from **`Dimensions`** into the **`Columns`** shelf.
3. Drag and drop **`Frequency`** from **`Measures`** onto **`Text`** in the **`Marks`** card:



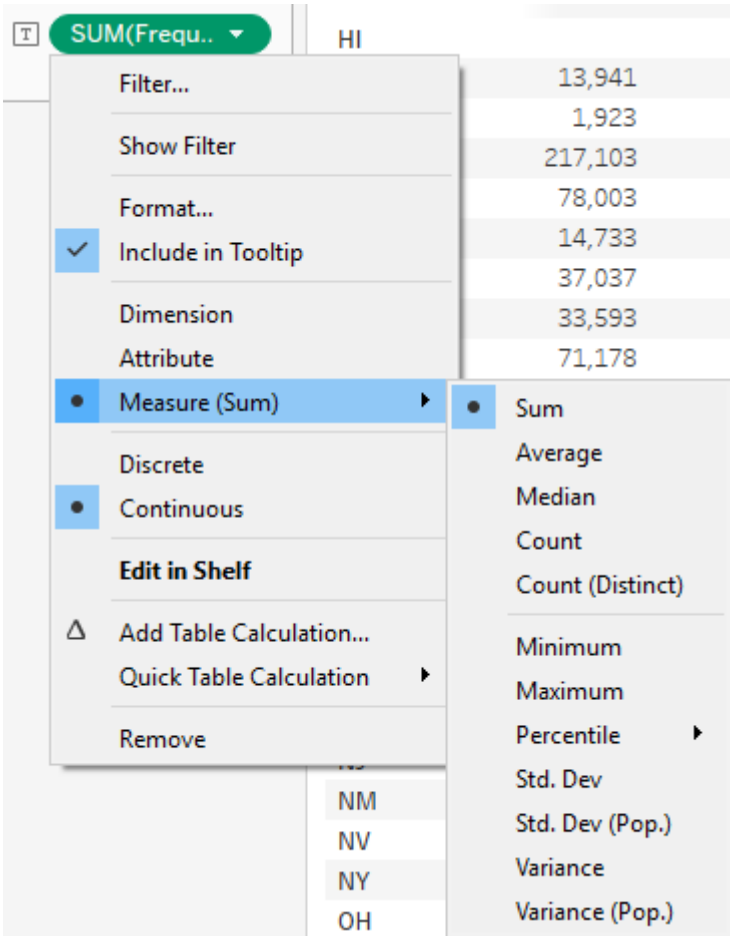
How it works...

We have placed `State` and `Gender`, two discrete dimensions, into the rows and columns of our table. However, this still leaves the table itself empty. We can only see the `Abc` placeholder text. When we place `Frequency`,** **a continuous measure, onto `Text`, Tableau fills our table with that measure, and automatically aggregates it along the dimensions we placed in rows and columns.

There's more...

When you place a continuous measure into a view, Tableau needs to aggregate it. It will use `SUM` as the default aggregation function. You can also see that if you look at the `Frequency` pill in `Text`, in the `Marks` card, it says `SUM(Frequency)`:

However, you can change the aggregation function. Hover over the `SUM(Frequency)` pill in the `Marks` card, so that a white arrow appears on it, and click on the arrow. If you hover over `Measure (Sum)` in the drop-down menu, it opens another drop-down menu. From it, you can choose from a range of aggregation functions, as shown in the following screenshot:



Note

Keep in mind that this method of aggregation only affects the worksheet it is applied in. To change the default aggregation function for a particular measure across all worksheets, consider using the **`Default Properties`** function, which is available in the drop-down menu that will appear when we right-click a field under **`Measures`**.

Adding filters

This lab will get you familiar with basic filtering functionality in Tableau. We will create a chart that shows name frequency across years, but we will then filter one name to see how its popularity has been changing over the years, and also narrow our view down to one state.

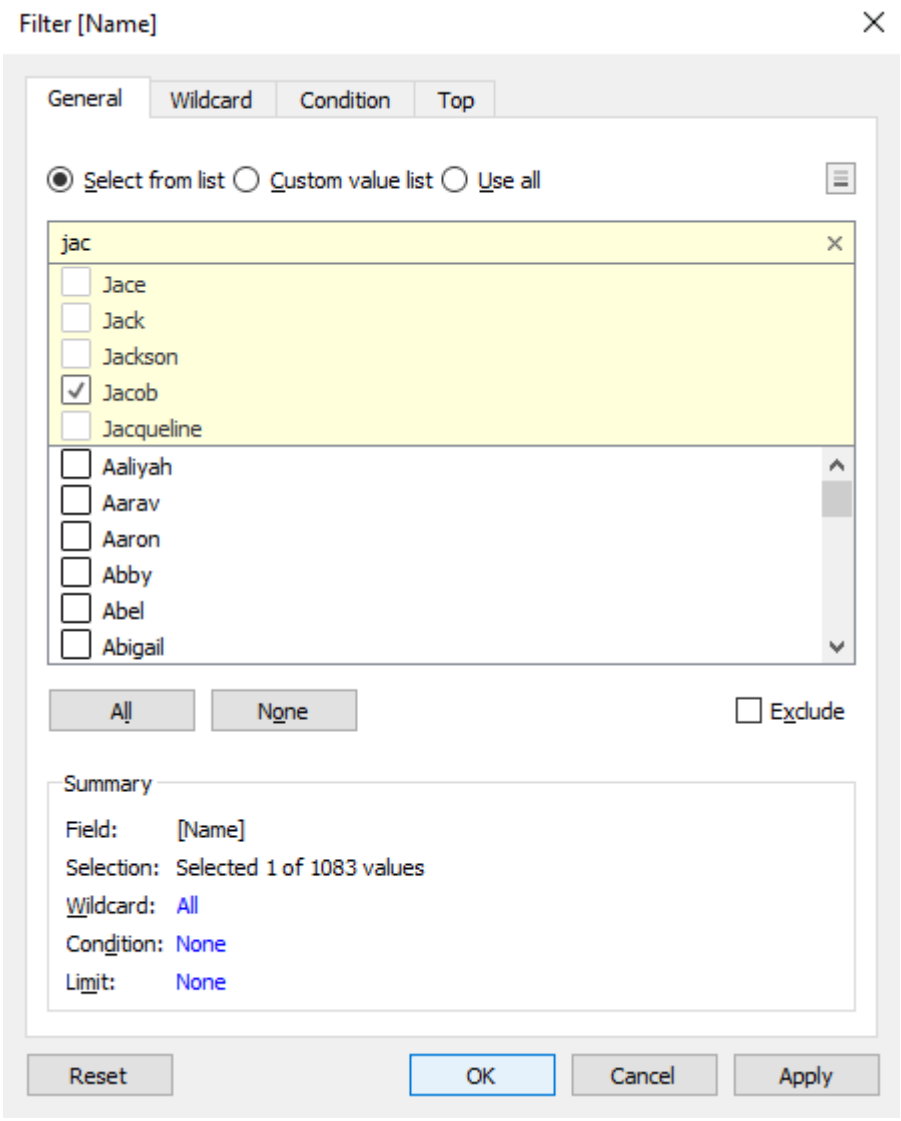
Getting ready

Connect to the `Baby_names.csv` dataset, and open a new worksheet.

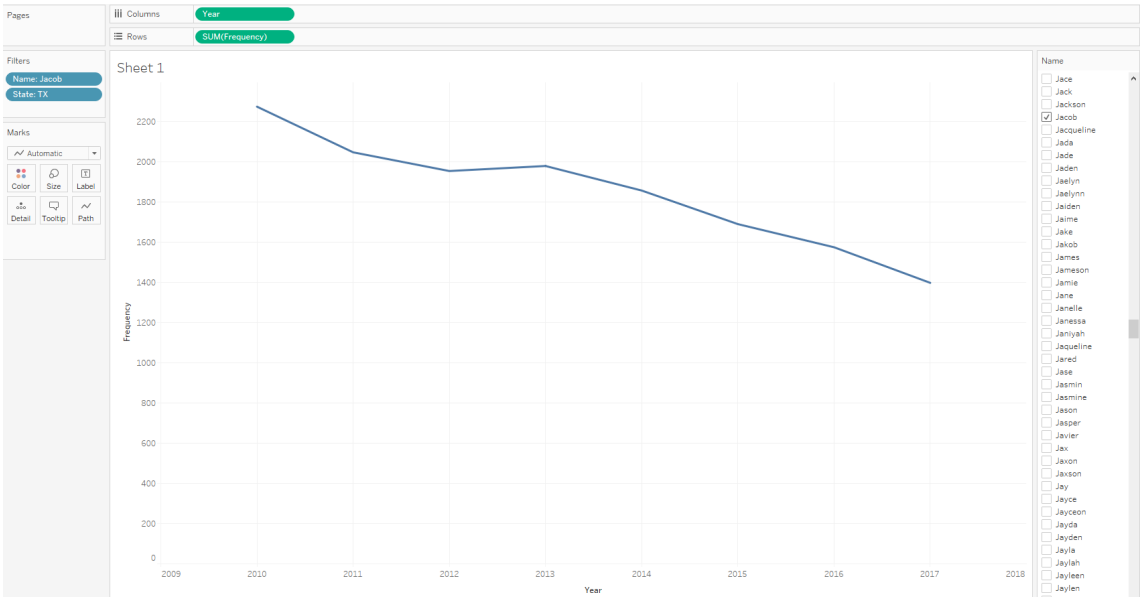
How to do it...

1. Drag and drop **`Year`** from **`Dimensions`** into the **`Columns`** shelf.
2. Drag and drop **`Frequency`** from **`Measures`** into the **`Rows`** shelf.
3. Drag and drop **`Name`** into the **`Filters`** shelf.
4. In the search bar at the top of the list, start typing `jac`.

5. Select **`Jacob`**, and click **`OK`**:



6. We can see that the name **`Jacob`** has been gradually decreasing in popularity since **`2010`**. Let's see how it has fared in Texas specifically. Drag and drop **`State`** from **`Dimensions`** into the **`Filters`** card.
7. In the search box in the **`Filter [State]`** window, type `tx`.
8. Select **`TX`**, click **`OK`**, and you will see the following results:



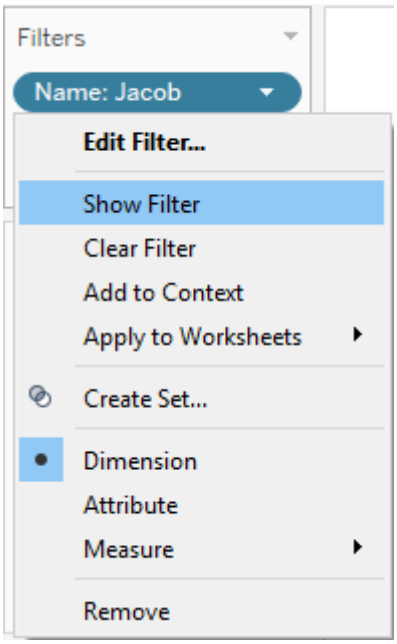
How it works...

Filters exclude rows from your dataset. When you select the name **`Jacob`** using a filter, only rows that contain the `Jacob` value from your dataset are analyzed, while all the other rows are excluded. You can also filter multiple values and select two, three, or 50 names to show in your view.

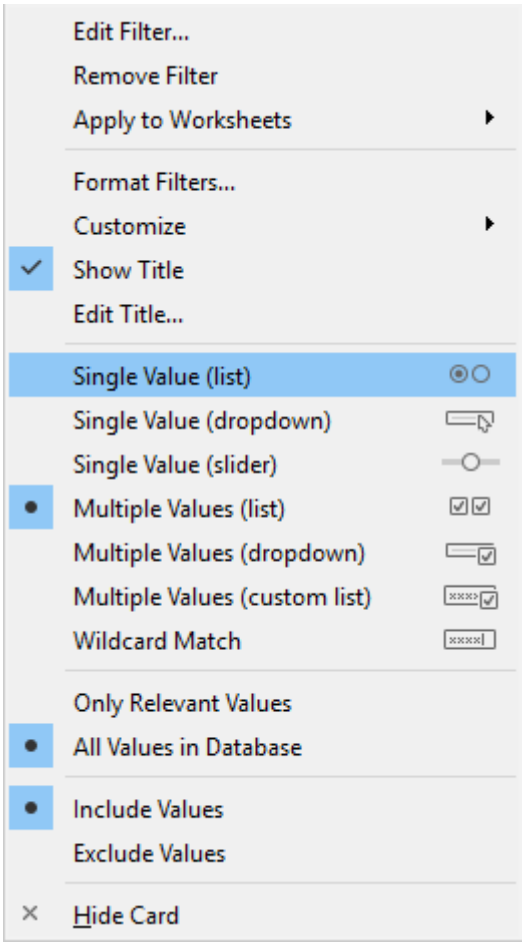
There's more...

One of the main advantages of Tableau filters is their interactivity. Let's execute the following steps to see how the **`Filter`** option works:

1. If you hover over the **`Name: Jacob`** pill in the **`Filters`** shelf, a small white arrow will appear on it.
2. Click on the arrow, and in the drop-down menu, click on **`Show Filter`**.
3. A list of all the names will appear in the top-right corner of the worksheet. Only **`Jacob`** is selected, because that's how we set our filter. However, you can select and deselect any name(s) to change your visualization:



4. If you hover over the filter control and click on the small black arrow that appears in the top-right corner, you can change the mode of the filter. You can choose whether you would like the filter to allow single or multiple values. You can also decide whether to implement the filter control as a drop-down list, checkboxes, or slider, as shown in the following screenshot:



Adding color

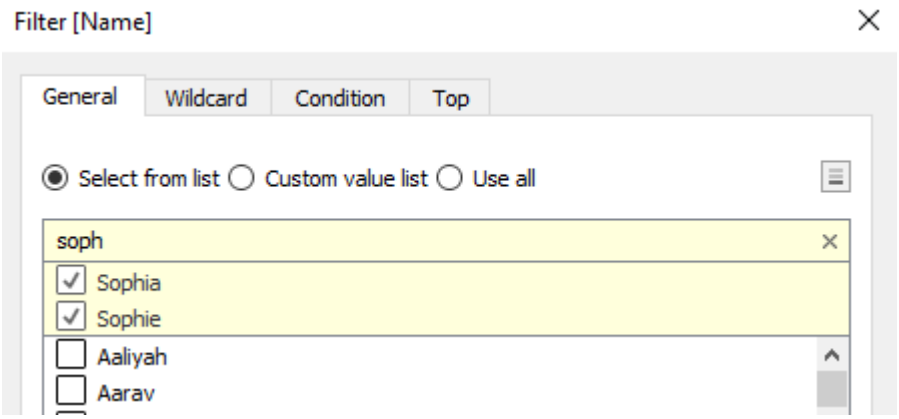
Colors are a very useful way to enrich your visualization. In this recipe, you will learn how to add information to your visualization by selecting **`Dimension`** and adding it to **`Color`**, which is present in the **`Marks`** card.

Getting ready

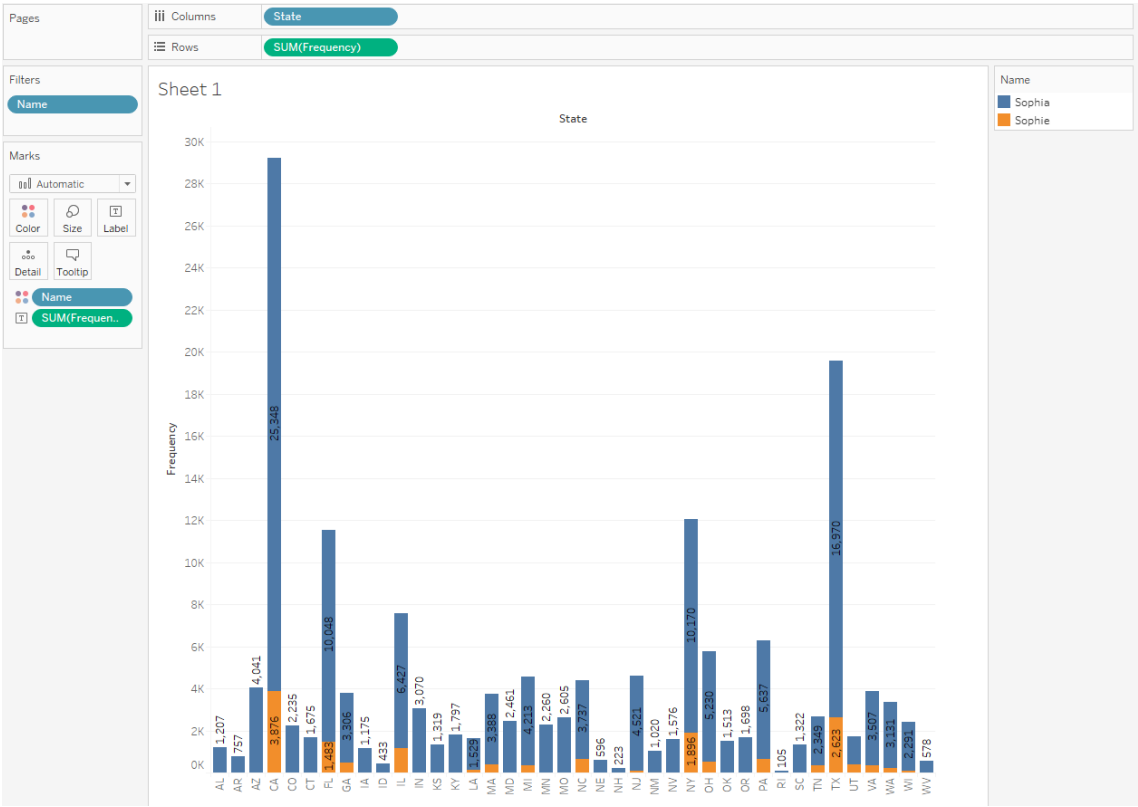
Connect to your local copy of `Baby_names.csv` and open a blank worksheet.

How to do it...

1. Drag and drop **`State`** from **`Dimensions`** into the **`Columns`** shelf.
2. Drag and drop **`Frequency`** from **`Measures`** into the **`Rows`** shelf.
3. Drag and drop **`Name`** into the **`Filter`** shelf.
4. In the **`Filter[Name]`** window, in the **`General`** tab, make sure **`Select from list`** is selected.
5. Click on **`None`** to deselect all values.
6. In the search bar at the top of the list, start typing `soph`.
7. Tableau will show the results that start with those letters, such as **`Sophia`** and **`Sophie`**. Select both values:



8. Click on `OK`. 9. Drag and drop `Frequency` to `Label` in the `Marks` card. 10. We have now created a chart with the summed total frequency of the names `Sophie` and `Sophia` per `State`. But, what if we wanted to know which of the two names is more popular in which state? We will achieve that by adding `Name` to `Color` in the `Marks` card. 11. Drag and drop `Name` from `Dimensions` onto `Color` in the `Marks` card:



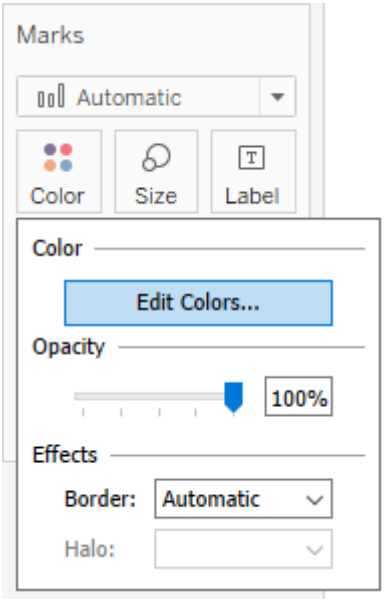
How it works...

When you add a discrete dimension (`Name`) to `Color`, Tableau disaggregates the measure you are using, `Frequency`, by the categories of `Name`, and assigns each category a different color. Since we filtered out all names except for `Sophia` and `Sophie`, only those two colors appeared in the chart. It's also possible, and often useful, to add a measure to `Color`. In that case, the value measure will be represented by a color gradient. For an example of adding a measure to `Color`, you can refer to the [*Creating a map with a color gradient*] recipe.

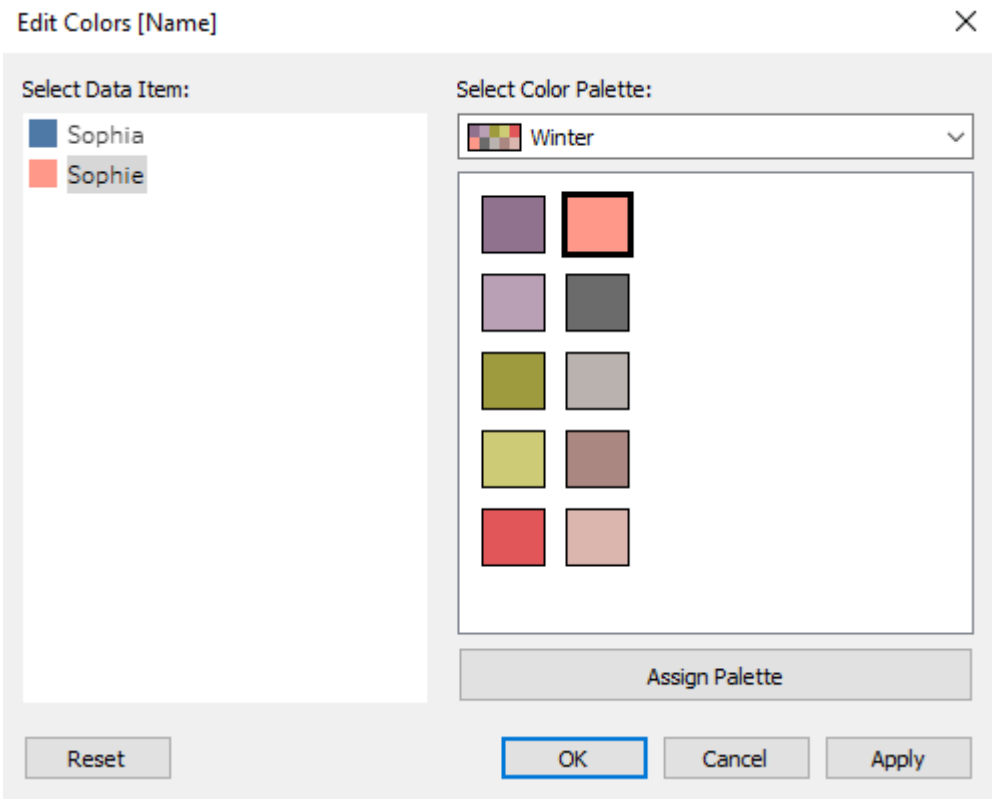
There's more...

It's possible to customize the colors in your view by performing the following steps:

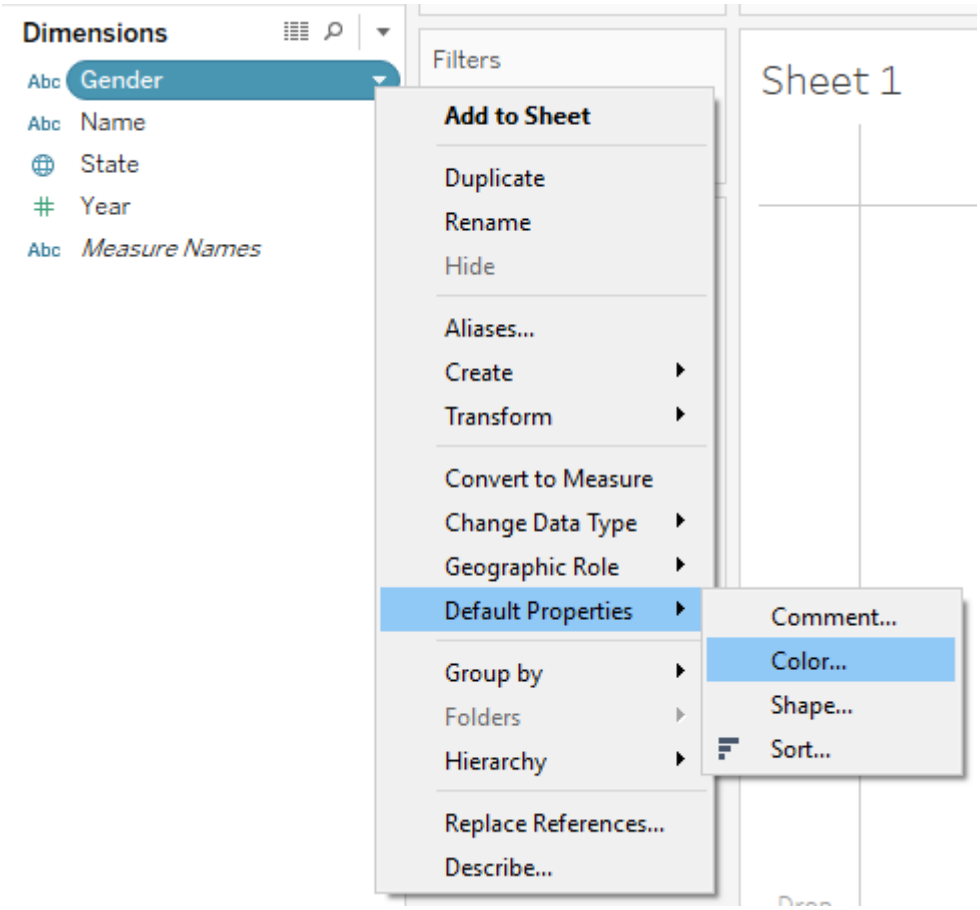
1. Click on `Color` in the `Marks` card, and then click on `Edit Colors...`:



2. In the `Edit Colors[Name]` window that opens, you can select a color palette from the drop-down menu that appears and click on the `Assign Palette` button. This will assign colors from the palette that you chose to the categories of your dimension. You can also manually assign specific colors to a category by selecting it in the `Select Data Item` pane, and by clicking on the desired color on the right-hand side:



3. When you are satisfied with the colors, click **`OK`** to exit. Note that this will only affect the colors in the particular view you created.
4. You can also hardcode a color palette for a specific measure or dimension. Hover over the field pill under **`Measures`** or **`Dimensions`** and click on the white arrow that appears on it. In the drop-down menu, navigate to **`Default Properties`** | **`Color...`** :



This will launch the `Edit Colors` window, where you can choose the color palette. However, once you assign your desired color palette to a field this way, it will be used by default every time you add this field to `Color` in a view.

Note

If you plan to use a field in `Color` in more than one visualization, it's a good practice to hardcode the color palette for it. Using colors in your visualizations consistently makes them cleaner and easier to follow, especially as they get more complex.

Building a tree map

Tree maps are useful for showing relative proportions of many categories in a total. In this lab, we will investigate the composition of our dataset to see which states are dominant, with the most records, and which are represented with fewer records.

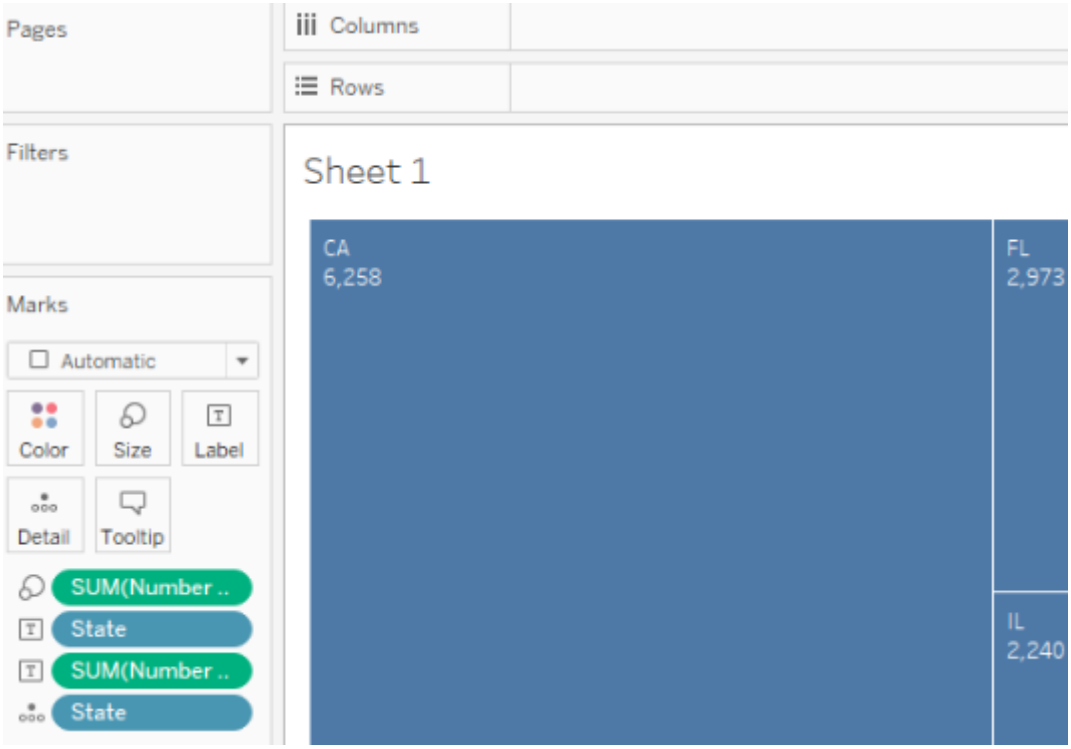
Getting ready

Connect to the `Baby_names.csv` data source and open a new worksheet.

How to do it..

1. Drag and drop `Number of Records` from `Measures` onto `Size` in the `Marks` card.
2. Drag and drop `State` from `Dimensions` onto `Detail` in the `Marks` card.
3. Drag and drop `State` from `Dimensions` onto `Label` in the `Marks` card.

4. Drag and drop `Number of Records` from `Measures` **onto** `Label` in the `Marks` card:

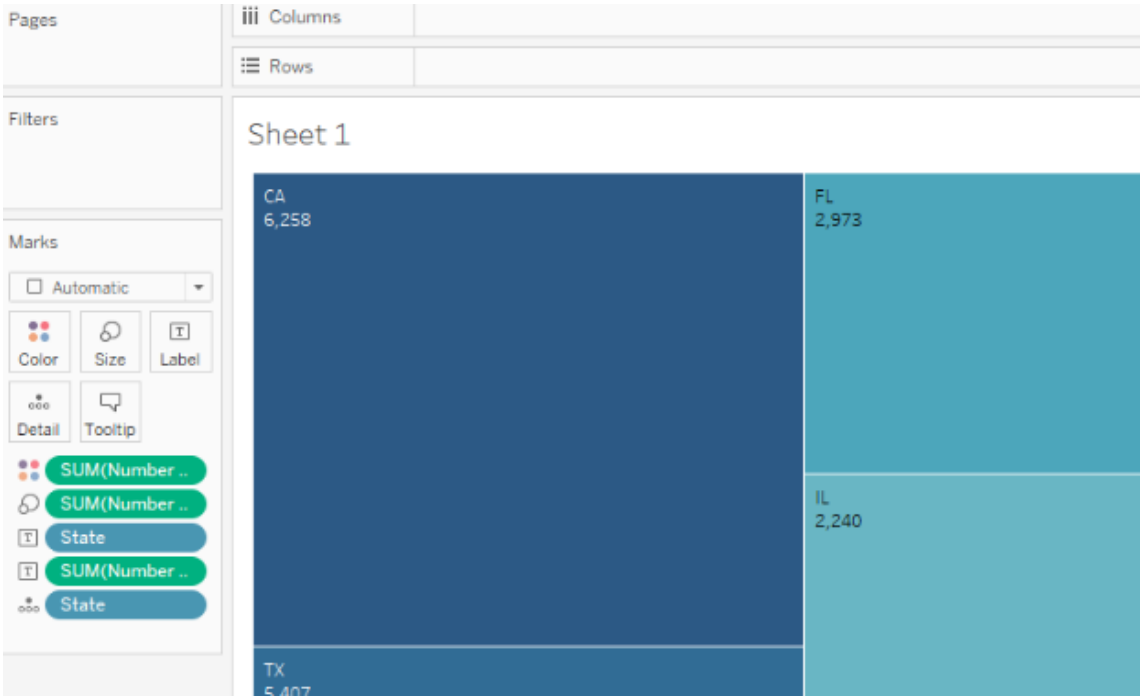


How it works...

The number of records is an automatically generated measure that simply represents the number of rows in the dataset. We are using it to see the relative representation of each state in our dataset.

There's more...

Placing a measure, in this case, `Number of Records`, on `Size` is necessary for creating a tree map. However, you can make your tree map even more intuitive by adding `Number of Records` to `Color` as well. You just need to drag and drop `Number of Records` from `Measures` onto `Color` in the `Marks` card button, and the value of `Number of Records` will also be reflected by a color gradient of the rectangles. You can also change and adjust the color palette by clicking on the `Color` button in the `Marks` card and choosing the settings you prefer:



Building a map

Maps are a great way to present geographical data, as they are intuitive and easy to read. In this lab, we will show name frequency by state, but this time using a map. This recipe will cover two frequently used ways to present data on a map: creating a map with circles of different sizes, and creating a filled map with a color gradient.

Getting ready

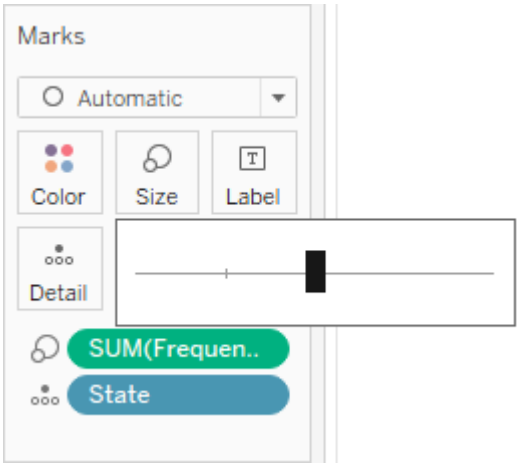
To complete this recipe, you will need to connect to the `Baby_names.csv` dataset and open a new blank worksheet.

How to do it...

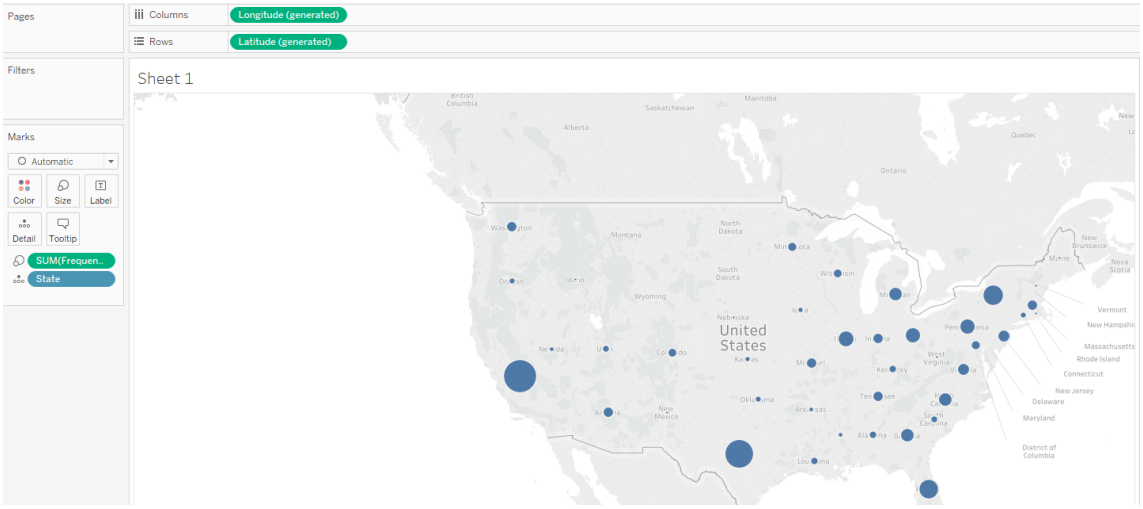
First, we will make a map with circles.

Creating a map with circles

1. Drag and drop **`State`** into the worksheet workspace.
2. Drag and drop **`Frequency`** onto **`Size`** in the **`Marks`** card.
3. Click on **`Size`** in the **`Marks`** card, and move the slider to the center, through which we can increase and decrease the size of the circle in the following map:



You can see the results in the following screenshot:

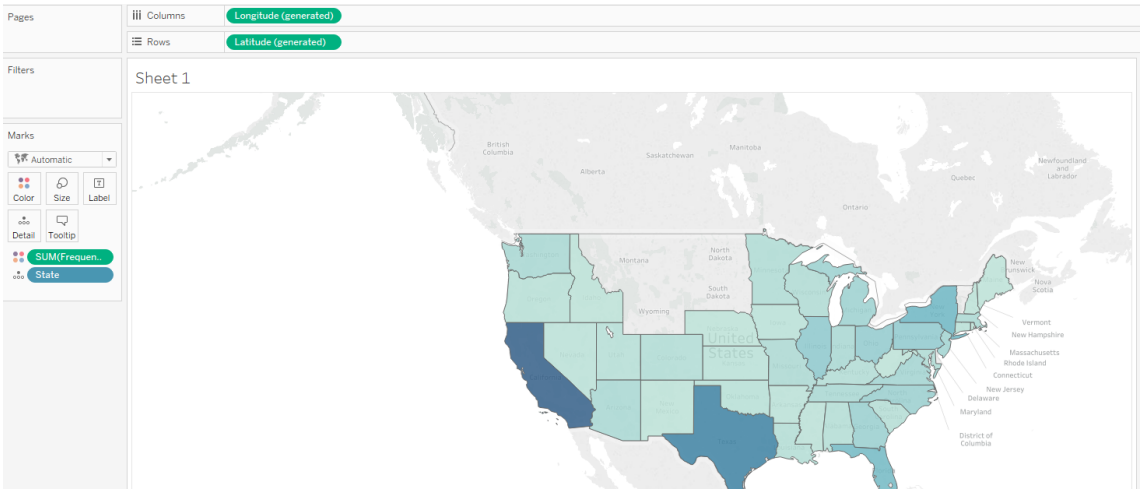


Note

If the map is failing to display, navigate to **`File|Workbook Locale`** in the main menu toolbar and select **`More...`**. When the **`Set Workbook Locale`** window opens, select **`English (United States).`**

Creating a map with a color gradient

1. Drag and drop ** `State` **into the worksheet workspace.
2. Drag and drop **`Frequency`** onto **`Color`** in the **`Marks`** card:



How it works...

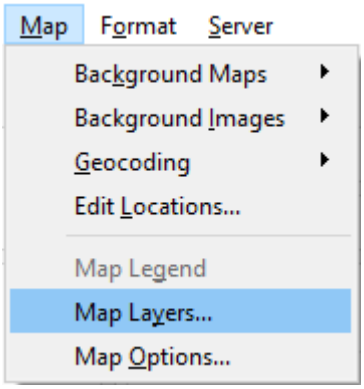
Tableau has correctly recognized that the `State` dimension contains geographical information, and has assigned a geographical role to it. This is indicated by a small globe symbol (

) next to the dimension name in the `Dimensions` pane, as well as in the data preview on the `Data Source` page. Based on that, it has automatically generated two new measures, which are not in the dataset itself: `Longitude` and `Latitude`. When you drag and drop the `State` dimension into the worksheet workspace, the `Show Me` functionality is implemented. It places `State` in `Detail` in the `Marks` card, `Longitude` into the `Columns` shelf, and `Latitude` into the `Rows` shelf. Based on what we do with our measure, `Frequency`, Tableau automatically chooses the appropriate mark type, which is a circle or a map.

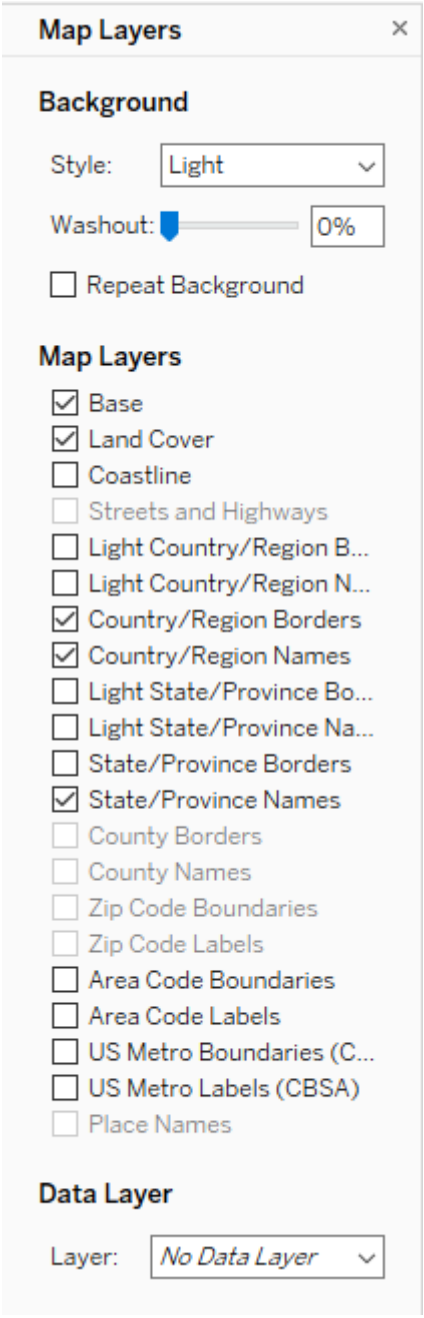
There's more...

It is possible to add and subtract layers from a map and change the map style by performing the following steps:

1. From the main menu toolbar, navigate to `Map` | `Map Layers...` to open the `Map Layers` pane:



2. In the `Map Layers` pane, you can add and remove map layers by checking and deselecting the boxes in front of them:



3. You can also add data layers by selecting them from the **`Data Layer`** drop-down menu. Depending on the data you are showing on your map, adding different data layers might add relevant information to your visualization.
4. It's also possible to adjust the background style under **`Background`**.
5. Set the map style and layers as default. This means that every time you create a new map, those settings will be applied.

Building a dual-axis map

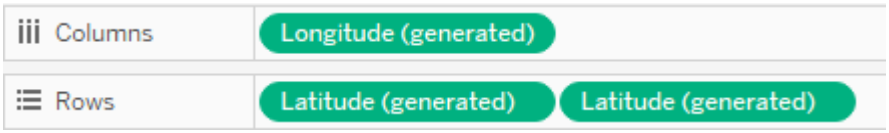
In this lab, you will learn how to create a dual-axis map. We will build on what we learned in the [*Building a map*] recipe and learn how to implement a dual axis.

Getting ready

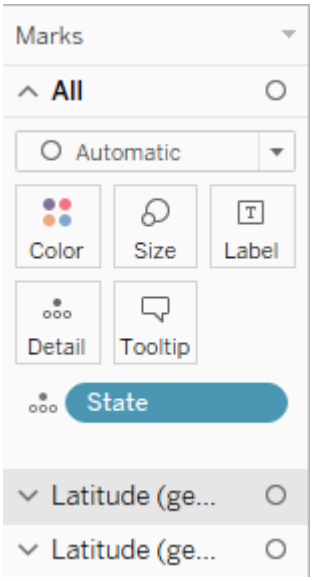
Connect to the `Baby_names.csv` dataset and open a new worksheet.

How to do it...

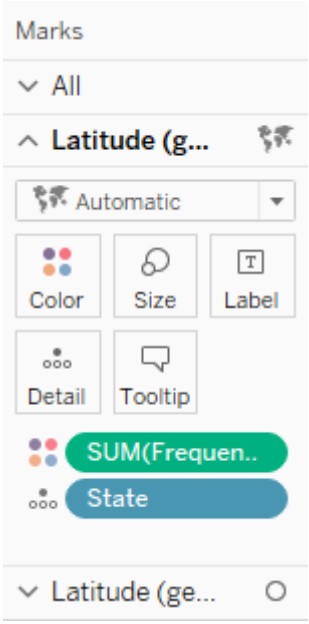
1. Drag and drop **`State`** from **`Dimensions`** into the worksheet workspace so that a basic map appears.
2. Drag and drop **`Latitude (generated)`** from **`Measures`** into the **`Rows`** shelf to the right of the **`Latitude (generated)`** pill, which is already there:



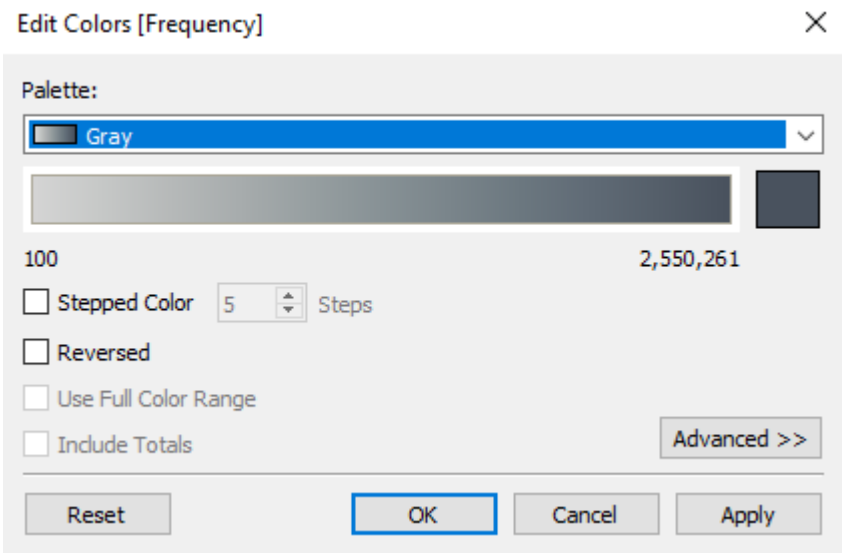
Now we have two maps, one beneath the other. Also, notice how new sections have appeared in the **`Marks`** card. There is the **`All`** section, followed by **`Latitude (generated)`**, which refers to the upper map, and **`Latitude (generated) (2)`**, which refers to the bottom map:



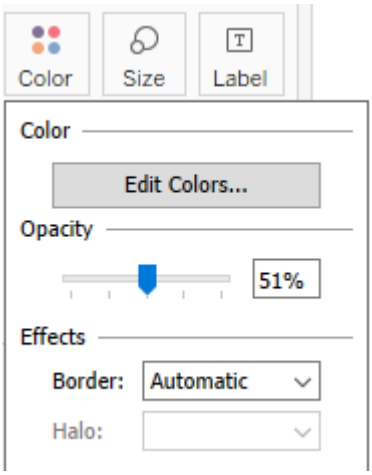
3. Click on the second section, **`Latitude (generated)`**, in the **`Marks`** card to expand it.
4. Drag and drop **`Frequency`** from **`Measures`** onto **`Color`**:



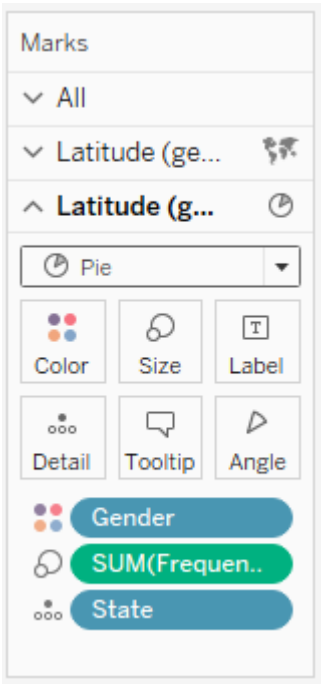
5. Click on the `Color` button and select `Edit Colors...`.
6. From the `Palette` drop-down menu, select `Gray`, and click on `OK`:



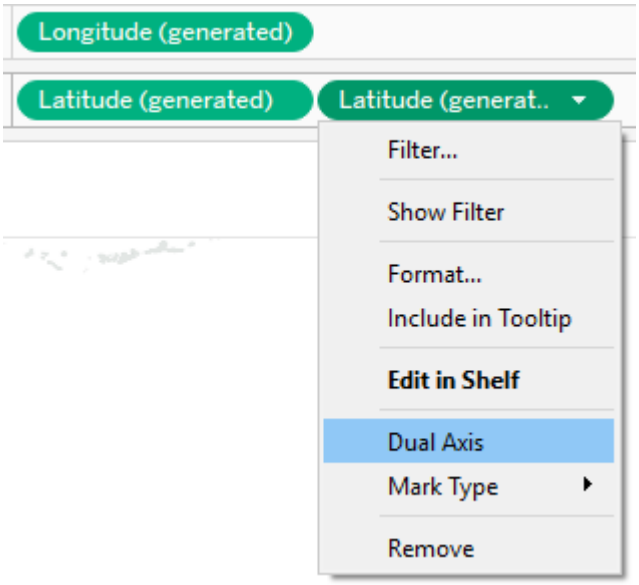
7. Click on the `Color` button again, and use the slider to decrease the opacity to around `51%`:



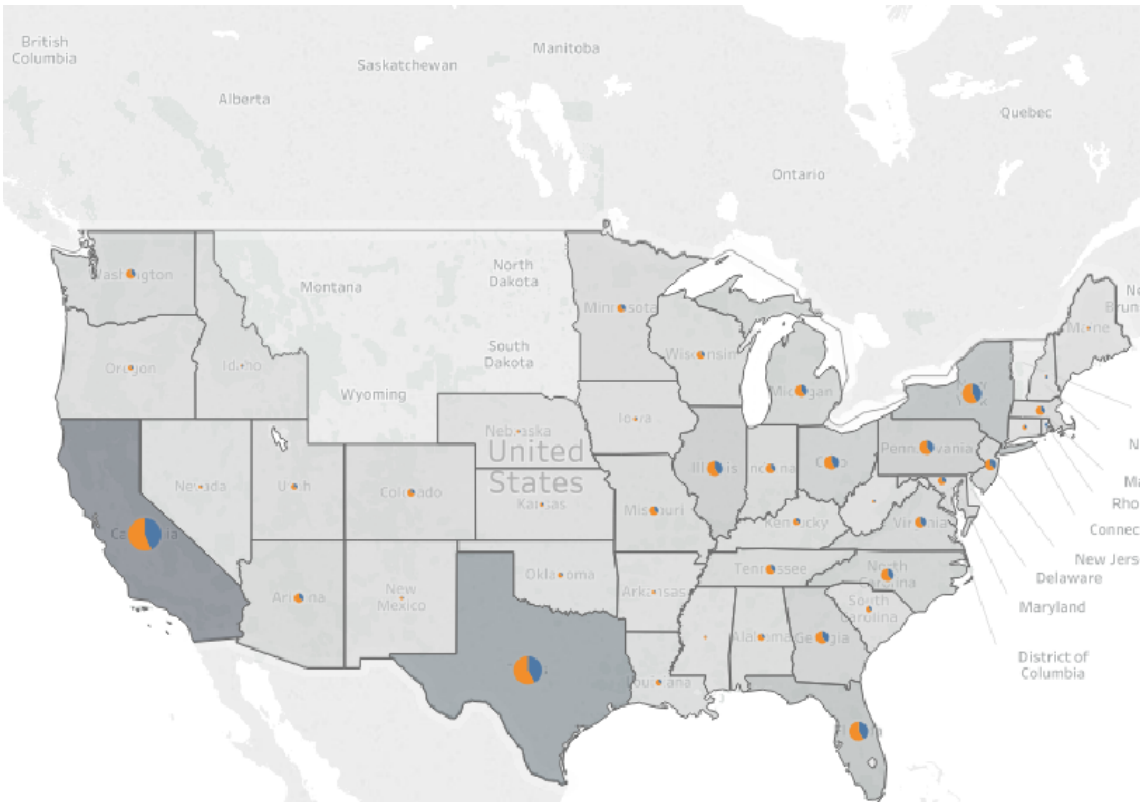
8. Click on the third section, **`Latitude (generated) (2)`**, to expand it. In it, drag and drop **`Gender`** from **`Dimensions`** onto **`Color`**.
9. Drag and drop **`Frequency`** from **`Measures`** onto **`Size`**.
10. Click on the **`Automatic`** drop-down menu and change the mark type to **`Pie`**:



11. Let's set the dual axis. In the **`Rows`** shelf, hover over the second **`Latitude (generated)`** pill so that a small white arrow appears on it:



12. Click on the arrow, select `Dual Axis`, and you will get the following result:



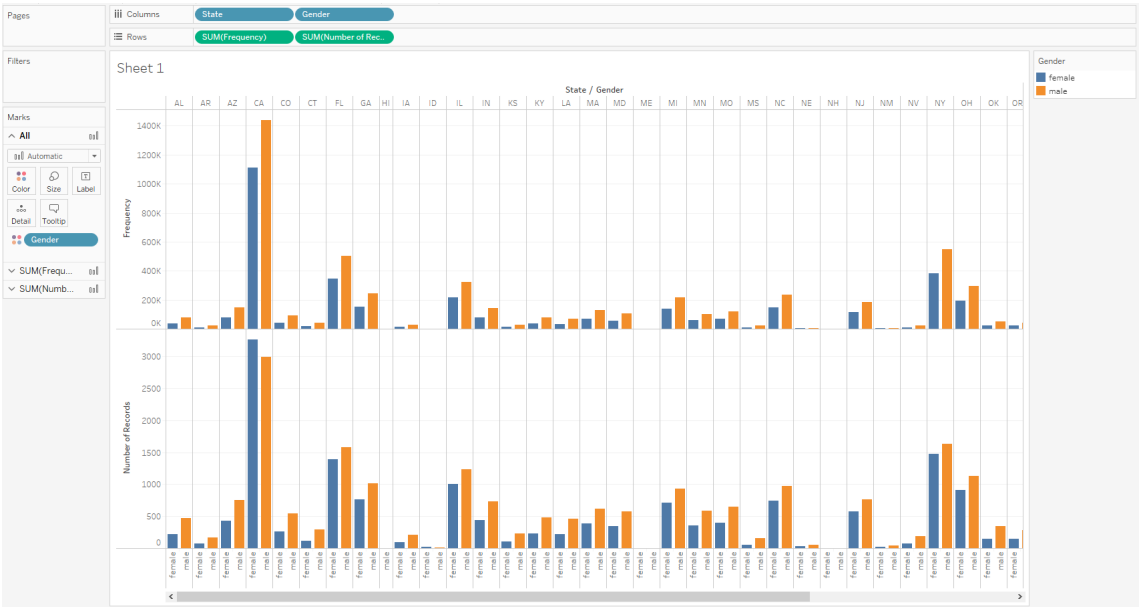
How it works...

Adding the `Latitude` measure to the `Rows` shelf twice duplicates our view, making two maps instead of one. The two maps initially have the same specifications in the `Marks` card and `State` in `Detail`. However, we then build them separately by adding different dimensions and measures on each of them, and they show different

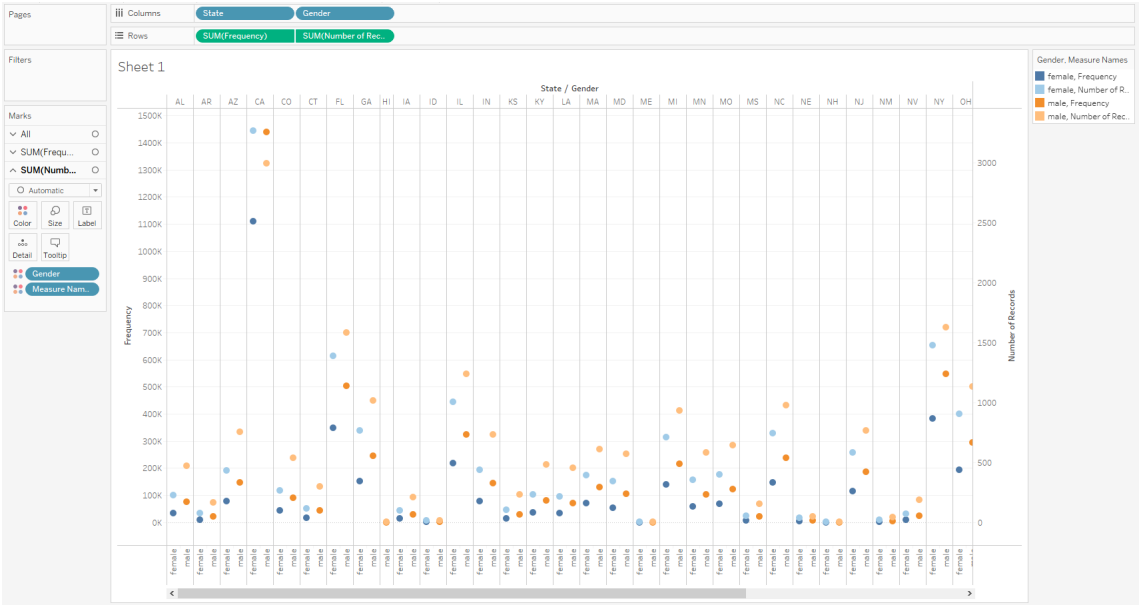
information. We have finally implemented the dual axis, and we have also made the maps overlap. We ended up with one map that has two layers.

There's more...

The dual axis can be implemented with different types of visualizations, not just maps. In the following example, we can see two different measures in the rows so that the upper bar chart shows `Frequency` and the lower chart shows `Number of Records`:



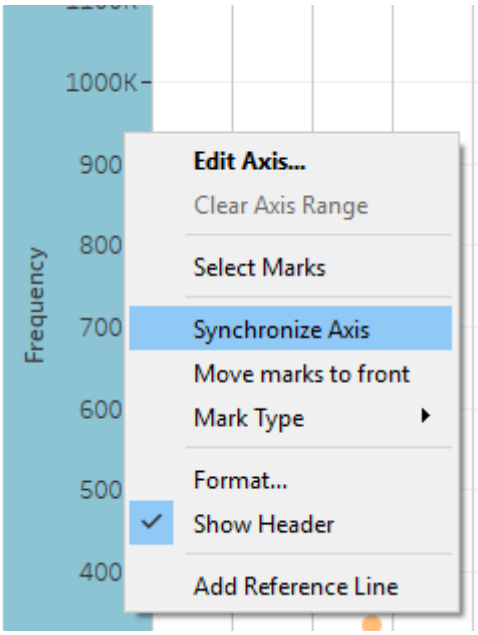
If we implement dual axis, both measures will be displayed in one chart:



However, we must notice that the new chart has two y axes on each side---one showing `Frequency` and the other showing `Number of Records`. The axes are very different, as these two measures have different scales, thus

showing that the same scale would make the measure with the narrower scale, in this case, **`Number of Records`**, look flat on the chart. However, Tableau does offer an option for synchronizing the axes, which is useful when the scales are similar.

To implement it, right-click on any of the two [*y*] axes and select **`Synchronize Axis`**:



Customizing tooltips

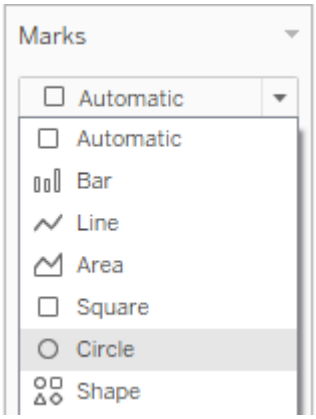
When you hover over a point in your view, a tooltip will appear. Tooltips are small boxes, holding detailed information about a data point in the view, and are present by default. In this lab, you will learn how to customize tooltips.

Getting ready

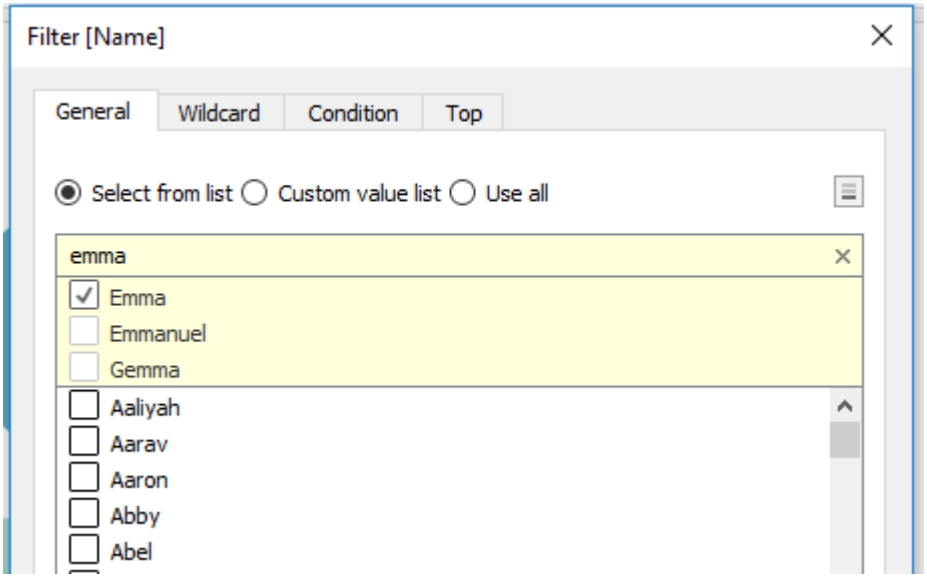
To follow this recipe, connect to the `Baby_names.csv` data source and open a new worksheet.

How to do it...

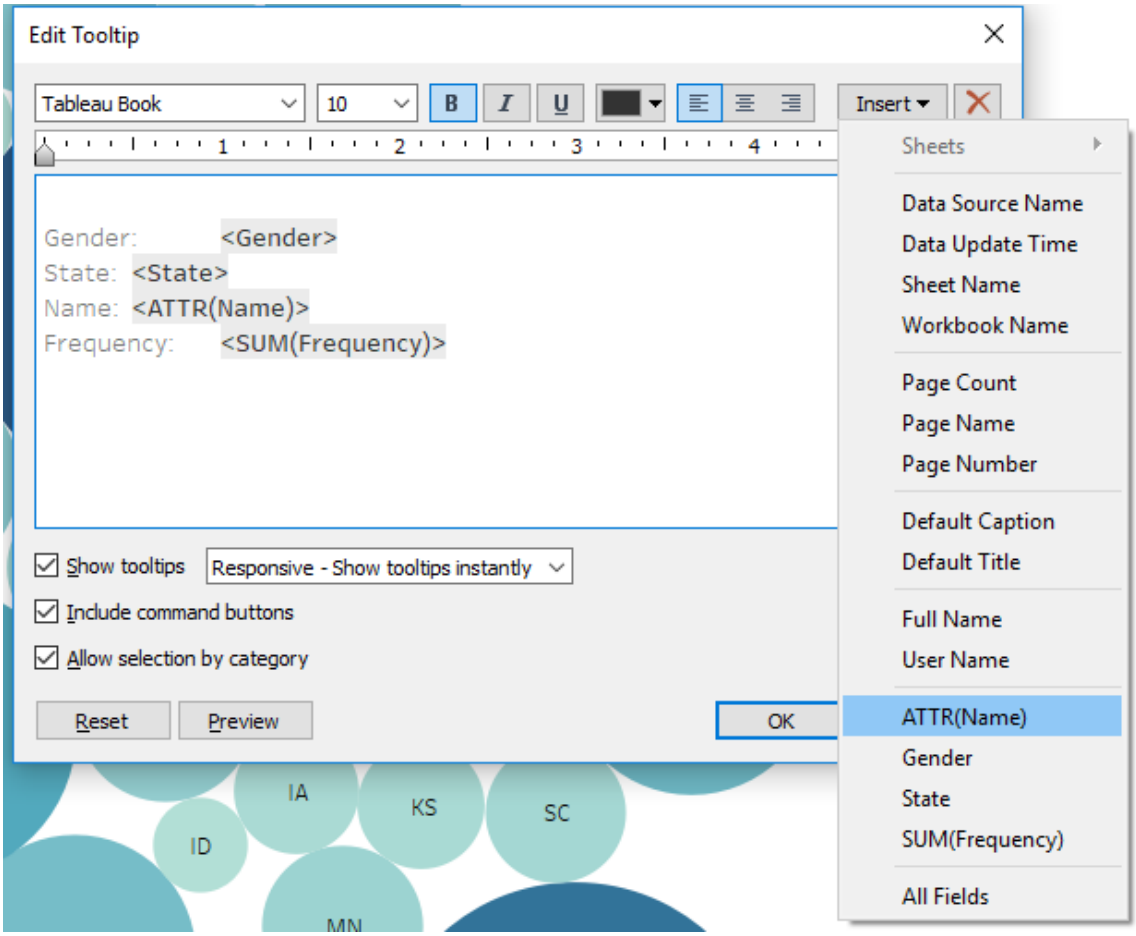
1. Drag and drop **`Frequency`** from **`Measures`** onto **`Size`** in the **`Marks`** card.
2. Drag and drop **`State`** from **`Dimensions`** onto **`Detail`** in the **`Marks`** card.
3. Drag and drop **`State`** from **`Dimensions`** onto **`Label`** in the **`Marks`** card.
4. Drag and drop **`Frequency`** from **`Measures`** to **`Color`** in the **`Marks`** card.
5. Click on the drop-down menu in the **`Marks`** card and select **`Circle`**:



6. Drag and drop **`Name`** from **`Dimensions`** into the **`Filter`** shelf.
7. In the **`Filter [Name]`** window, click **`None`** to deselect all values.
8. Start typing `emma` in the search bar at the top of the list, select **`Emma`**, and click on **`OK`**:

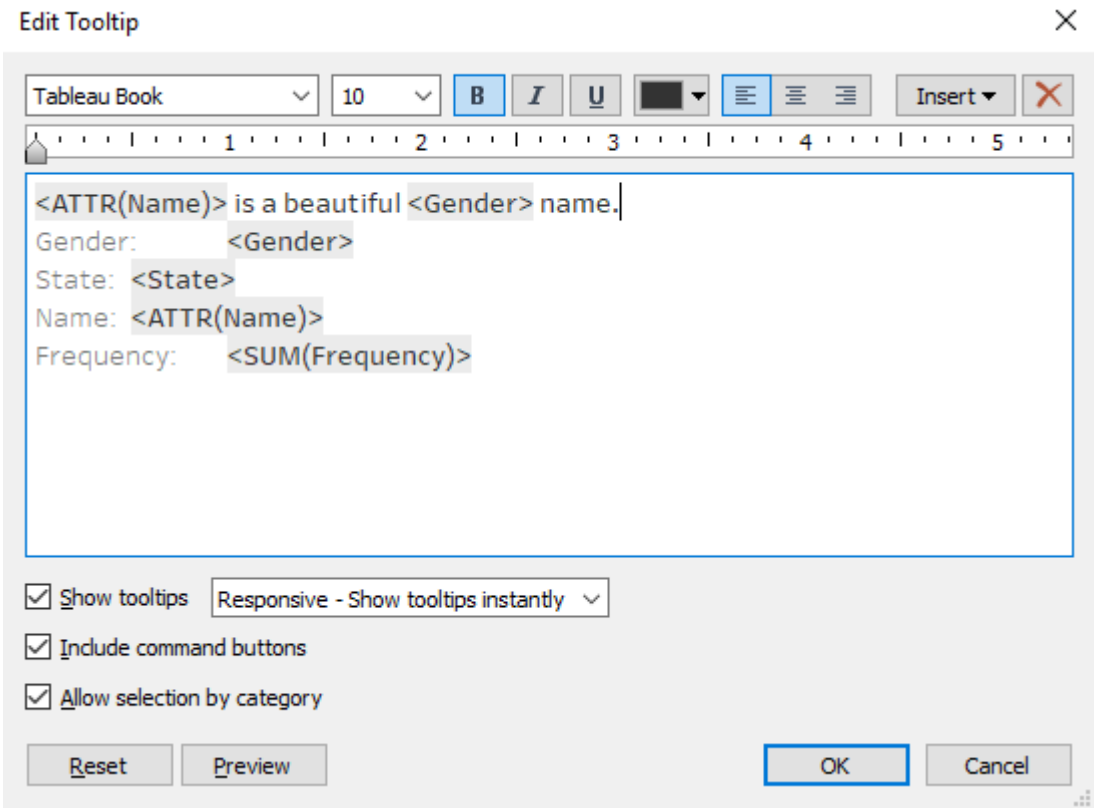


9. Drag and drop **`Gender`** from **`Dimensions`** onto **`Detail`** in the **`Marks`** card.
10. Drag and drop **`Name`** from **`Dimensions`** onto **`Tooltip`** in the **`Marks`** card.
11. Double-click on **`Tooltip`** in the **`Marks`** card.
12. In the **`Edit Tooltip`** window, hit [*Enter*] to add a row above the existing text and place your cursor in the new row.
13. Click on **`Insert`** and select **`ATTR(Name)`**:

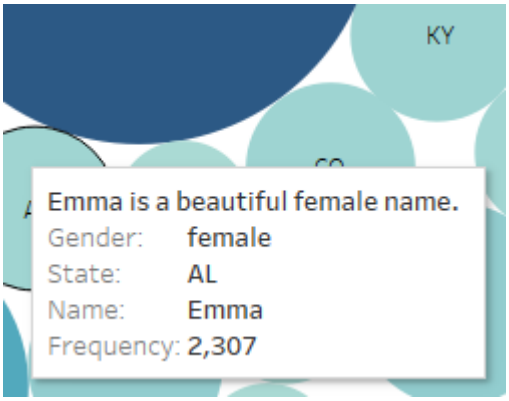


14. Click on **`Insert`** again and select **`Gender`**.

15. Between **`<ATTR(Name)>`** and **`<Gender>`**, type `is a beautiful`. After **`<Gender>`**, type `name`. The whole expression should be **`<ATTR(Name)> is a beautiful <Gender> name`**, as shown in the following screenshot:



16. Click on `OK`. The expression we entered into the tooltip will now appear when you put your mouse over any of the circles:



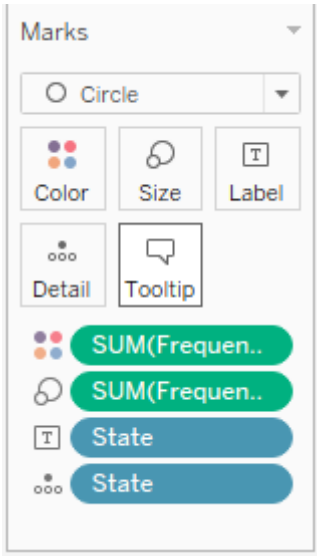
How it works...

Tooltips are, by default, set to hold information on the fields that are in the view and their current values. However, as we just saw, you can customize them by adding additional elements, or removing the ones that are there by default. We inserted fields such as `Name` and `Gender` into the `Tooltip` section; they will change automatically. If we change the `Name` filter from `Emma` to another name, it will change the value of the name in the sentence, as well as automatically update the gender.

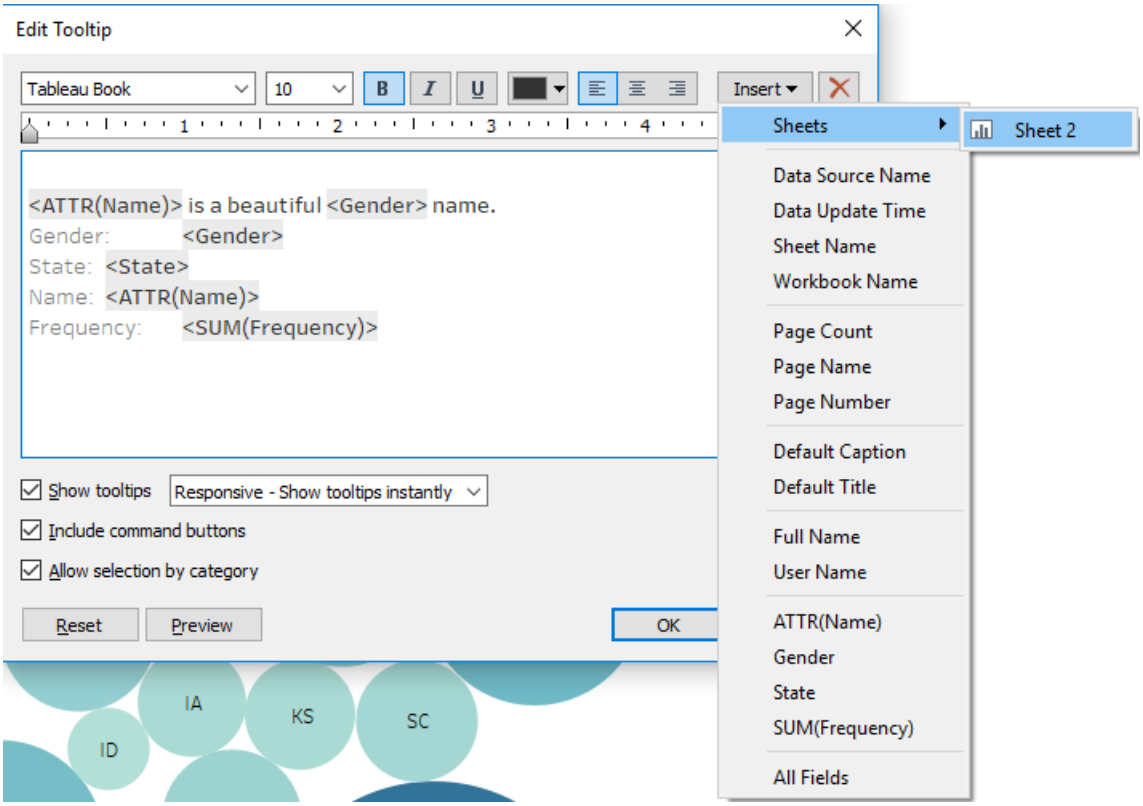
There's more...

You can also insert another worksheet from the workbook into the tooltip. Let's say you want your user to be able to see where the particular state is on the map. We can do this by executing the following steps:

1. Create another sheet with the map, just by opening a blank worksheet and double-clicking on **`State`** in **`Dimensions`**.
2. On the original sheet, double-click on **`Tooltip`** to open the **`Edit Tooltip`** window and add an empty row:



3. Click on **`Insert`** and navigate to **`Sheets`** | **`Sheet 2`**. Tableau will insert an expression referencing **`Sheet 2`** into the **`Tooltip`** section:



4. If you go to **`Sheet 2`**, you will notice that Tableau added **`Tooltip (State)`** as a filter. When your mouse cursor goes over any of the states in **`Sheet 1`**, a tooltip with a map marking that state will show up:

Emma is a beautiful female name.

Gender: female
State: NJ
Name: Emma
Frequency: 4,114