



Tableau for the Business User

Practice Manual

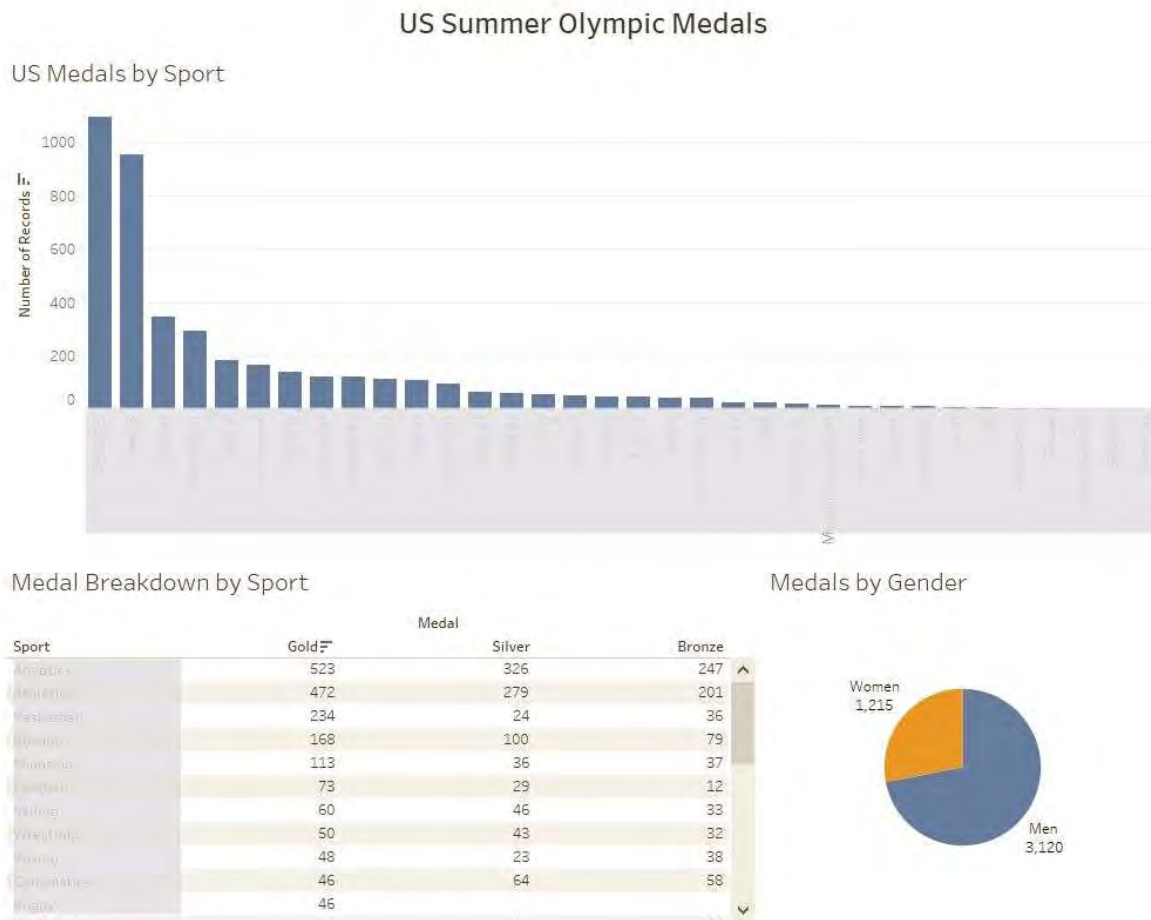
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Practice: Getting Started with Tableau – Creating Your First Dashboard

In this practice, you will connect to data in an Excel file. Using this data, you will create a sorted bar chart, text table, and pie chart to find the answer to some questions. Finally, you will include these views in an interactive dashboard to show the data for exploration.



NOTE: The sport names are shaded out.

The data source includes all medal winners from the Summer Olympics from 1896 to 2008. Using this data source, you will seek to answer the following questions:

In which sport did the United States win the most medals?

- In which sport did the United States win the most gold medals?
- Does gender impact which sport the United States won the most gold medals?

Connect to Data

1. Open Tableau Desktop, and under **Connect** click **Excel**.
2. Navigate to the student files and open the **Data Sources** folder.
3. Open the **Summer_Olympic_Medalists.xls** file.

4. Drag the **ALL MEDALISTS** Sheet to **Drag Sheets Here**.

The data from the Excel file will appear on the lower half of the screen.


5. Click **Sheet 1** to go to the worksheet.

Create Three Views

Question 1: In which sport did the United States win the most medals in the summer Olympics?

1. Create a bar chart using the dimension **Sport** and measures **Number of Records**.

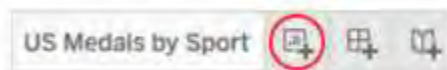
Drag this field	To
Sport	Columns
Number of Records	Rows

2. From the toolbar, click the **Sort Descending** icon . This sorts the values from highest to lowest.
3. Drag **Country** to **Filters** and select **USA** from the Filter list.
4. Double click on the **Y-axis** and edit the **Title** to “# of Medals”.
5. Name the worksheet by double-clicking on the **Sheet 1** tab and type a name for your view: US Medals by Sport

The sport where the United States won the most Summer Olympic medals: _____

Question 2: In which sport did the United States win the most gold medals in the summer Olympics?

1. Click the **New Worksheet** tab to add a second worksheet.



2. Create a text table, called a **Crosstab** in Tableau.

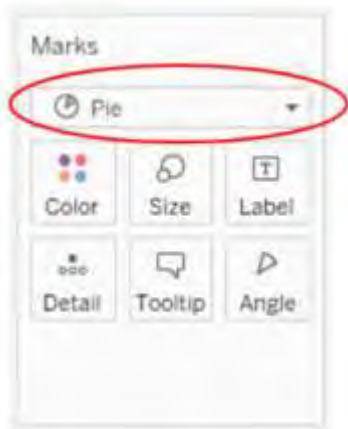
Drag this field	To
Number of Records	The middle of the view, labeled Drop field here
Medal	Columns
Sport	Rows

3. Drag **Country** to **Filters** and select USA from the Filter list.
4. Reorder the Medals from alphabetical order to **Gold, Silver, Bronze** by dragging the medal name to the order you want.
5. From the Medal column labels, click on **Gold** to sort the Sport list by number of Gold Medals. Notice the sort icon now next to the Gold label.
6. Name the worksheet by double-clicking on the **Sheet 2** tab, and type a name for your view: Medal Breakdown by Sport

The sport where the United States won the most Summer Olympic **GOLD** medals: _____

Question 3: Does gender impact which sport the United States won the most gold medals?

1. Click the **New Worksheet** tab to add a third worksheet.
2. Create a pie chart. Change the **Marks** type to **Pie**.



Drag this field	To
Gender	Color on the Marks card
Number of Records	Angle

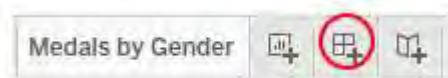
3. Drag **Country** to **Filters** and select USA from the Filter list.
4. Add labels for **Gender** and **Number of Records** by dragging a second copy of each to **Label** on the **Marks** card.

Drag this field	To
Gender	Label on the Marks card
Number of Records	Label on the Marks card

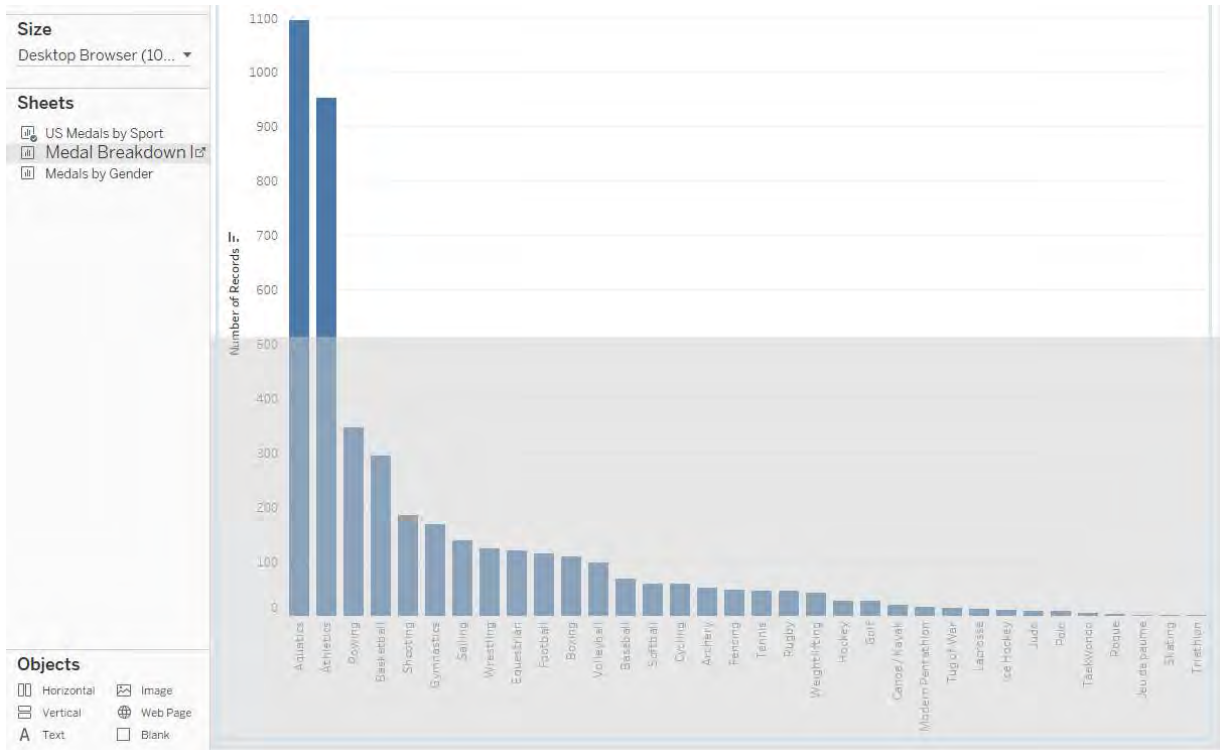
5. Name the worksheet by double-clicking on the **Sheet 3** tab, and type a name for your view: Medals by Gender

Build A Dashboard

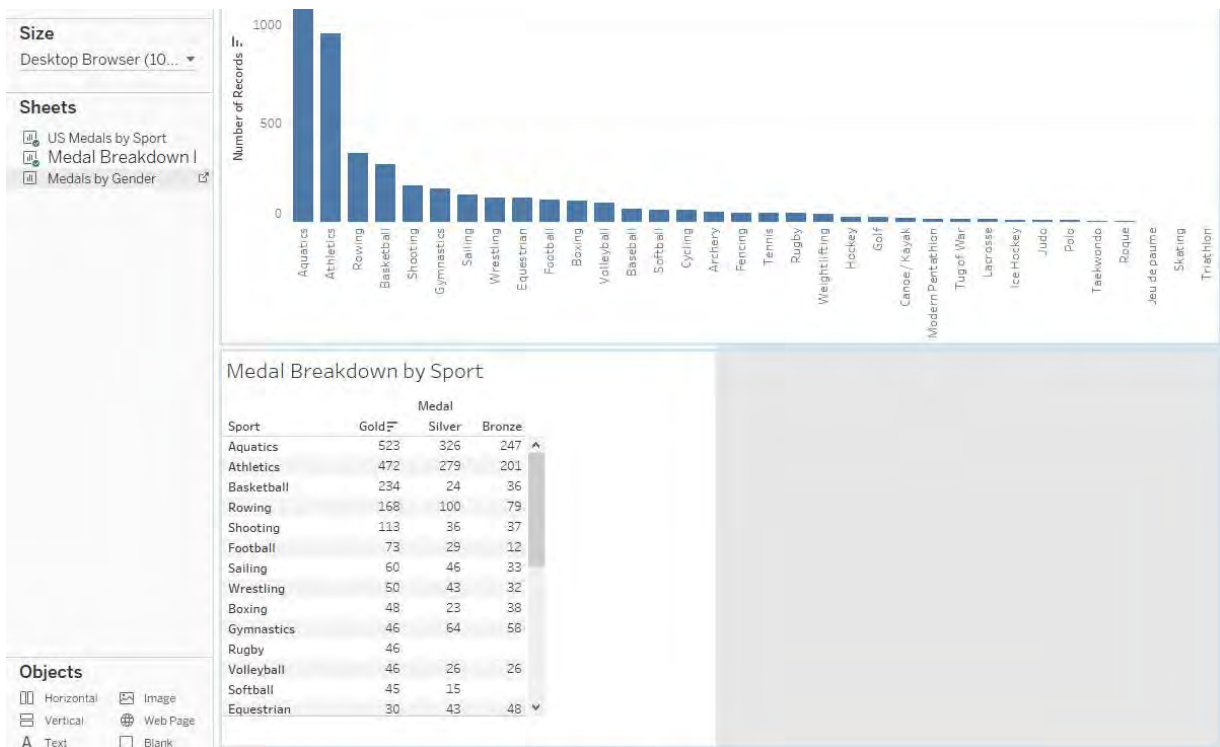
1. Click the **New Dashboard** tab to add a dashboard.



2. Under **Sheets**, drag the worksheet **US Medals by Sport** to the dashboard on **Drop sheets here**.
3. Drag the worksheet **Medal Breakdown by Sport** to the bottom half of the dashboard and drop when you see the gray box.



4. Drag the worksheet **Medals by Gender** to the right of **Medal Breakdown by Sport** on the dashboard.



5. On the **US Medals by Sport** sheet on the dashboard, click the **Use as Filter** icon. Once activated, the button will turn white.
6. Use CTRL + click to select **Basketball**, **Gymnastics** and **Equestrian**.



Notice how the **Medal Breakdown by Sport** and **Medals by Gender** sheets now display only the results for Basketball, Gymnastics and Equestrian.

7. On the **Medals by Gender** sheet on the dashboard, click the **Use as Filter** icon. Click on Men in the Pie Chart.

Notice how the US Medals by Sport and **Medal Breakdown by Sport** sheets now display only the results based on the selected Gender.

In which sport did men win the most medals? _____

In which sport did women win the most medals? _____

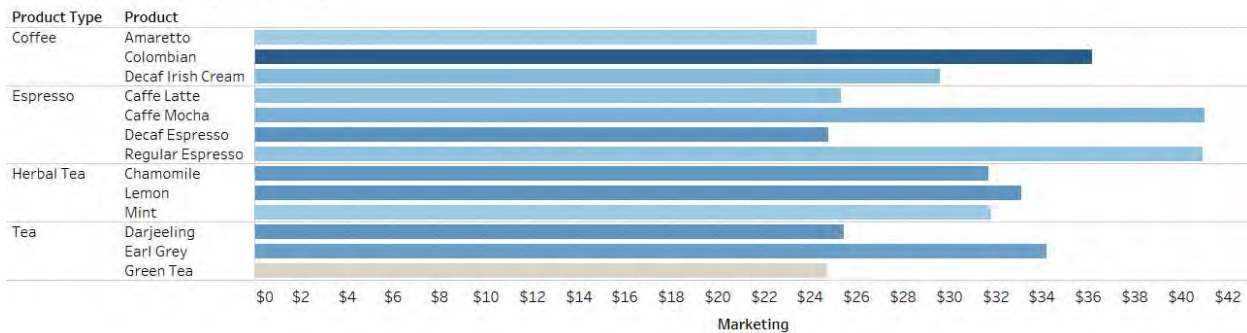
8. Select the **US Medals by Sport** sheet in the dashboard and change the **View** to **Entire View**
9. Repeat this process for **Medals by Gender**.
10. Change the view for **Medal Breakdown by Sport** to **Fit Width**.
11. Remove the pie chart **Legend** from the dashboard.
12. Name the dashboard **US Summer Olympic Medals**.
13. From the **Dashboard** menu, click **Show Title**.
14. **Save** the workbook as **US Summer Olympic Medals.twbx**.



Practice: Creating a Local Data Connection

Connect to a data source and edit some data attributes. Save those changes locally so you can reuse those changes again during future analysis. Then, create a visualization and export it as a picture so you can share your analysis in a presentation.

Average Marketing Expenses



DIRECTIONS

Create the Connection

1. Open **Creating a Local Data Connection Starter.twbx**.
2. Connect to the **Coffee Chain Sheet** in the **Data Connection Practice.xls** data source.

Change Data Attributes

1. Open **Sheet 1**, and in the Data Pane, rename the **Row** field to **Row ID**.
2. Convert **Row ID** from a **Measure** to a **Dimension**.

NOTE: Tableau uses logic to put fields containing numbers in **Measures**. However, Tableau recognized **Customer ID** and **Product ID** from the original Excel file should be **Dimensions** because of the “ID” at the end.

3. Rename the **Area** field to **State** and assign this field a geographic role of **State/Province**.
4. Change the **Default Properties** of **Profit**, **Sales** and **Marketing** fields to **Currency** with 0 decimal places.
5. Change the **Default Properties** of **Marketing** to use the **Average** aggregation.
6. Add a **Comment** for the **Marketing** field to read “Average Marketing Expenses”.

NOTE: Changes to the attributes in Tableau do not modify the actual data in the underlying data source.

Save the Data Source and Test the Connection

1. Add **Coffee Chain (Data Connection Practice)** to **Saved Data Sources** as “My Coffee Chain” and make sure to save it in the **My Tableau Repository** folder, in the **Data Sources** folder.
2. **Close** the current workbook (You do not need to save the workbook), and then open a new workbook.

3. Under **Connect to Data**, select the new “My Coffee Chain” data source from **Saved Data Sources** and confirm the data attribute changes that you previously modified were saved.

NOTE: A saved data source does not contain any actual data. It just stores the information to connect to the data source and maps and displays the data based on the attribute modifications you’ve made, such as the default properties.

Create a Visualization

1. Build a bar chart showing the **Average Marketing Expenses** by **Product Type** and **Product**.
2. From **Measures**, drag **Profit** to **Color** on the **Marks** card.
3. Observe that **Marketing** and **Profit** are displayed with the saved attributes.
4. Name the Sheet “Average Marketing Expenses”.

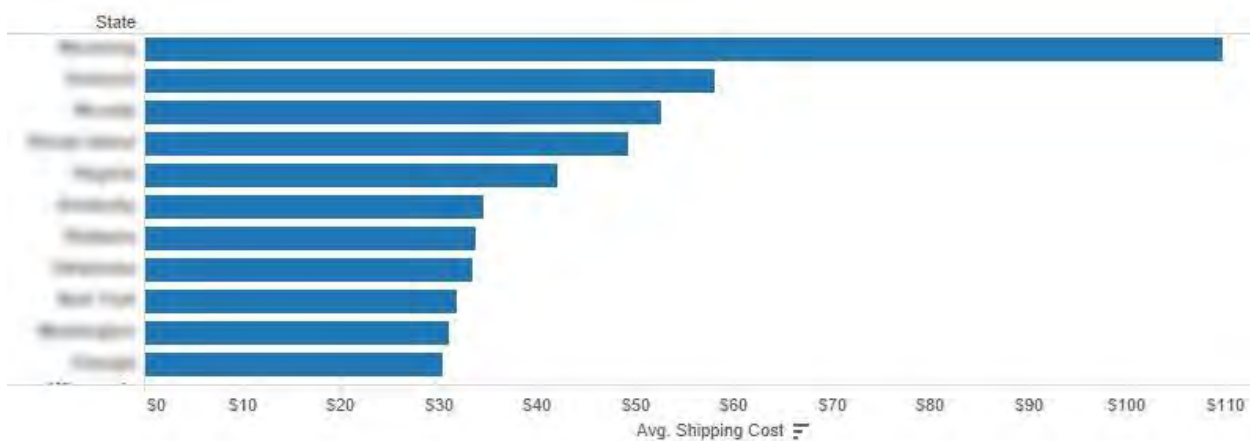
Share as an Image

1. Export the worksheet as a .jpeg or .png.
2. Insert the image into a program such as Microsoft Word or PowerPoint.

Practice: Using Split and Custom Split

View One

Currently you have average shipping costs by cities in the U.S. market. You would like to analyze your data aggregated by state. Use split to create a new field for state, so you can easily determine where your shipping costs are highest.



DIRECTIONS

1. Open **Using Splits Starter.twbx**
2. On the **Data Source** page, use **Split** to separate the **City, State** field into two fields.
1. Rename the new fields "City" and "State".
2. On the **Average Shipping Costs** worksheet, drag the **State** field to **Rows** on top of the **City, State** field to replace it.

SELF CHECK: Which state has the highest average shipping cost?

View Two

Currently you have a view that lists total sales and product ID for each product. The current product ID contains duplicate information from other fields, so you only want to include the number portion of the product ID. Use a custom split to create a new field and add this field to the view to determine if this would be a unique identifier for each product.

Product ID Analysis

Product ID Number	Product ID	
10000002	FUR-ADV-10000002	\$159
10000108	FUR-ADV-10000108	\$350
10000183	FUR-ADV-10000183	\$975
10000188	FUR-ADV-10000188	\$125
10000190	FUR-ADV-10000190	\$222
10000571	FUR-ADV-10000571	\$2,195

DIRECTIONS

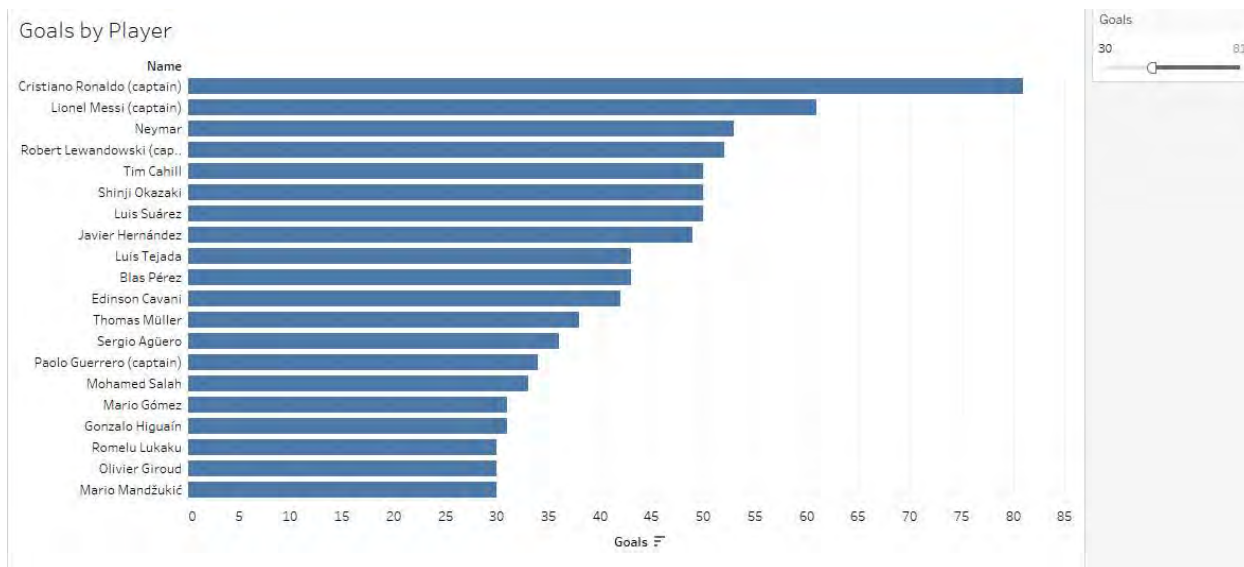
1. Click the **Product ID Analysis** tab to see the worksheet.
2. From the **Data Pane**, right-click on the **Product ID** field and select **Transform** and then **Custom Split** to create a field for only the numeric portion.
TIP: For example, if the **Product ID** was FUR_CH_10004860, the **Product ID Number** for that row would be 10004860.
3. Rename the new field “Product ID Number”
4. On the **Product ID Analysis** worksheet, add the **Product ID Number** to your view in front of the **Product ID** field on **Rows**.

SELF CHECK: Could Product ID Number be used as a unique identifier for the products? Why or why not?

Practice: Filters

View One

The data source contains historical data for the players on the rosters for all teams in the 2018 World Cup. Create a view to show the total goals by player. Filter the view to show only those players that are forwards, with a type of Cap, who scored at least 30 goals.



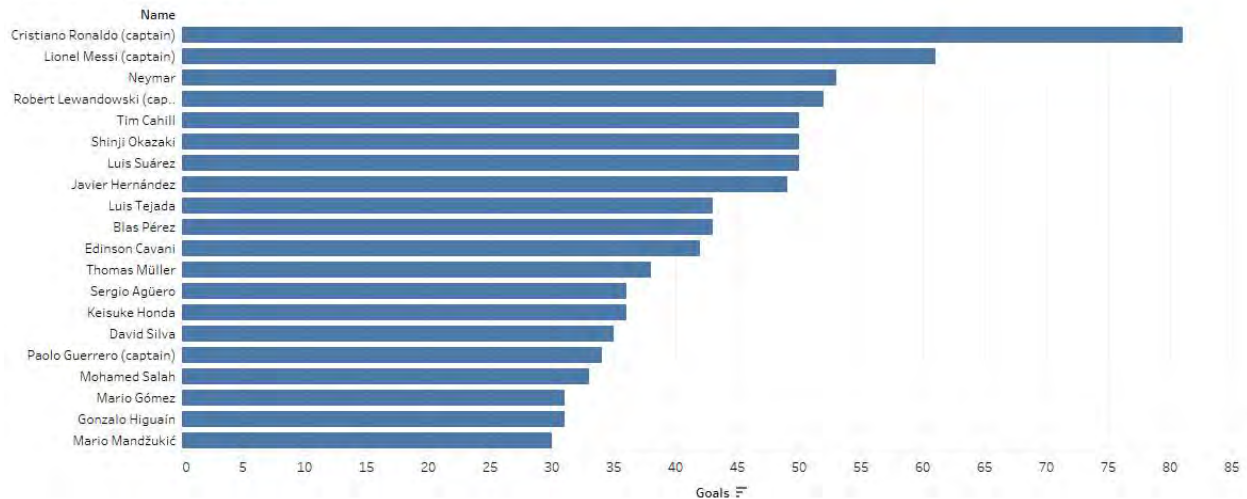
DIRECTIONS

1. Open **Using Filters Starter.twbx**.
2. On the **Goals by Player** worksheet, build a view to compare the Goals for each Player. Drag **Goals** to **Columns** and **Name** to **Rows**.
3. Sort the **Name** by **Goals** in descending order, using the sort icon on the menu bar.
4. Add a **Dimension Filter** to **Include only forwards** (Use **Position - FW**).
5. Add a **Measure Filter** to show only those players with at least 30 goals (Use **SUM(Goals)**).
6. **Show the filter** and **Edit the Title** to "Goals".

View Two

Create a view to show the top 20 goal scorers, regardless of position.

Top 20 Players by Goals



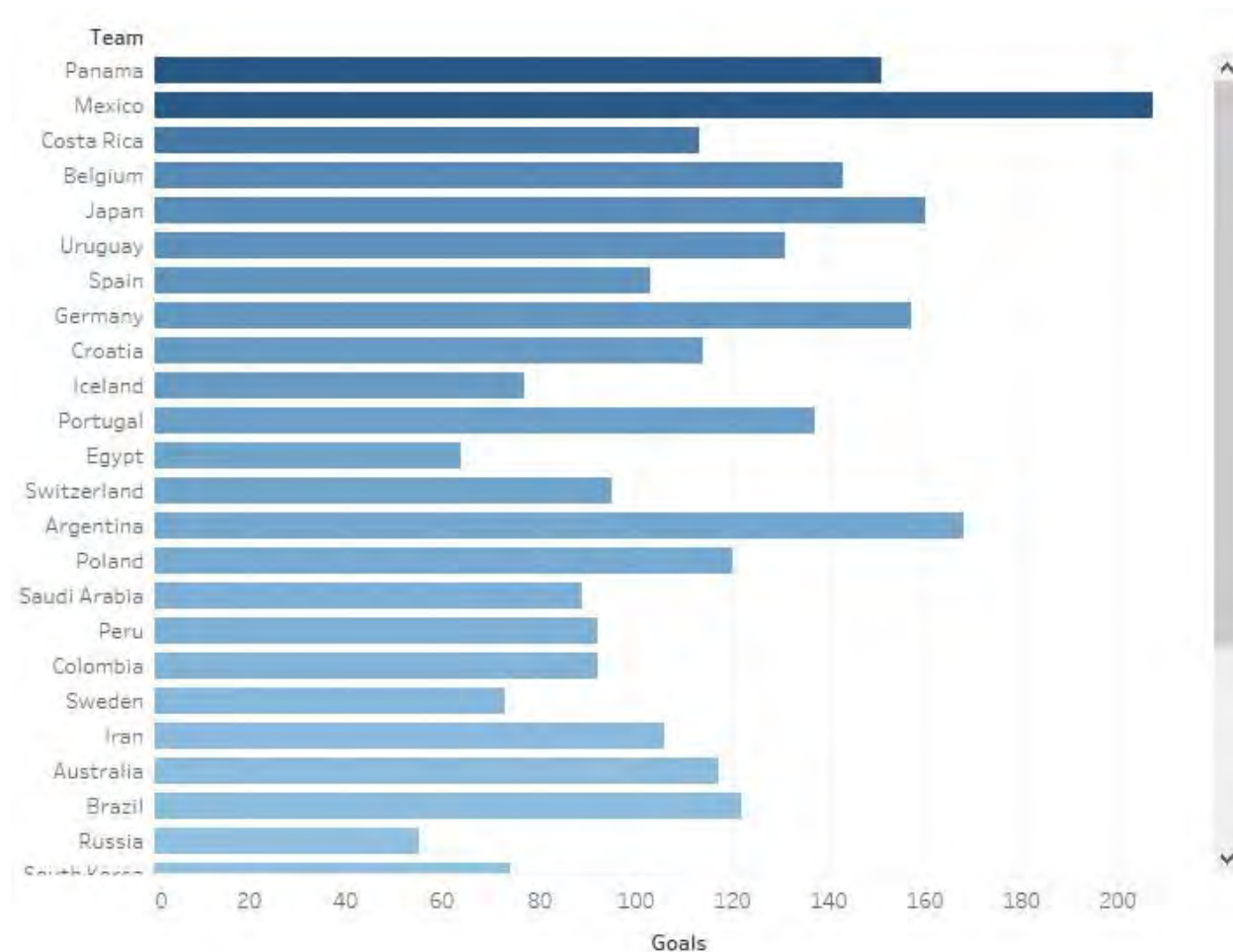
DIRECTIONS

1. Duplicate the **Goals by Player** sheet (right click on the tab and select **Duplicate**).
2. Rename this new tab **Top 20 Players by Goals**.
3. Remove both the **Position** and **SUM(Goals)** filters.
4. Add a Top N filter to show the top 20 **Names** by **SUM(Goals)**. HINT: Use Name and select Top to set up the Top N filter.

Practice: Sorting

Try all three methods for sorting: computed, manual, and default.

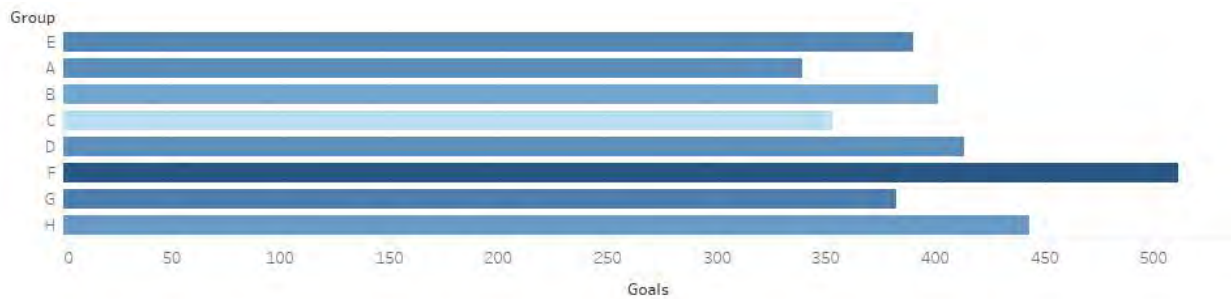
View One



DIRECTIONS

1. Open to **Using Sorts Starter.twbx**.
2. Using the **Goals by Team** worksheet:
 - Sort the Teams based on the **Goals** in descending order with one click.
 - Change the sort – Sort **Teams** in descending order by **Caps** using the sort dialog.

View Two



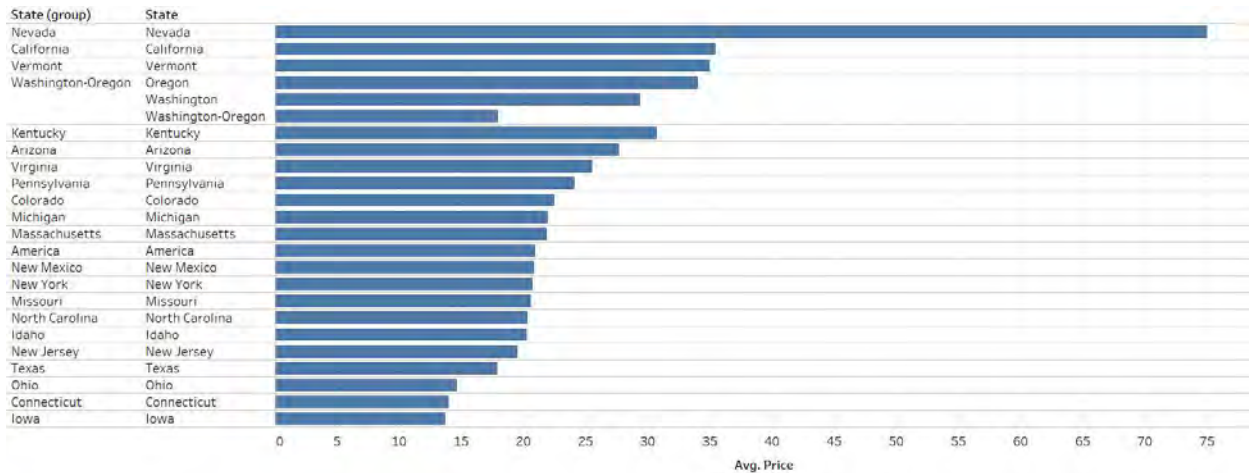
DIRECTIONS

1. Duplicate the **Goals by Team** worksheet and rename as **Goals by Group**.
2. Replace **Team** with **Group** on **Rows**. Drag **Group** on top of **Team** field on **Rows**.
3. Use a **manual sort** to move **Group C** to the top of the graph.
4. Set the **Default Sort Properties** for **Group** to have **Group E** at the top.
NOTE: Your view did not change. The default properties have been overridden by the initial sort.
5. **Clear the Sort** for **Group**.
Notice what happened to your view now.

Practice: Creating Groups and Hierarchies

Explore both groups and hierarchies.

You currently have a view that displays average price of wine bottles for the United States broken down by State. Notice that there is a State called Washington-Oregon as well as separate entries for Washington and Oregon. Create a group to combine all Washington and Oregon entries together. Then create a hierarchy to drill up and down between the group and the states.



DIRECTIONS

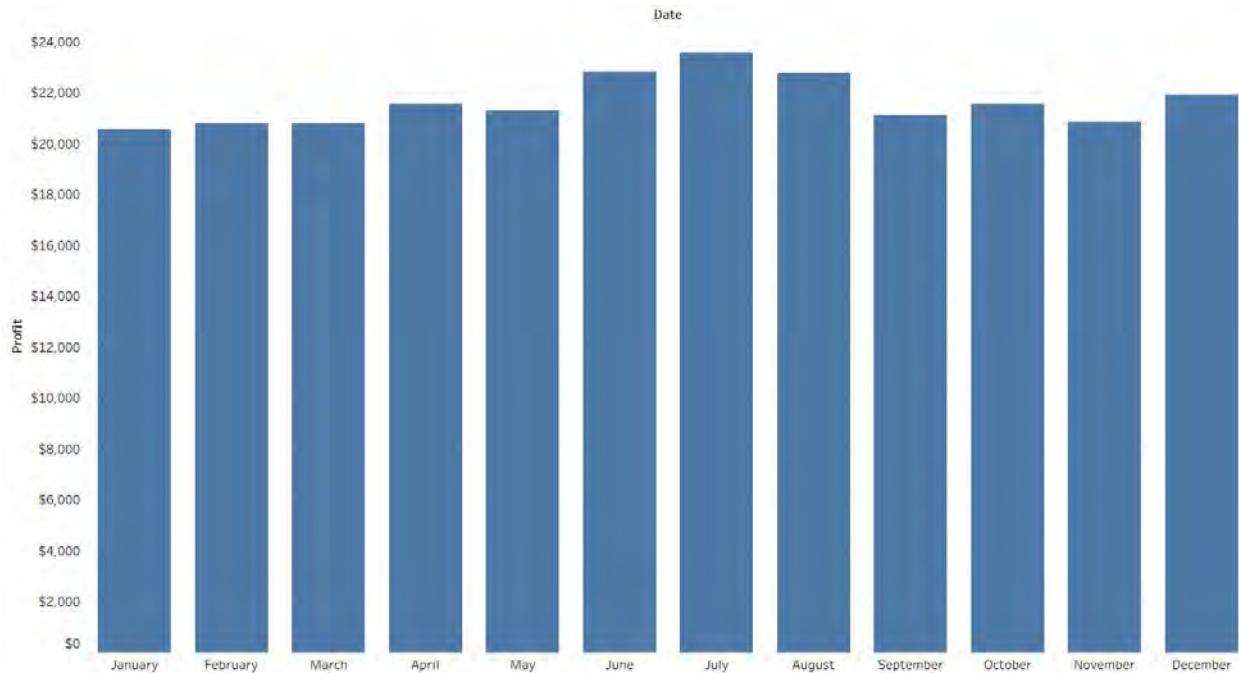
1. Open **Creating Groups and Hierarchies Starter.twbx**.
2. On the worksheet **Average Wine Price**, create a **Group** combining Washington, Oregon, and Washington-Oregon:
 - CTRL+click to select multiple state names
 - Click on the **Group** icon to group the three entries as one in the new State (group) dimension.
 - Rename the group "Washington-Oregon". HINT: **Edit the Alias** or Edit and **Rename** from within the new group dimension
3. Create a **hierarchy** called "Geography" in the **Data** pane organized as follows: State(group), State. Notice how you can drill up or down through the hierarchy.
HINT: If your hierarchy was not automatically added to your view, drag the new hierarchy **Geography** on top of the existing dimension in **Rows**.

Practice: Discrete and Continuous Dates

Explore the differences between Discrete and Continuous Dates.

View One: Discrete Months View

Create a bar chart to show the aggregation of profit by month of date. Use your visualization to determine the total profit for all years in a specific month.



DIRECTIONS

1. Open **Using Discrete and Continuous Dates Starter.twbx**.
2. On Sheet 1, create a view that shows **Profit** by **Date**.
3. Change the chart type to **Bar** (Hint: Use the **Marks** card).
4. Right-click the **Date** and select the **Discrete Month** format.
5. Rename **Sheet 1** to "Profit by Month".

View Two: Continuous Month View

On a new worksheet, create a line chart to show profit for each month of the dates in a continuous timeline. Use your visualization to see highs and lows for profit over time and determine profit for a specific month and year.



DIRECTIONS

1. Add a **New Worksheet** and create a view that shows **Profit by Date**.
2. Right-click the **Date** and select the **Continuous Month** format.

NOTE: The field for Date is now green, indicating it is continuous.

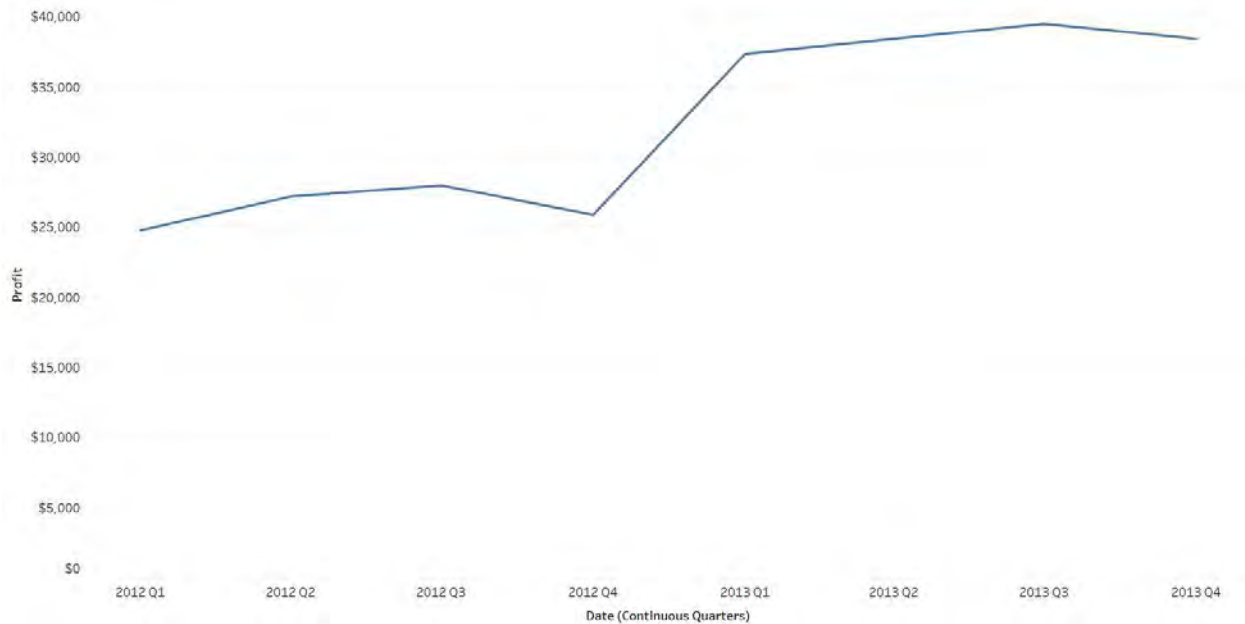
3. On the **Date** axis, use the plus and minus sign icons to drill up and down to different levels of detail. This data set does not have data below the month level but notice how you can roll the data up to quarter or year by using the minus sign.
4. Rename **Sheet 2** to “Monthly Profit Timeline”.

Practice: Using Custom Dates

Practice creating custom dates and build a hierarchy to control and simplify your view, so you only see profit by the date parts you need.

View One: Continuous Custom Dates

Create a line chart that shows profit by date using a custom continuous date in quarters.

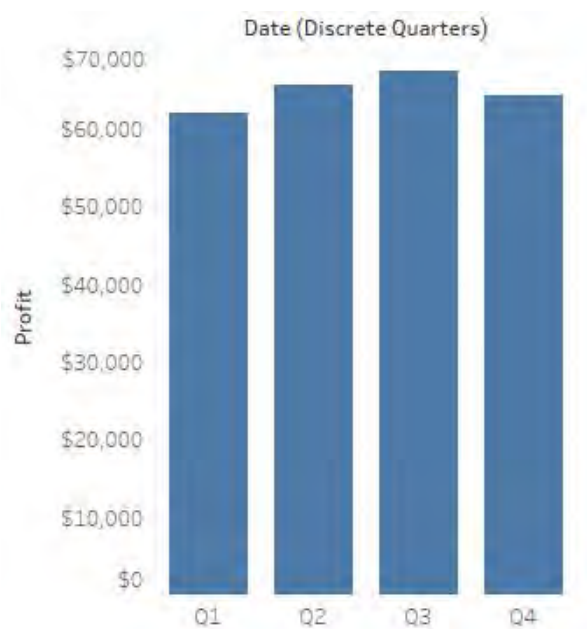


DIRECTIONS

1. Open **Custom Dates Starter.twbx**.
2. Using the **Date** dimension, create a **Custom date** with a **Date Value** of quarters and name it "Date (Continuous Quarters)".
3. On the sheet named **Continuous Quarters**, drag the newly created **Date (Continuous Quarters)** to **Columns** on top of **MONTH(Date)** field to replace it entirely.

View Two: Discrete Custom Dates

Create a bar chart that shows profit by date using a custom discrete date in quarters.



DIRECTIONS

1. Using the **Date** dimension, create a **Custom date** with a value of quarters, change to **Date Part**, and name it "Date (Discrete Quarters)".
2. On the sheet named **Discrete Quarters**, remove the field on the **Columns** shelf, and drag this new field to **Columns**.
3. Change the mark type to **Bar**.

View Three: Discrete Year to Quarters Hierarchy

Create a bar chart that shows profit by date using a custom discrete date hierarchy of years to quarters.

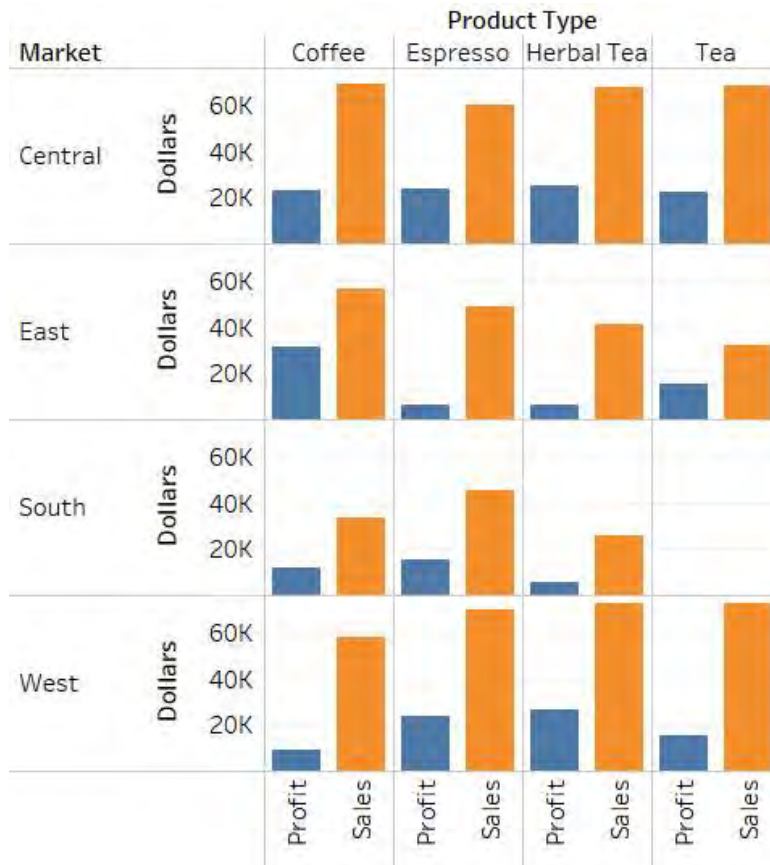


DIRECTIONS

1. Using the **Date** dimension, create a **Custom date** with a value of years, change to **Date Part**, and name it "Date (Discrete Years)".
2. Create a **hierarchy** using **Date (Discrete Quarters)** and **Date (Discrete Years)** and name the new hierarchy "Date (Discrete Years to Quarters)".
3. On the sheet named **Year to Quarter Custom Date Hierarchy**, drag the new hierarchy to the view on top of the current **Month(Date)** field in **Columns**.
4. Change the mark type to **Bar**.
Notice that you can now drill up and down between Year and Quarter. Using this type of hierarchies' limits what you allow the user to view

Practice: Combined Axis Chart

Create a bar chart broken down by Segment and Category that shows Profit and Sales on the same axis. Use your chart to compare measures within dimensions.



DIRECTIONS

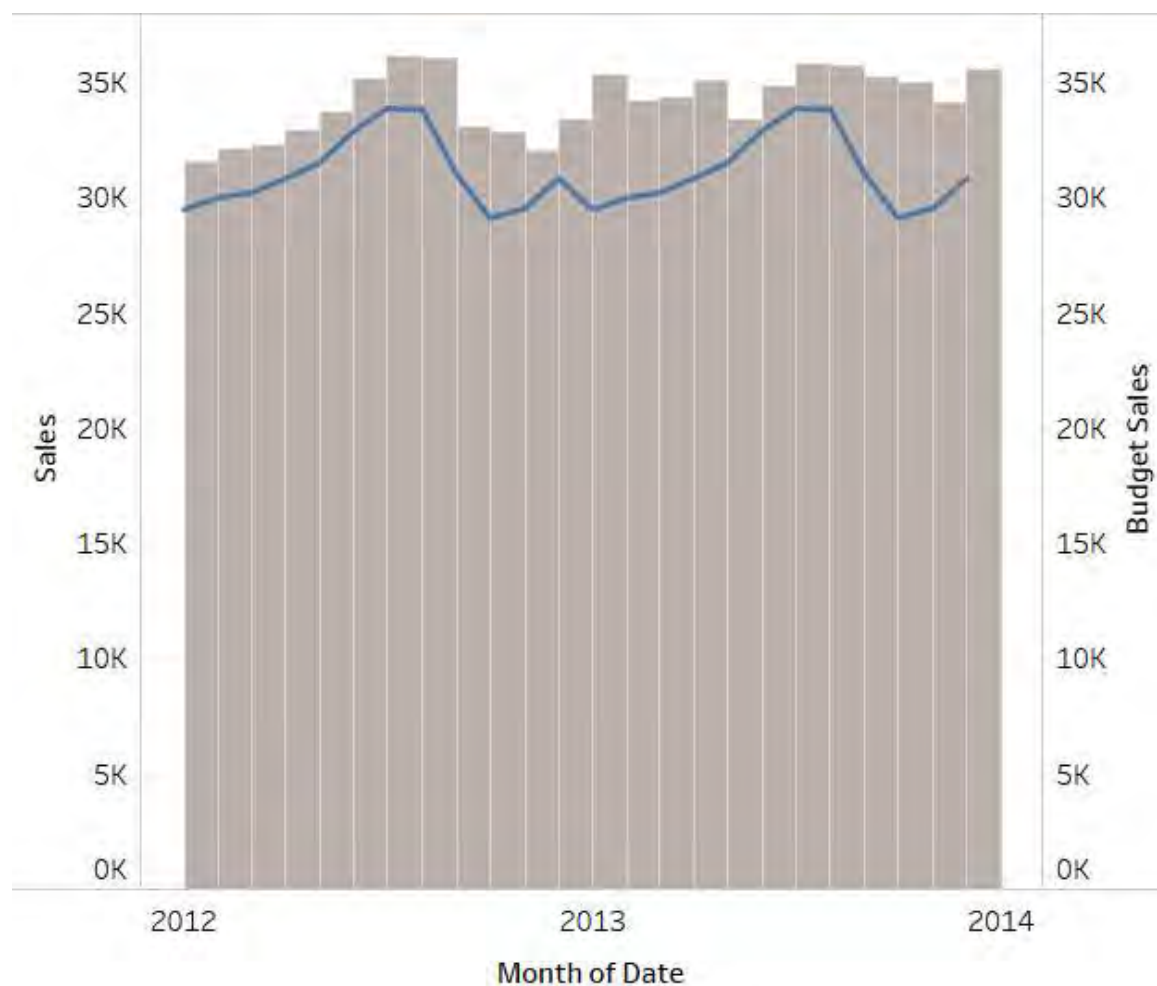
1. Open **Combined Axis Chart Starter.twbx**
2. Create an initial view showing **Sales** broken down by **Product Type** and **Market**.
3. Show **Profit** on the same vertical axis as **Sales**.

Hint: Drop **Profit** when the mouse icon changes to a double ruler.

4. Show Sales and Profit in different colors.
Hint: Use **Measure Names**.
5. Edit the "Value" axis to "Dollars."
6. Right-click on the Axis to **Format** the number format to **Currency (Custom)** with 0 decimal places.
7. Rename **Sheet 1** to "Profit and Sales"

Practice: Dual Axis Chart

Create a dual axis chart with synchronized axes to compare sales and budget sales using different mark types.

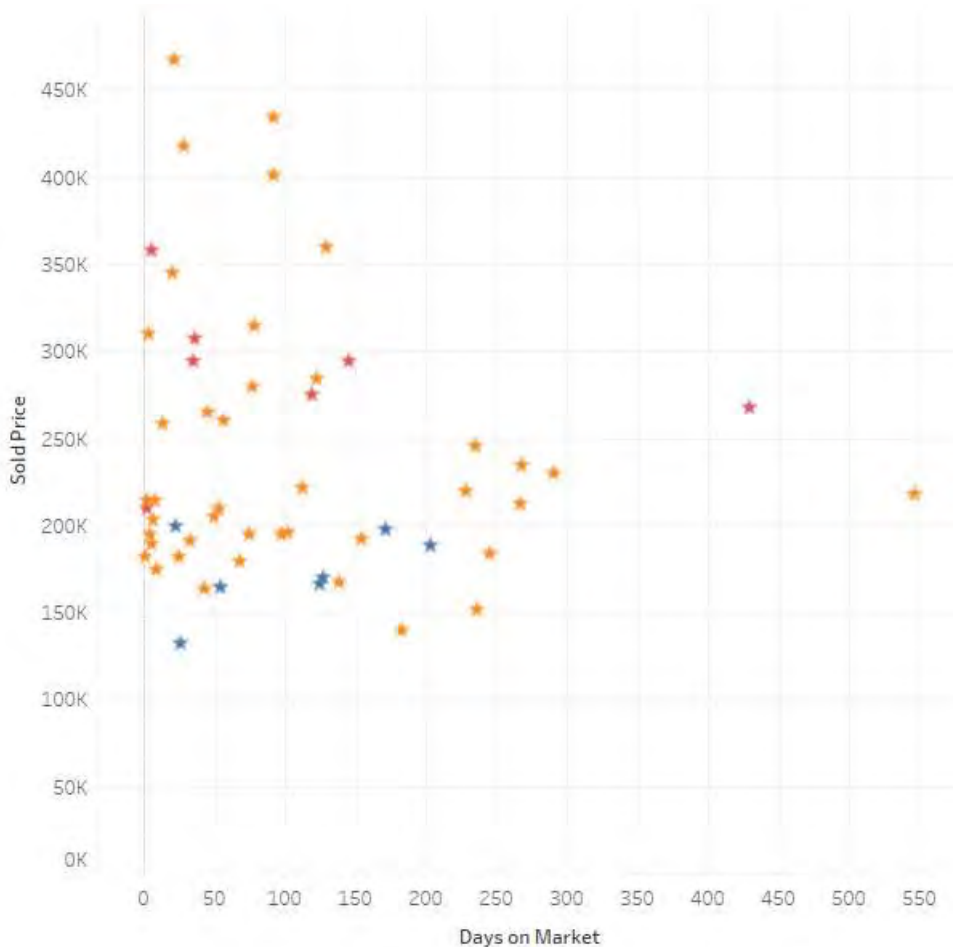


DIRECTIONS

1. Open **Dual Axis Chart Starter.twbx**.
2. Create an initial view showing **Sales** by **Date**.
3. Change the **Year(Date)** on **Columns** to continuous **Month** (for example May 2015)
4. Change the mark type to **Bar**.
5. Create a dual axis chart using **Budget Sales**. Hint: Use the opposite axis.
6. Change the mark type to **Line** for the newly created **Budget Sales** axis.
7. Synchronize the **Budget Sales** axis to the **Sales** axis.
8. Edit the colors so **Sales** is shown as light gray bars. Hint: use the **Tableau Classic 20** color palette.

Practice: Creating a Scatter Plot

Create a scatter plot to compare number of days a house was on the market against the final sold price of the house. Color the data if the house was part of a gated community.



DIRECTIONS

1. Open **Scatter Plot Starter.twbx**.
2. Create a scatter plot that compares **Sold Price** with **Days on Market**.
3. Add **House ID** to the worksheet's level of **Detail**.
4. **Color** by **Bedrooms**.
5. Change the **Shape** to a filled star.
6. Add a highlighter for **House ID**.

Practice: Creating a Crosstab with Totals

Create a crosstab that shows total medals won for the top 5 countries in skiing events: Alpine Skiing, Cross Country Skiing, Freestyle Skiing and Ski Jumping.

Sport	Year	Country					Grand Total
		Austria	Germany	Italy	Norway	Sweden	
Alpine Skiing	2002	9	1	3	4	2	19
	2006	14			1	4	19
	2010	4	3	1	4	2	14
	Total	27	4	4	9	8	52
Cross Country Skiing	2002	2	11	9	17	1	40
	2006	1	10	10	5	10	36
	2010		10	1	16	11	38
	Total	3	31	20	38	22	114
Freestyle Skiing	2002				1		1
	2006				1		1
	2010	1			2		3
	Total	1			4		5
Ski Jumping	2002		5				5
	2006	6			7		13
	2010	6	4		4		14
	Total	12	9		11		32
Grand Total		43	44	24	62	30	203

DIRECTIONS

View One

1. Open **Creating Crosstab with Totals and Aggregations Starter.twbx**
2. On the Total Medals worksheet, create a crosstab that shows the **Total Medals** for each **Sport** and **Year** by **Country**. HINT: Start by dragging **Total Medals** to **Text**.
3. **Filter** the **Sport** to show only those Skiing events: Alpine Skiing, Cross Country Skiing, Freestyle Skiing and Ski Jumping. HINT: Use the Search function when selecting Sport in the filter to find those containing Ski.
4. Add the **Sport** filter to **Context**.
5. Create a **Top N Filter** on **Country** to show the Top 5 countries based on Total Medals.
6. Show all subtotals.
7. Show all row and column grand totals.
8. Change the **Fit** of the view to **Fit Width** from **Standard**.
9. Add shading and borders as desired.

Practice: Highlight Tables

Create a highlight table that shows total medals won by country for the Summer Olympics.

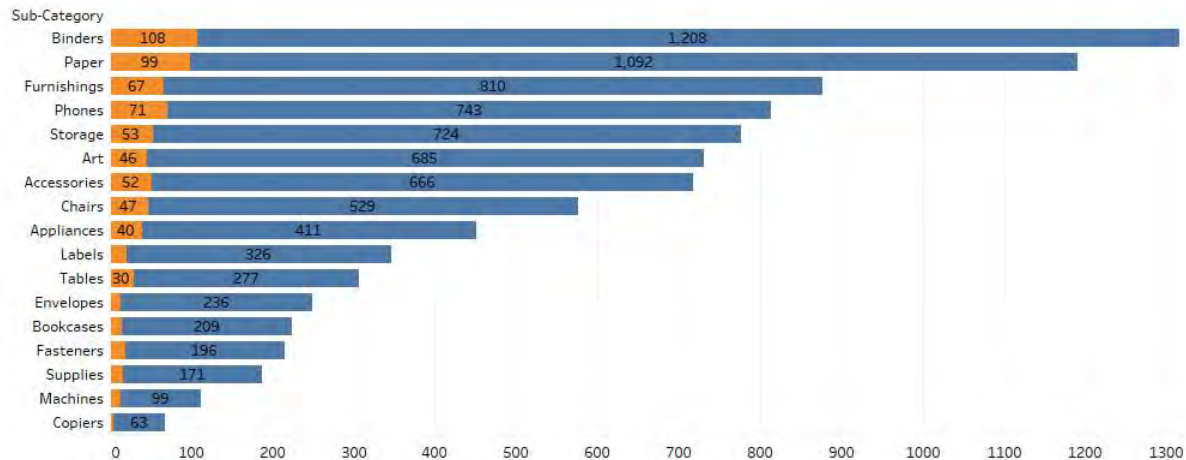
Country	Year				Grand Total
	2000	2004	2008	2012	
United States	243	265	317	254	1,079
Russia	187	191	146	140	664
Australia	183	156	149	114	602
China	79	94	184	125	482
Germany	118	149	99	94	460
Great Britain	54	57	77	126	314
Netherlands	79	77	61	69	286
Italy	65	104	43	68	280
France	66	53	77	78	274
Japan	44	93	51	84	272
South Korea	73	52	78	61	264
Brazil	48	40	74	59	221
Spain	42	29	70	64	205
Cuba	65	62	47	14	188
Hungary	53	40	27	25	145
Argentina	20	49	51	21	141
Ukraine	35	48	31	26	140
Canada	31	17	34	55	137
Romania	46	39	22	16	123
Belarus	22	17	30	23	92

DIRECTIONS

1. Open **Creating Highlight Tables Starter.twbx**.
2. On the "Top Medal Counts by Country" worksheet, create a view that shows **Total Medals** as text.
Hint: Use the Marks card.
3. **Color** the text by **Total Medals**.
4. Build the crosstab by adding **Country** to **Rows** and **Year** to **Columns**.
5. Change the **Mark type** to Square.
6. Add both **Column** and **Row Grand Totals**.
7. **Sort** the table in descending order based on the **Grand Total** of the Years.
8. Edit the **Colors** to **Include Totals**. Notice what happens to the color ranges.
9. Edit the **Colors** to **NOT** include the totals.

Practice: Joining Tables

You would like to show the total orders by sub-category, noting how many have been returned. Use a join to combine data from the Orders and the Returns tables. Then create a bar in bar chart to break up the orders by returned and non-returned.



DIRECTIONS

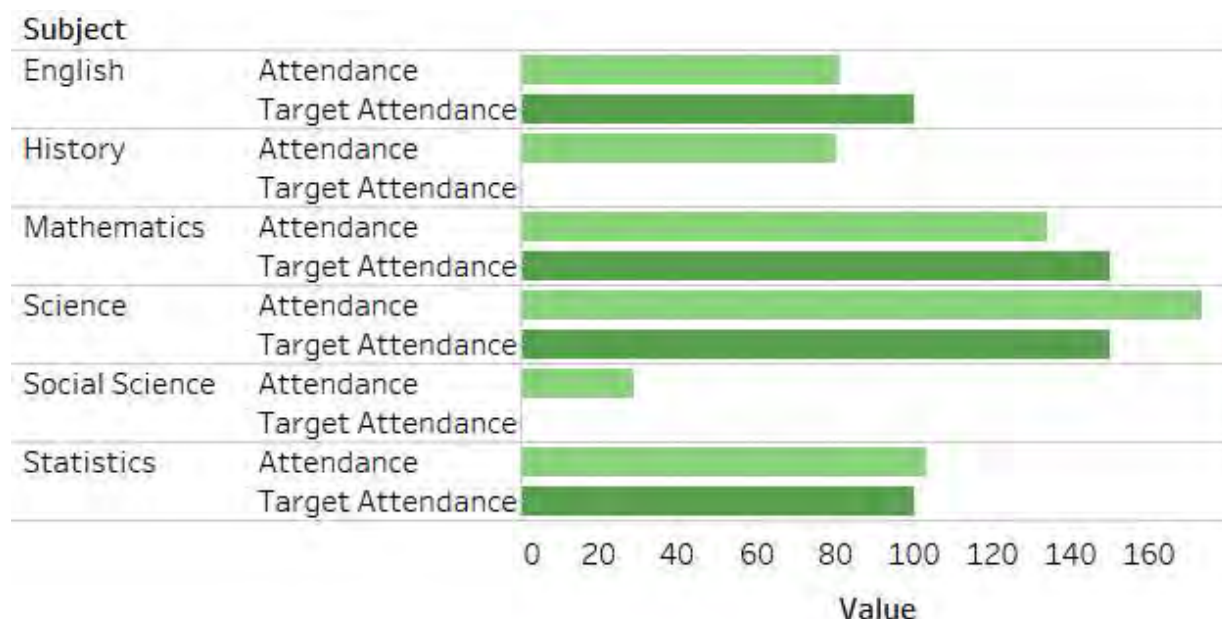
1. Open the **Using Joins Starter.twbx** and connect to the **Sample –SuperStore.xls** from within the **Data Sources** folder. From within the excel file, connect to the **Orders** sheet.
2. Double click on the **Returns** sheet to join with the **Orders** sheet. Tableau will try to automatically create a join between the two sheets if a common field exists. In this case a common field is not found, and a red exclamation point indicates this error.
3. In the join dialog box, define a **left join** between the **Orders** and **Returns** sheets, using the **Order ID** field from **Orders** and **Order #** from **Returns**.
4. Create a bar chart with **Count Distinct (Order ID)** broken down by **Sub-Category**.
Hint: Right click and drag **Order ID** on Rows and select **CNTD** as the aggregation.
5. Add **Returned** to **Color**.
6. Show **labels**.
7. Edit the X-axis and remove the **title**.
8. Edit the **Aliases** for the **Returned** field. Change **Null** to “Non-Returned” and **Yes** to “Returned”.
9. Name the **Sheet** “Returned and Non-Returned Orders by Sub-Category”.

Practice: Data Blending

You currently have separate data sources for Student Attendance, Target Attendance, and a master list of subjects for a school. You would like to visualize what data is missing from your data sources. Use three different blends to see how using a different primary data source affects the resulting view for your analysis. Locate the Data folder on the student USB and be ready to use Tabs: Student Attendance, Target Attendance and Subject Masterlist.

BLEND ONE:

Create a blend with **Students Attendance** as the primary data source and **Target Attendance** as the secondary source. Then create a dual axis bar chart from both data sources so you can identify which subjects still need target information.

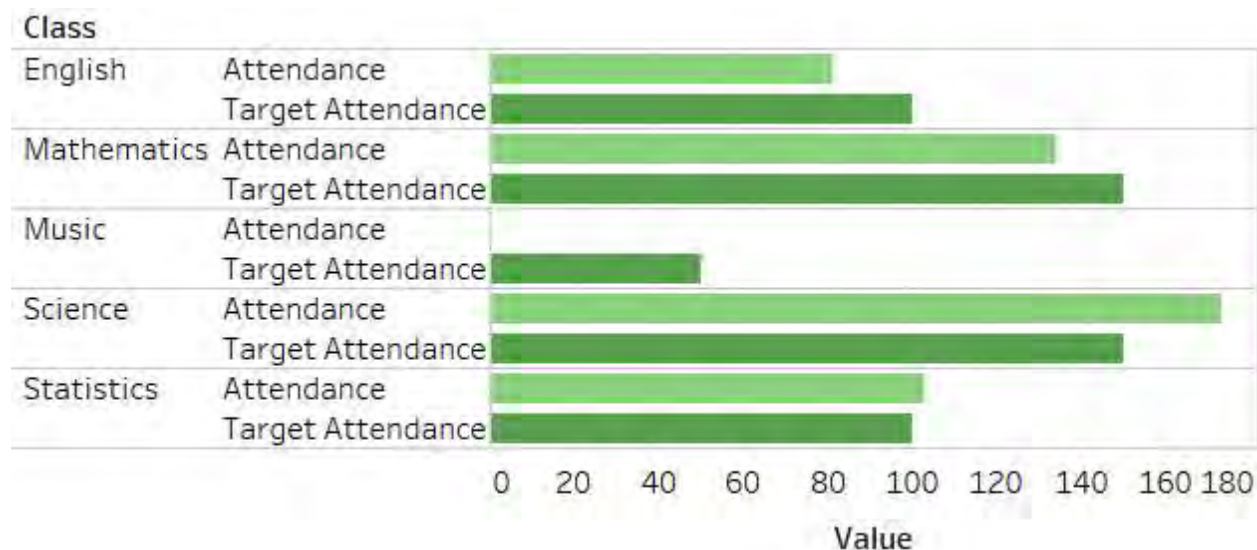


DIRECTIONS

1. Open **Data Blending Starter.twbx** and connect to Student Attendance sheet in **Student Attendance.xls**.
2. Using the **Data** menu, connect to a new data source, **Target Attendance.xls**.
3. Rename the "**Blend One**" worksheet to "**Student Attendance First.**"
4. Using the **Data** menu, **Edit the Relationship** between the two sources using a custom relationship with **Class** from **Target Attendance** and **Subject** from **Students Attendance**.
5. Starting from the **Students Attendance** data source, build a bar chart showing **Attendance** broken down by **Subject**.
6. Switch to the **Target Attendance** data source and drag **Target Attendance** to the **Attendance** axis to create a combined axis view.
7. Drag a copy of **Measure Names** to color.
8. Change the bar colors to light green and dark green.
9. Show the **Nulls** at Default Position.
10. Notice that there is no Target Attendance for History, Mathematics or Social Science.

BLEND TWO:

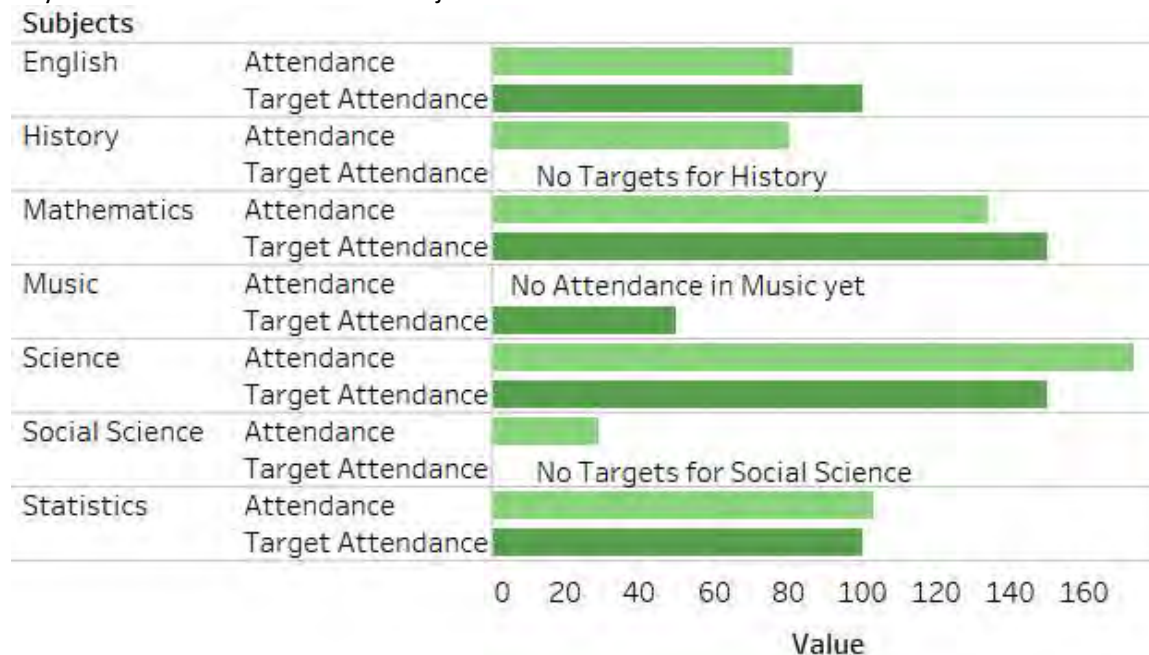
Create another combined axis chart, this time using **Target Attendance** as the primary and **Students Attendance** as the secondary data source in the blend. Correct for naming differences in the two data sources, then use the visualization so you can identify which Subjects still need attendance information.

**DIRECTIONS**

1. In the same workbook, create a new worksheet and name it "**Target Attendance First**".
2. Starting from **Target Attendance**, build a bar chart showing **Target Attendance** down by **Class**. Using this data source first establishes it as the primary data source.
3. From the **Students Attendance** source, drag Attendance to the Target Attendance axis to create a combined axis view.
4. Drag a copy of **Measure Names** to color.
5. Change the bar colors to light green and dark green.
6. Show the **Nulls** at Default Position.
7. Notice how there is no Attendance value for Math. Change the **Alias** for **Math** to **Mathematics**. Changing the name allows for the blend to occur, as the Students Attendance data source uses Mathematics instead of Math.
8. Notice that neither History nor Social Science appears anywhere in this view. This is because neither class exists in the Target Attendance data source.

BLEND THREE: RETURN ALL VALUES

Create a blend with **Subject Masterlist** as the primary and both **Student Attendance** and **Target Attendance** as the secondary data sources. Then create a dual axis bar chart from all three data sources with annotations so you can let others know which subjects still need information.

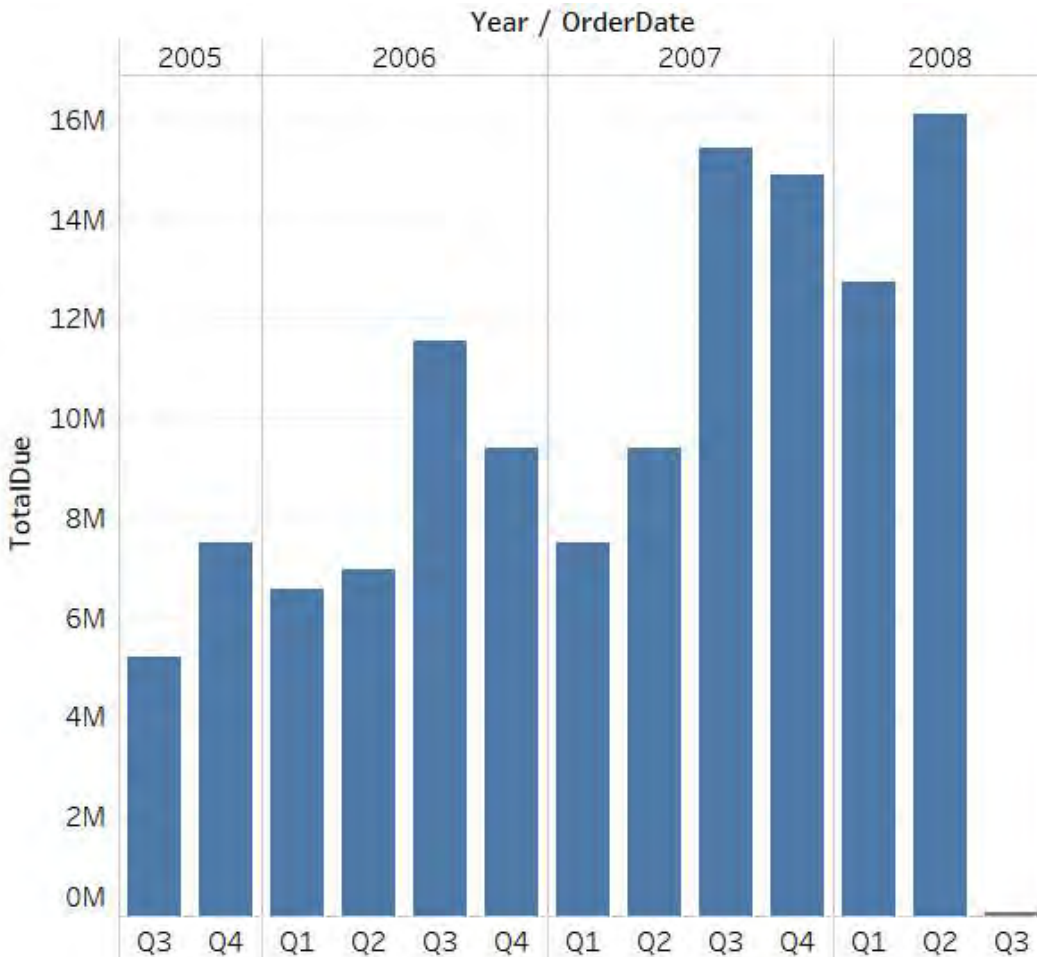


DIRECTIONS

1. In the same workbook, create a new worksheet named "**Subject First**".
2. Create a new data connection to a third data source, **Subjects Master List.xlsx**.
3. **Edit the relationship** for **Subjects Master List** and **Student Attendance** to create a custom blend the **Subjects** and **Subject** fields.
4. **Edit the relationship** for **Subjects Master List** and **Target Attendance** to create a custom blend between the **Subjects** and **Class** fields.
5. Create a view which includes information for all Subject:
 - Starting from the **Subjects Master List** data source, drag **Subjects** to **Rows**.
 - Change the data source to **Students Attendance** and drag **Attendance** to **Columns**.
 - Change the data source to **Target Attendance** and drag **Target Attendance** to the **Attendance** axis to create a combined axis view.
6. Complete the view:
 - Drag a copy of **Measure Names** from the **Subjects Master List** data source to **Color** in the **Marks** card.
 - Change the bar colors to light green and dark green.
 - Show the **Nulls** at Default Position.
 - Right click in the area where information is missing. **Annotate** the **Point** for the subjects missing information, as shown in the picture above. Remove the shading, lines, and box around the annotation.

Practice: Unions

You have a data source that contains Order Details for various years. You would like to see Total Due for the various years at the same time, but the information for each year is in a separate table. Union the tables to combine the data so you can compare Total Due for the whole year further broken down by quarters.

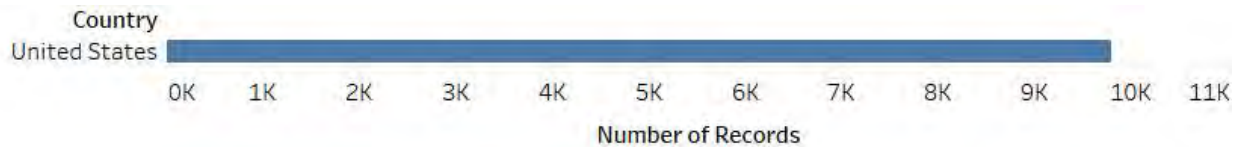


DIRECTIONS

1. Open **Understanding Unions Starter.twbx** (it will be empty), and create a live connection to **Orders Details.xlsx**
2. Create a **New Union** between the four sheets in the data source and notice the nulls in the results:
 - **TotalDue** was changed to **Due** starting with the **2008** sheet.
 - **OrderDate** was mistyped as **Order Date** in the **2007** sheet.
3. Merge the mismatched fields, and edit the merged field names to read **TotalDue** and **OrderDate**.
4. On the **Unions** sheet, create a bar chart showing **TotalDue** for each **Year of OrderDate**, broken down by **Quarters**.
5. In the Data pane, rename **Table Names** to **Year**.
6. Replace **Year(OrderDate)** on **Columns** with **Year**.

Practice: Create an Extract

You want to create an extract of your data source to make a portable copy of your data. Then, you want to filter the extract to only include information for students from the United States. Lastly, you will create an extract to only include the fields needed to create the view within your workbook.

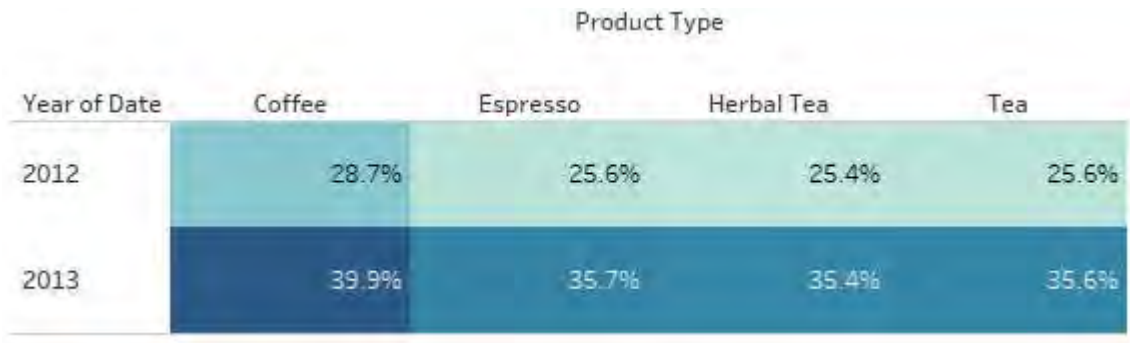


DIRECTIONS

1. Open **Creating_an_Extract Starter.twbx**.
2. On the **Registered Students** worksheet, observe the bar chart showing **Number of Records** by **Country**.
3. From within the **Data Pane**, create an extract of the EdX data source, including all rows and columns of data. Notice that the bar chart has not changed.
4. Create a new **Extract**, adding a filter by **Country** including only the **United States**. Notice the change in the bar chart.
5. Right-click on the data source and uncheck **Use Extract**. Tableau is now connected Live to the data source.
6. Create one final **Extract** and **Hide All Unused Fields**. Notice that the bar chart has not changed, but the available fields are only those in use within the workbook.

Practice: Understanding Aggregations when Calculating Profit Ratio

Create a view that shows an ad-hoc calculation of profit ratio broken down by year and product type. Experiment with the calculation to see how aggregation level impacts your results. Compare the profit ratio of products and save your calculation for future analysis.



Year of Date	Product Type			
	Coffee	Espresso	Herbal Tea	Tea
2012	28.7%	25.6%	25.4%	25.6%
2013	39.9%	35.7%	35.4%	35.6%

DIRECTIONS

1. Open **Understanding Aggregations Starter.twbx**.
2. On the **Profit Ratio** worksheet, create a view using **Date**, **Product Type**, and **Profit**, showing **Profit** on **Color** with labels.
3. Use the **Profit** field on the **Marks** card to create an ad-hoc calculation for **Profit Ratio**, using the formula: `[Profit] / [Sales]`
4. Format the calculation as percentage with two decimal places.
HINT: Format the calculated field using the **Pane**, not the **Axis**.

SELF CHECK – Look at the results of the ad-hoc calculation. Do these look right? Why are these so large? How should you fix the calculation?

5. Change the calculation to `SUM([Profit]) / SUM([Sales])`.
6. Save the calculation in the **Data** pane as “Profit Ratio”.
7. Set the default format for **Profit Ratio** to percentage with 2 decimal places.

Practice: Using Date Calculations

Create a calculated field to determine the average number of days it takes for an order to ship. Create a crosstab so you can compare the average days to ship to the average profit.

Market	Product Type	Avg. Days to Ship	Avg. Profit
Central	Coffee	4.3	\$60.58
	Espresso	4.5	\$81.60
	Herbal Tea	4.5	\$73.68
	Tea	4.6	\$66.46
East	Coffee	4.9	\$184.48
	Espresso	6.6	\$26.02
	Herbal Tea	4.5	\$29.74
	Tea	4.6	\$58.93
South	Coffee	4.9	\$60.95
	Espresso	4.5	\$52.10
	Herbal Tea	4.5	\$30.06
West	Coffee	6.6	\$27.96
	Espresso	4.5	\$66.31
	Herbal Tea	4.6	\$84.30
	Tea	4.5	\$41.94

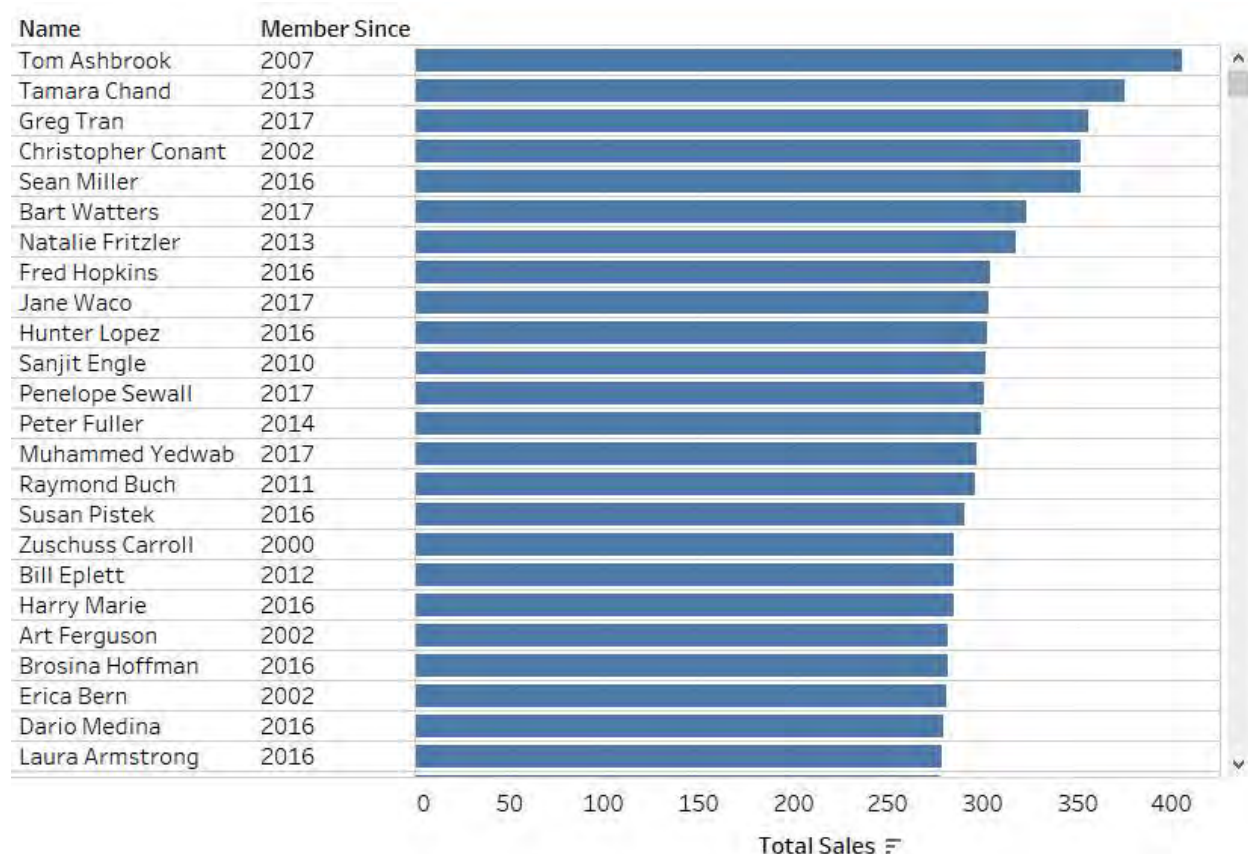
DIRECTIONS

1. Open **Using Date Calculations Starter.twbx**.
2. Create a calculated field named "Days to Ship" that calculates the number of days between the date an order was placed and the date the order was shipped. Use the **DATEDIFF** function to create this calculation.
3. On the **Days to Ship** worksheet, create a crosstab showing **Days to Ship** broken down by **Market** and **Product Type**.
4. Change **SUM(Days to Ship)** to use the **Average (AVG)** aggregation.
5. Change the number format of **Days to Ship** to show only one decimal place.
6. Add **Profit** to your crosstab.
7. Change **SUM(Profit)** to also use the **Average (AVG)** aggregation.

Practice: Using Join Calculations

You have a workbook that is connected to a data source with information about when members have joined a club. Set up a cross database join, using a join calculation, to a second data source that has sales information on each member of the club.

Then, create a bar chart so you can analyze how long the members with the greatest sales has been with the club.

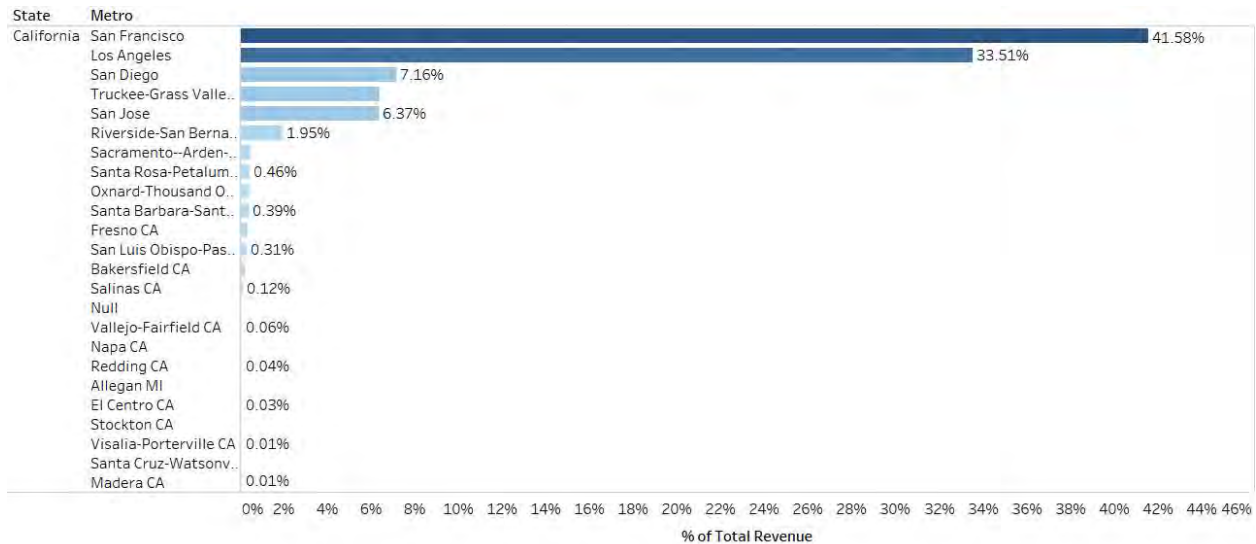


DIRECTIONS

1. Open **Join Calculations Starter.twbx**, which already has a connection to the Club Membership.xlsx data source.
2. On the **Data Source** page, explore the fields in the first data source.
 - Note the format of the **Name** as First Name Last Name.
3. Add a connection to the **Sales by Member.xlsx** data source (found in the Data folder).
4. Explore the fields in the second data source.
 - In the **Sheets** section, click the **View Data** icon to look at the fields in the **Sales by Member** data source. Note that there are separate columns for **First Name** and **Last Name**.
5. Create a join calculation in the X data source defined as:
`[First Name] + ' ' + [Last Name]`
6. Complete the inner join with the Name field.
7. On the **Membership Analysis** worksheet, create a bar chart that shows **Total Sales** by **Name** and **Member Since**, sorted by descending **Total Sales**.

Practice: Percent of Total

Create a bar chart, filtered to the State of California, and use a Quick Table Calculation to show the Percent of Total Revenue by Metro Area. Color the bars by Percent of Total Revenue.



DIRECTIONS

View One

1. Open **Percent of Total Starter.twbx**.
2. On the **Percent of Total** sheet, create the initial view showing **Revenue** by **State** and **Metro**, filtered on **State** to show only **California**.
3. **Sort** the bars in descending order.
4. Use a **Quick Table Calculation** to edit **Revenue** to show it as **Percent of Total**.
5. Drag a copy of the **Percent of Total Revenue** table calculation field to **Color** on the **Marks** card.

HINT: Hold CTRL+click and drag to make a copy of the **Percent of Total Revenue** table calculation

6. Show **Labels** for the bars as the **Percent of Total Revenue**.

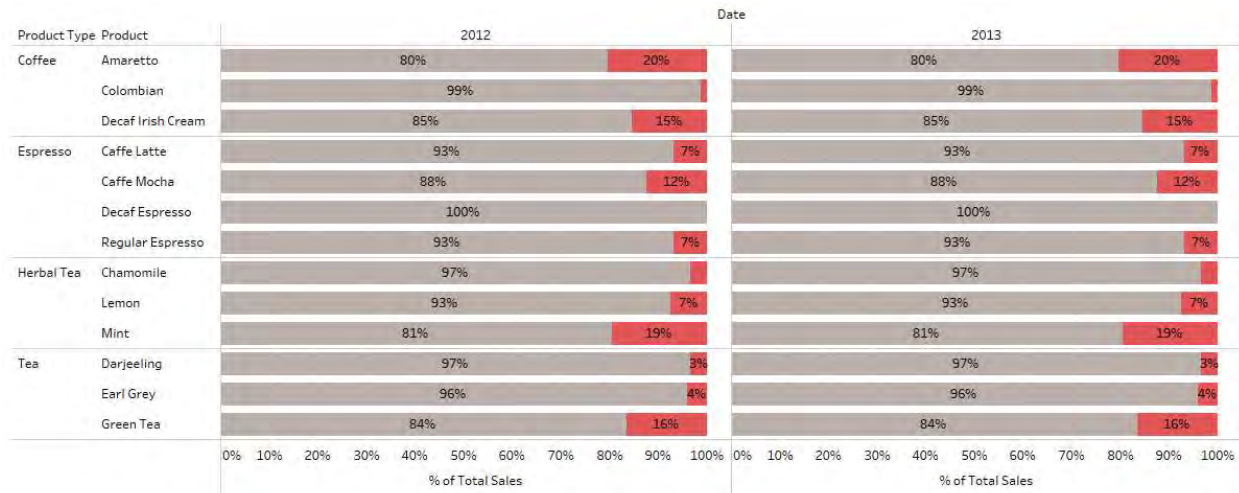
View Two

State	Metro	% of Total Reven..	Revenue
California	San Francisco	41.58%	\$12,896,377,534
	Los Angeles	33.51%	\$10,393,769,174
	San Diego	7.16%	\$2,219,675,402
	Truckee-Grass Valle..	6.38%	\$1,977,921,907
	San Jose	6.37%	\$1,976,534,532
	Riverside-San Berna..	1.95%	\$605,387,772
	Sacramento--Arden..	0.47%	\$145,946,541
	Santa Rosa-Petalum..	0.46%	\$142,242,247
	Oxnard-Thousand O..	0.39%	\$121,664,388
	Santa Barbara-Sant..	0.39%	\$121,518,959
	Fresno CA	0.35%	\$109,178,601
	San Luis Obispo-Pas..	0.31%	\$97,249,663
	Bakersfield CA	0.23%	\$72,691,231
	Salinas CA	0.12%	\$37,273,905
	Null	0.06%	\$17,998,277
	Vallejo-Fairfield CA	0.06%	\$17,923,008
	Napa CA	0.05%	\$16,940,863
	Redding CA	0.04%	\$12,211,607
	Allegan MI	0.03%	\$10,622,193
	El Centro CA	0.03%	\$8,753,043
	Stockton CA	0.02%	\$5,708,690
	Visalia-Porterville CA	0.01%	\$3,796,168
	Santa Cruz-Watsonv..	0.01%	\$3,098,705
	Madera CA	0.01%	\$2,900,840
Grand Total		100.00%	\$31,017,385,250

1. Right-click on the **Percent of Total** worksheet and **Duplicate as Crosstab**. Rename this new tab **Data View**.
2. Drag **Metro** from **Columns** to **Rows**.
3. Add **Revenue** to the text table.
HINT: Drag it into the view until you see **Show Me**.
4. Add **Column Grand Totals** to the crosstab.
5. Use your computer's calculator to confirm that your table calculation is being calculated correctly. Manually calculate the Percent of Total Revenue for San Francisco.

Practice: Profitability as a Percent of Total

Create a bar chart to see what percent of total sales by year are profitable for those same type of products. Use a percent of total table calculation so you can see the profitability for each type of product by year.

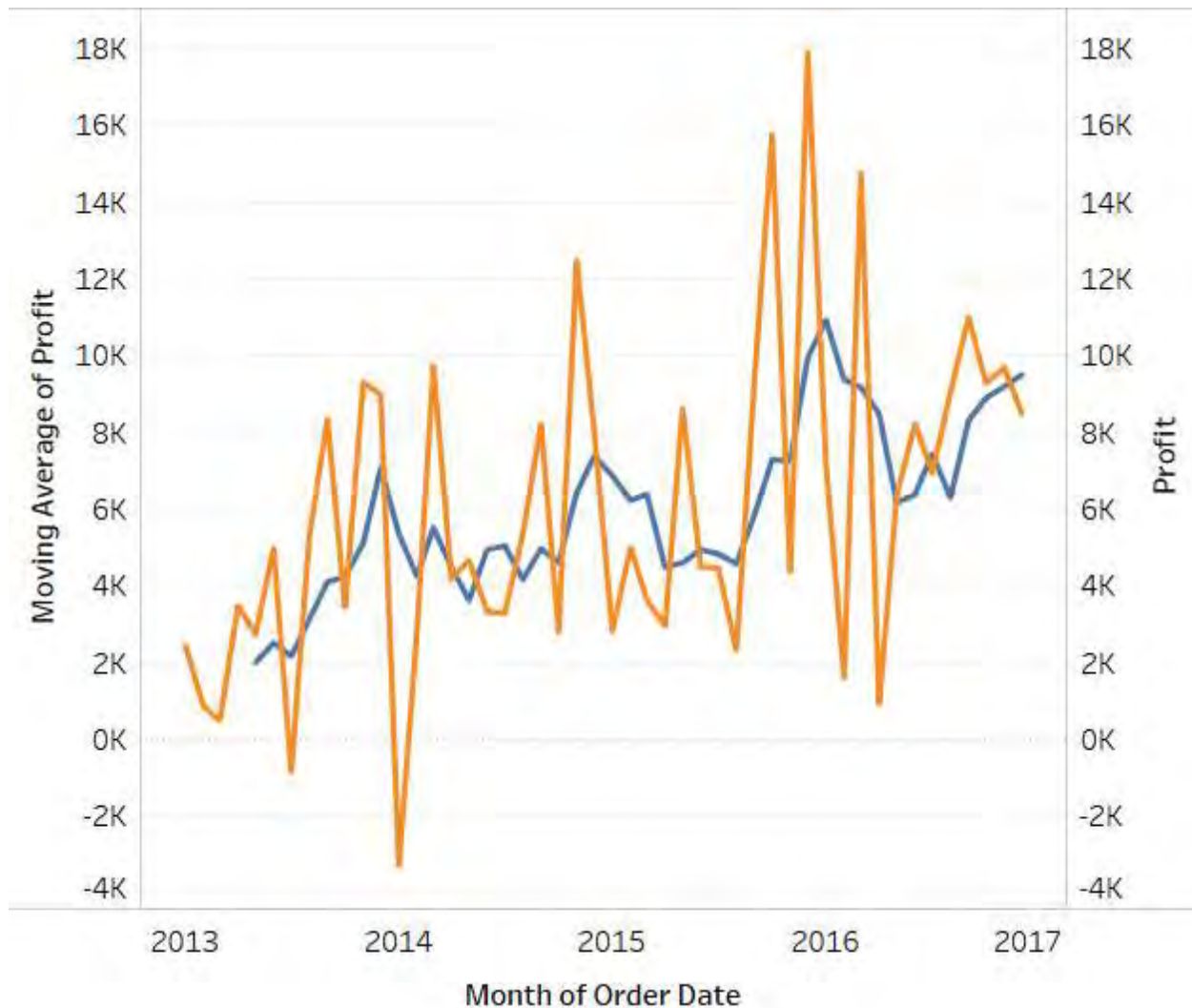


DIRECTIONS

1. Open **Profitability as Percent of Total Starter.twbx**.
2. On the **Profitability as a % of Total** sheet, create the initial bar chart showing **Sales by Year([Date])**, broken down by **Product Type** and **Product**.
3. **Create a calculated field named "Profit or Loss":**
 IF [Profit]>0 THEN "Profit"
 ELSE "Loss"
 END
4. Right click on the **Sales** field and select **Add Table Calculation**.
 - Calculation Type: Percent of Total
 - Compute Using Cell
5. Encode the "Profit or Loss" calculation by color.
6. Edit the colors to show **Profit** as grey and Loss as red.
7. Label the bars using a copy of the **SUM([Sales])** table calculation from columns.
8. Format the Percent of Total to a percentage with no decimal places.

Practice: Moving Average

You would like to see the long-term trends for profit data. Use a moving average table calculation to smooth the monthly fluctuations so you can see the bigger picture. Show both line charts at the same time in order to compare your calculation with actual profit.



DIRECTIONS

1. Open **Moving Average Starter.twbx**.
2. Create the initial view, a line chart of **Profit** by **Order Date**.
3. Change the **Order Date** on the **Columns** shelf to a continuous **Month**.
4. Right-click on the **Profit** field and select **Add Table Calculation** to show **Profit** as a **Moving Average** using the following options:

Calculation Type: Moving Calculation
Summarize values using: Average
Previous values: 4
Next values: 0

Current value: checked on

Null if there are not enough values: checked on

Compute Using: Table (across)

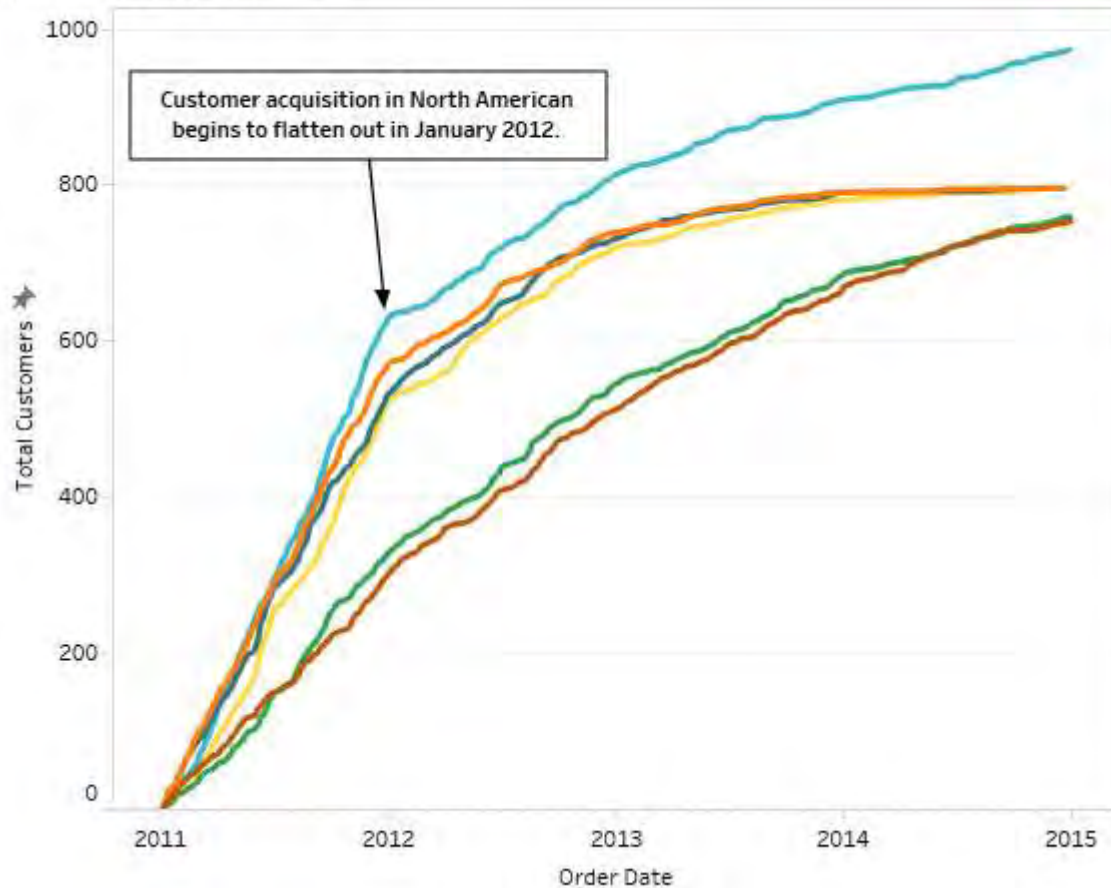
5. Drag another copy of **Profit** to **Rows** after the **Moving Average**, creating two separate panes for the view.
6. Right-click on the second **Profit** field and choose **Dual Axis**.
7. **Synchronize** the axes.
8. On **Rows**, right-click on the field for **Moving Average** of **Profit** and choose **Format**.
9. In the **Format** window, on the **Pane** tab, under **Special Values**, from the **Marks** drop down menu, choose **Hide (Break Lines)**, which will remove the null indicator, but not show the nulls at the default value of 0.

TIP: You may instead right-click the null indicator and choose **Hide Indicator**.

Practice: Using LOD Expressions

Create a daily trend line showing total customer acquisition by market. Use an LOD Expression to not count repeat customers as new customers.

Customer Acquisition



NOTE: Your dates may display as individual dates instead of years. It is dependent on your screen resolution.

DIRECTIONS

1. Open **Using LOD Expressions Starter.twbx**.
2. Create the initial line graph of **Total Customers** by **Day** and **Market**.
Hint: Use **CNTD(Customer ID)** for Total Customers. Use **Order Date** displayed as a **Continuous Exact Date** for **Day**. Use **Market** on **Color**.
3. Create a **LOD Expression** called **First Order Date** to determine the first day each customer placed an order:

```
{FIXED [Customer ID]: MIN ([Order Date])}
```

4. Create a calculated field called **New or Existing** to check if the customer is a new customer or existing customer:

`IIF([First Order Date] = [Order Date], "New", "Existing")`

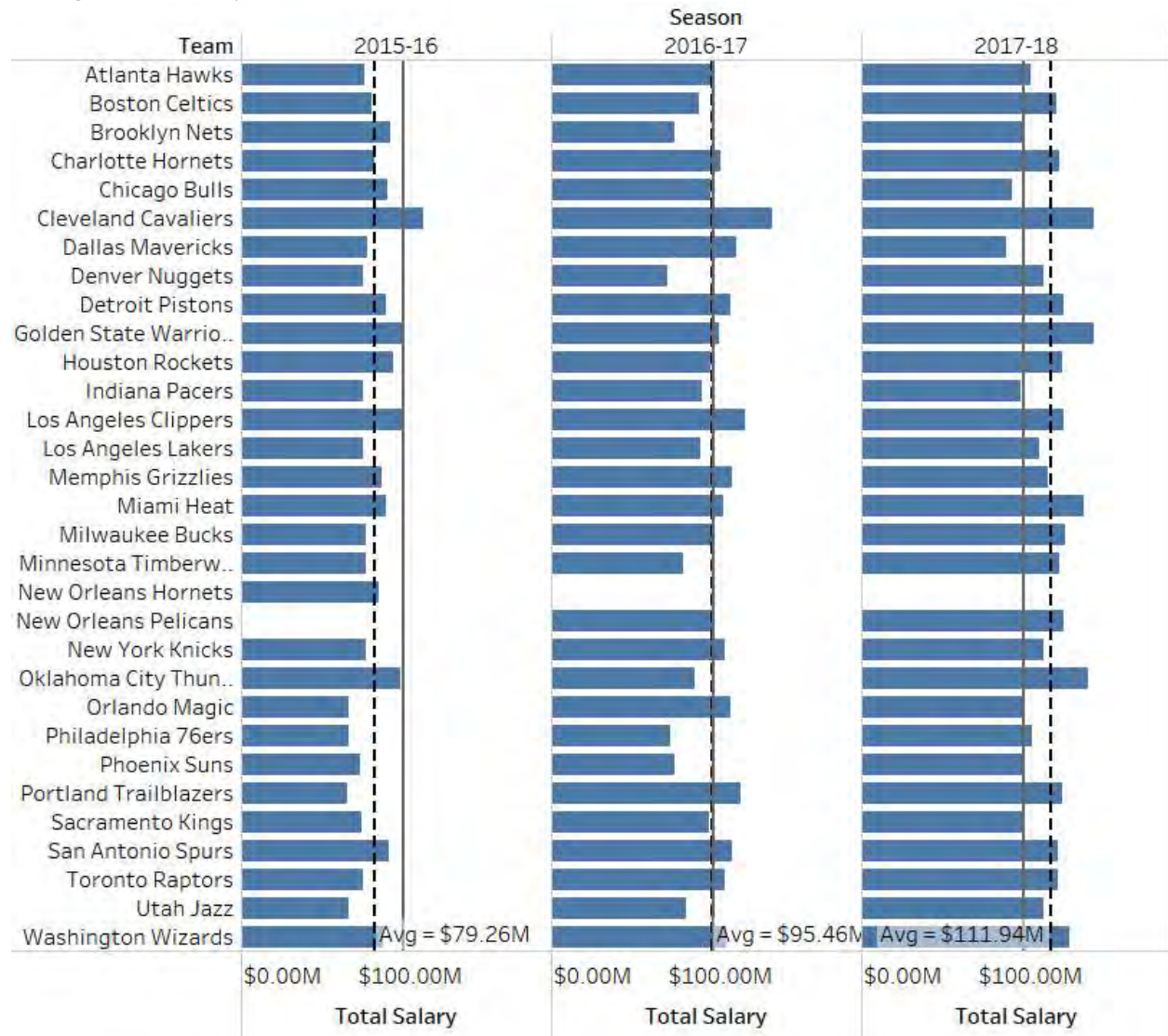
5. Drag this new calculated field to the filters shelf and set to **New**.
6. Add a quick table calculation to **CNTD(Customer ID)** to use a **Running Total** by day.
7. Set the view to **Fit Width**.
8. Rename the Y-axis to "Total Customers" and edit the Axis to start at 0.
9. Add an **annotation** around North America January 2012 pointing out that "Customer acquisition in North America begins to flatten out in January 2012". Change the color of border of the box to **black**.
10. Remove the horizontal **grid lines** for the date.

Practice: Reference Lines and Bands

Try creating a variety of reference lines and bands on your own.

View One

Create two reference lines: one showing Average Salary by Team across all three years, and one showing the Average across each year.

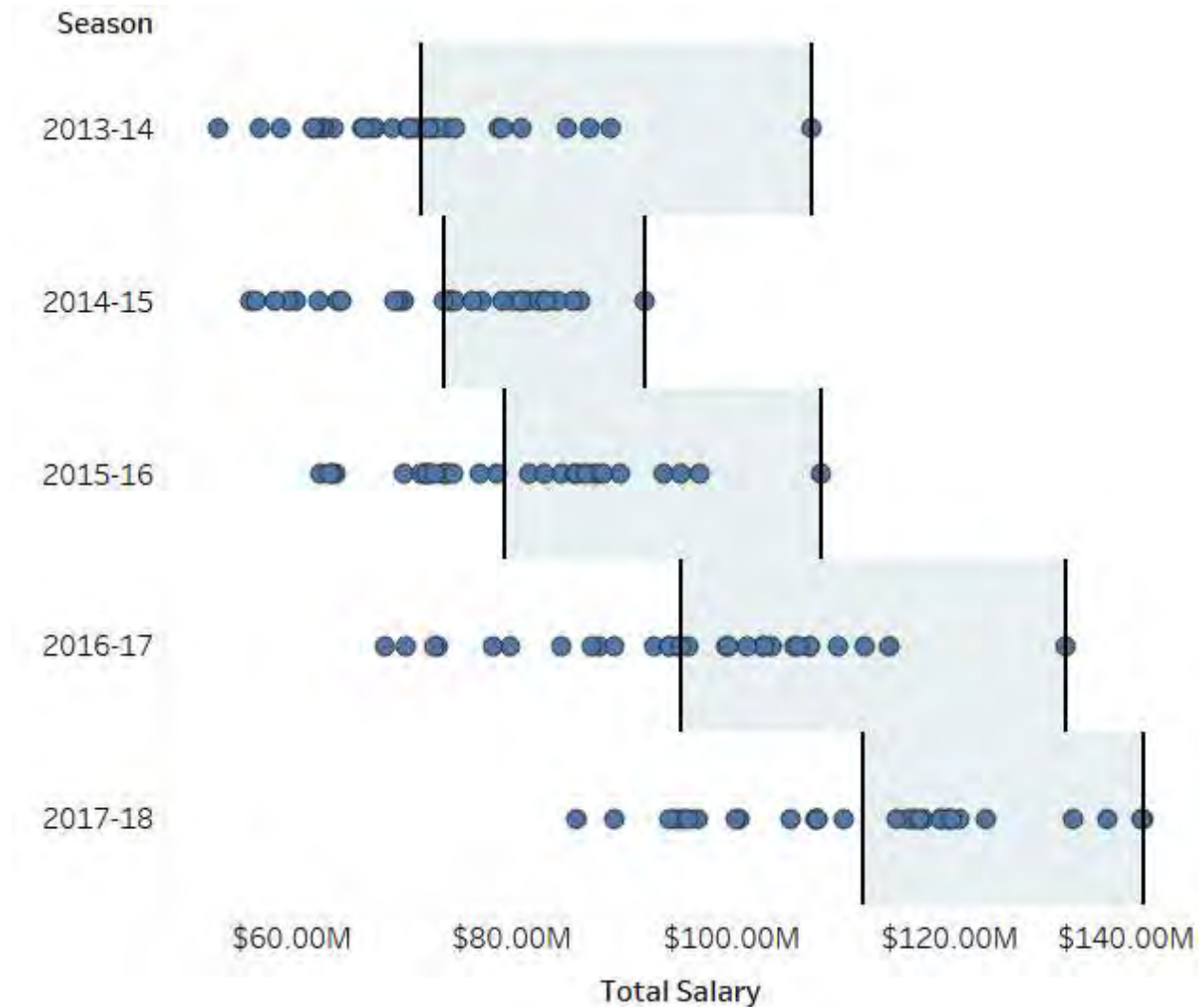


DIRECTIONS

1. Open **Reference Lines and Bands Starter.twbx**.
2. Using the **Salary by Team** worksheet, add an **Average Reference Line** for **SUM(Total Salary)** by **Pane**. Change the label to use a **Custom Label**: **Avg = [Value]**
3. Edit the **Average** reference line to be a dashed, black line.
4. Add a new **Average Reference Line** using **SUM(Total Salary)**, but with a scope of **Entire Table**, and displayed with no label as a grey line.

View Two

Create a reference band between the Average Salary and Maximum Salary by Season.



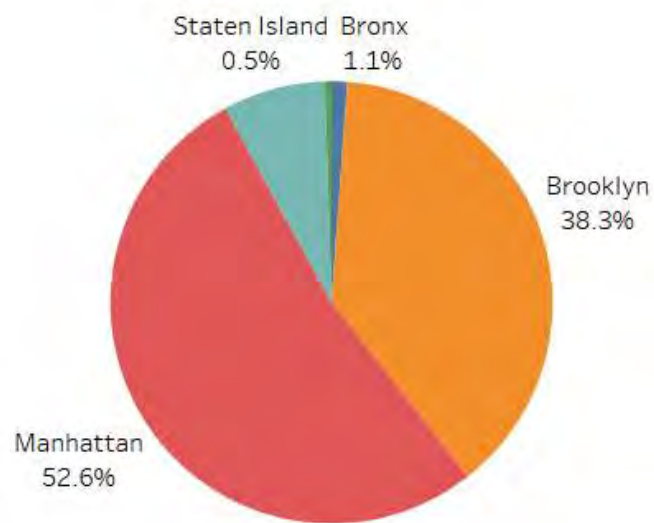
1. Using the **Salaries by Season** worksheet, add a **Reference Band** by **Cell**.
2. Set the band from the **Average SUM(Total Salary)** to the **Maximum SUM(Total Salary)**.
3. Exclude all **Labels**.
4. Include dark **Lines**.
5. Set the **Fill** to light blue.
6. From the **Format** menu, select **Lines**. Remove the **Column Grid Lines**.
7. Add a highlighter for **Team**.

Practice: Pie Charts & Tree Maps

Try creating both a pie chart and a tree map on your own.

Pie Chart

Using the historic data from AirBnB, create a Pie Chart to show the percent of rentals in each neighborhood of NYC.

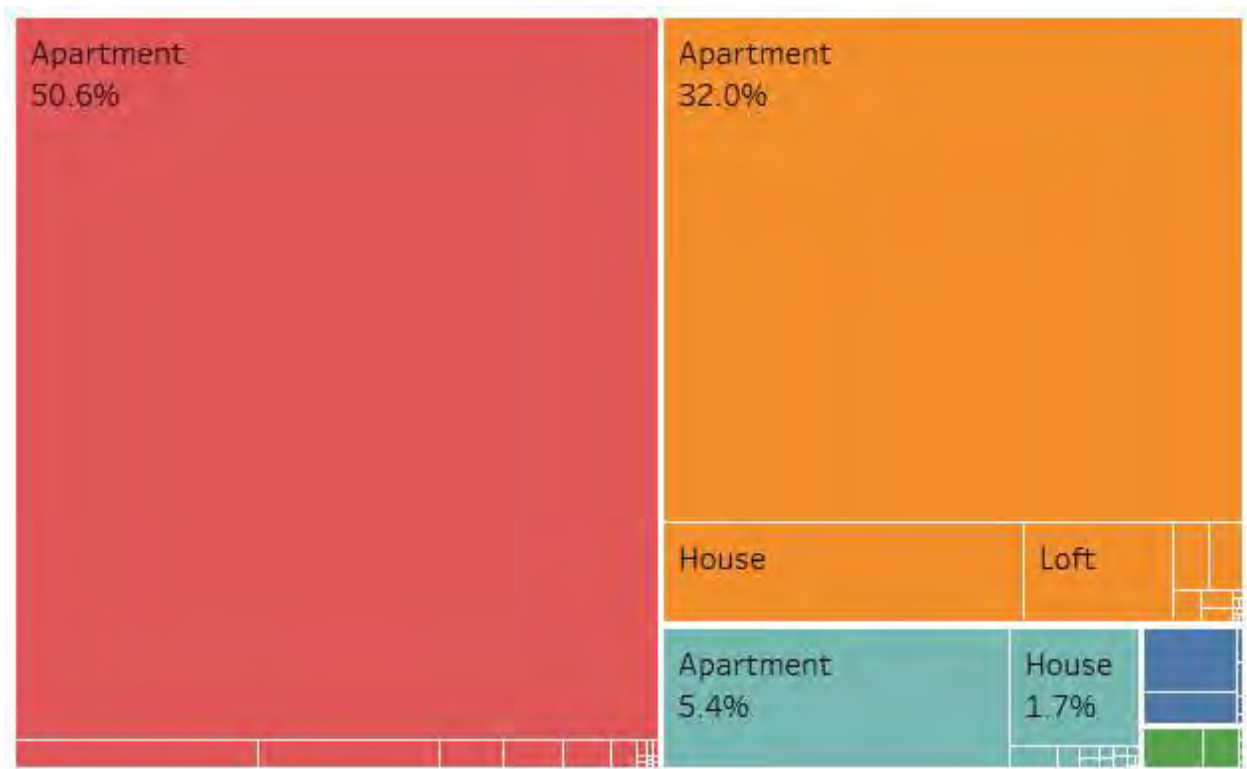


DIRECTIONS

1. Open **Pie Charts and Tree Maps Starter.twbx**.
2. On the **Pie Chart** worksheet, change the **Marks** type to **Pie Chart**.
3. **Color** the Pie Chart by **Neighborhood**.
4. Drag **Number of Records** to **Angle** on the Marks card. Note: You could also drag **Number of Records** to **Size** for the same result.
5. Label the Pie Chart by **Neighborhood**.
6. Add another **Label** using **Number of Records**.
7. Change the label for **Number of Records** to show the **% of Total Number of Records**, formatted to zero decimal places. Hint: Use a Table Calculation with **Number of Records** on **Label**.

Tree Map

Create a **Tree Map** to show the number of records by Neighborhood and Property Type.

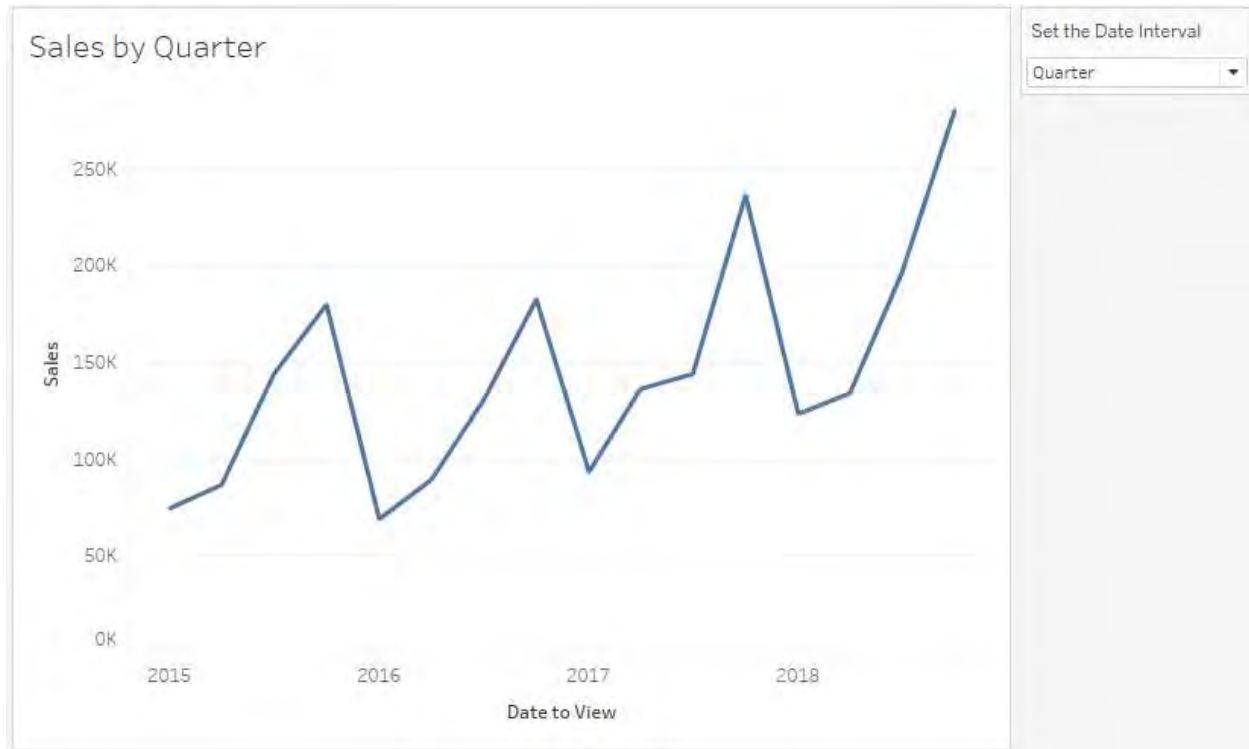


1. On the **Tree Map** worksheet, change the **Mark** type to **Square**.
2. Drag **Number of Records** to **Size**.
3. **Color** the tree map by **Neighborhood**.
4. Add **Labels** for **Property Type** and **Number of Records**.
5. Change the **Number of Records** label to show the **% of Total Records**, formatted to one decimal place.
HINT: Use a table calculation.
6. Right-click on **Property Type** in the Marks card and select **Show Highlighter**. Test out the functionality of the highlighter.

Practice: Exploring Parameters

Use a Parameter to Create a Dynamic Dimension

You would like to create a visualization that shows the data broken out by the selected date dimension. Create a parameter to allow the users to select the date dimension to use to display the data.



DIRECTIONS

- On the **Using Parameter to Select Date Dimension** worksheet, create a line graph showing **SUM(Sales)** by **Order Date**.
- Create a new parameter with the following settings:
 - Name** = Set the Date Interval
 - Data Type** = Integer
 - Display Format** = Automatic
 - Allowable Values** = List
 - List of Values:

Value	Display As
1	Year
2	Quarter
3	Month
4	Day

Click **OK** to save settings.

3. Create a new calculated field called **Date to View** to select the desired date dimension.

```
CASE [Set the Date Interval]
  WHEN 1 THEN [Order Date (Years)]
  WHEN 2 THEN [Order Date (Quarters)]
  WHEN 3 THEN [Order Date (Months)]
  WHEN 4 THEN [Order Date (Days)]
END
```

4. Replace **YEAR(Order Date)** on **Columns** with the new calculated field **Date to View**.
5. Right click on Date to View and change the display to use **Exact Date**.
6. Right click on the Date to View axis. Select **Format**. Change the **Scale** for the **Dates Axis**. From the drop-down menu select **Custom** and enter **YYYY**.
7. Double click on the Date to View axis to **Edit the Axis**. Select the **Tick Marks** tab. Change the **Major Tick Marks** to **Fixed** with a **Tick origin** of 1/1/16 and an **interval** of 1 with **Unit** of Years.
8. Right click on the **Set the Date Interval** parameter and **Show Parameter Control**.
9. Edit the **Title**:
Sales by <Parameters.Set the Date Interval>
Note: Insert the Parameter into the title by selecting **Parameters.Set the Date Interval** from the **Insert** button in the title dialog.
10. Test out the functionality of the parameter.

Practice: Mapping Top North American Airports

Create a map of the top North American airports in 2015 based on their airport code. Use size and color to compare the number of each passengers of each airport. Add a filter to the view so you can determine which airports were the busiest.



DIRECTIONS

1. Open **North American Airports Starter.twbx**.
2. Notice that Airport Code does is not currently a geographic field. Assign the **Geographic Role of Airport to Airport Code**.
3. On the **Top North American Airports – 2015** worksheet, create a map by dragging **Airport Code** to **Detail**.
Notice the indicator at the bottom right corner of the map. Tableau is unable to map one of the airport codes.
4. Click the **1 unknown** notification on the map. Edit the locations. Notice that the code for **ATL** was entered incorrectly in the data. Change the matching location for **ATTL** to the airport code of **ATL** for **Atlanta** and click **OK**.
5. Label the map with the name of the **Airport**.
6. Add the **Region/Country** to **Detail**.
7. Show the number of **Total Passengers** using **Size** and **Color**.
8. Increase the **Size** of the marks.
9. Edit the **Color** of the marks to set the Opacity to 65% and add a black **Border**.
10. From the **Map** menu, adjust the **Map Layers** to select the **Normal** map style. Remove the **Land Cover** and **Country/Region Names** map layers from the map.
11. Test the levels of zoom, and map selection options on your map.
12. Add a filter to your view with a slider for **Total Passengers**. Test the filter.
13. Notice the filter is showing those with null values for Total Passengers. Edit the filter and uncheck **Include Null Values**.

SELF CHECK – Use the **SUM(Total Passengers)** filter slider to determine which were the five busiest airports in 2015? How else might you find the top 5 airports by passengers?

Practice: Creating Geographic Groups

Create geographic groups to show the total number of stores in custom sales territories for your company in Washington. Use your map to explore whether you should consider splitting your territories.

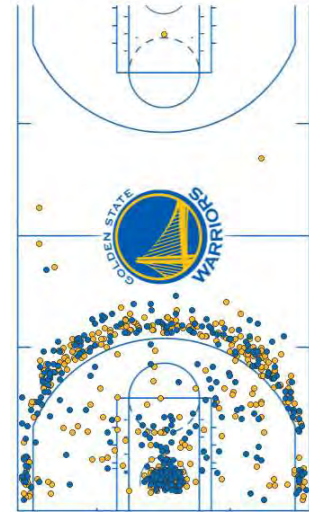


DIRECTIONS

1. Open **Geographic Groups Starter.twbx**.
2. Create a **Filled Map** with **State** and **County Name**, labeled with the number of **Stores** for each county.
3. Use the map selection tools or CTRL+click to select counties for the first geographic group.
4. Use the **Group** icon with **County, State** to create custom sales territories using geographic groups.
Note: A new group named **County Name & State (group)** appears in the **Data** pane.
5. Repeat steps 3-4 until all four territories are created.
Do not worry about matching the territories exactly.
6. Rename the territories as shown in the picture by using **Edit Group**.
7. Remove **County Name** from detail to show only the custom territories.
8. Add a copy of the group to **Label** on the **Marks** card.

Practice: Background Images

Basketball player Steph Curry is known for making difficult shots at critical times in a basketball game. You have obtained data for each shot he took and accompanying statistics for each shot. The location of each shot has been assigned to mapped positions (x, y). Use a background image of a basketball court to visualize the shots taken by Steph Curry and use color to designate shots he made versus those that he missed.



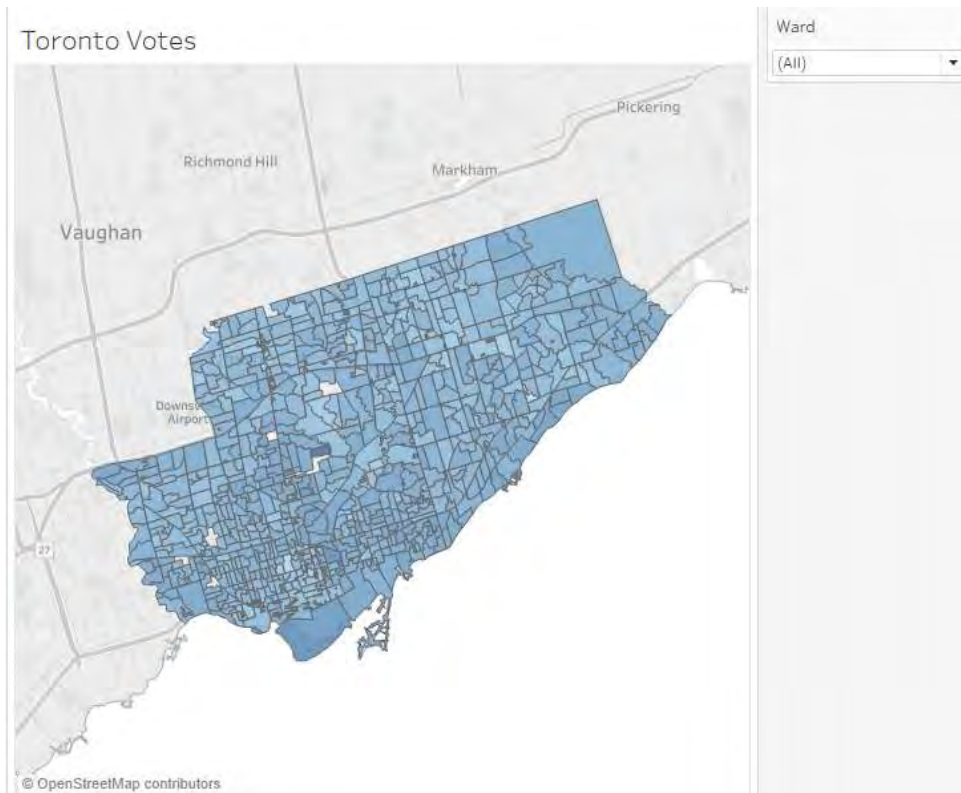
DIRECTIONS

1. Open **Background Images Starter.twbx**.
2. From the **Map** menu, select **Background Images**, and then click **NBA Savant – Steph Curry Shots**. This will relate the image to the correct data set.
3. From the **Background Images** dialog box, click **Add Image** to add the background image.
4. Use the following settings to define the background image and the scale to be used when placing the marks on the image. The scale was defined by the user to match the data.
 - **Name** = “Steph Curry Shots”
 - **File** = \Data\nba_court_dimensions.png
 - **X Field** = X
 - **Left** = -250
 - **Right** = 250
 - **Y Field** = Y
 - **Bottom** = -40
 - **Top** = 830
5. Build the view:
 - Drag **X** to **Columns** and drag **Y** to **Rows**.
 - From the **Analysis** menu, uncheck **Aggregate Measures**. This disaggregates the fields and shows all values for X and Y.
 - Drag **Shot Result** to **Color**.
6. Format the view:
 - Right-click on **X** on **Columns** and clear **Show Header**.
 - Right-click on **Y** on **Rows** and clear **Show Header**.
 - Change the mark to **Circle**.
 - Change the colors to match the Blue and Yellow from the logo.
 - Add a grey border around the circles.
 - Edit the mark tooltip to remove the references to X and Y. Remove the label for Shot Result and change the font size of <Shot Result> to be 12-point.

Practice: Mapping with Spatial Files

You are interested in voter turnout in Toronto. Create a map of Toronto voting districts. Add more information to your map from a second data source so you can analyze the voter turnout in the districts:

- Use color to show the % Voted
- Add another level of detail to the map to show the Area Name.
- Add a filter to allow the user to select specific Wards.



DIRECTIONS

1. Open **Spatial Analysis Starter.twbx**.
2. From the Toronto Votes worksheet, create a map by dragging **Geometry** to **Detail**. Notice that Tableau uses **COLLECT** to aggregate the marks.
3. Add both **Ward** and **Area Name** to **Detail**.
4. **Color** the shapes by **% Voted**.
5. Add **Number Voted** to the **Tooltip**.
6. Modify the Tooltip to the following:

<Area Name>

Ward: <Ward>

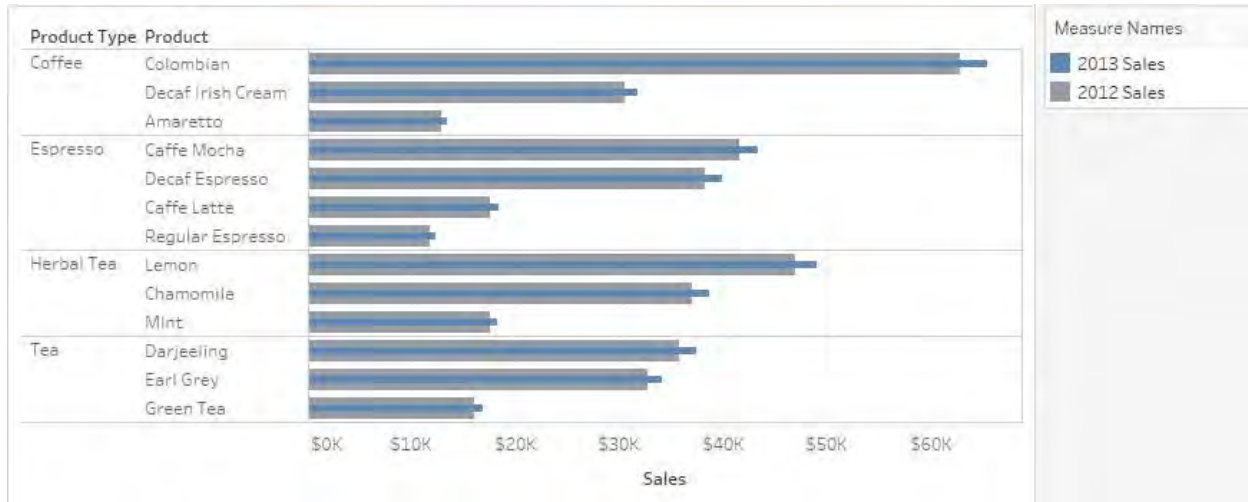
<SUM(% Voted)> Voted

<SUM(Number Voted)> voters

7. Right-click on **Ward** on the marks card and select **Show Filter** and show a single value dropdown filter.
8. Test the filter and view the results for different Wards.

Practice: Bar in Bar Chart

You would like to compare two years of sales data. Create a bar in bar chart that compares product sales for 2012 and 2013. Then analyze the visualization to determine which products sold less in 2013 than in 2012.

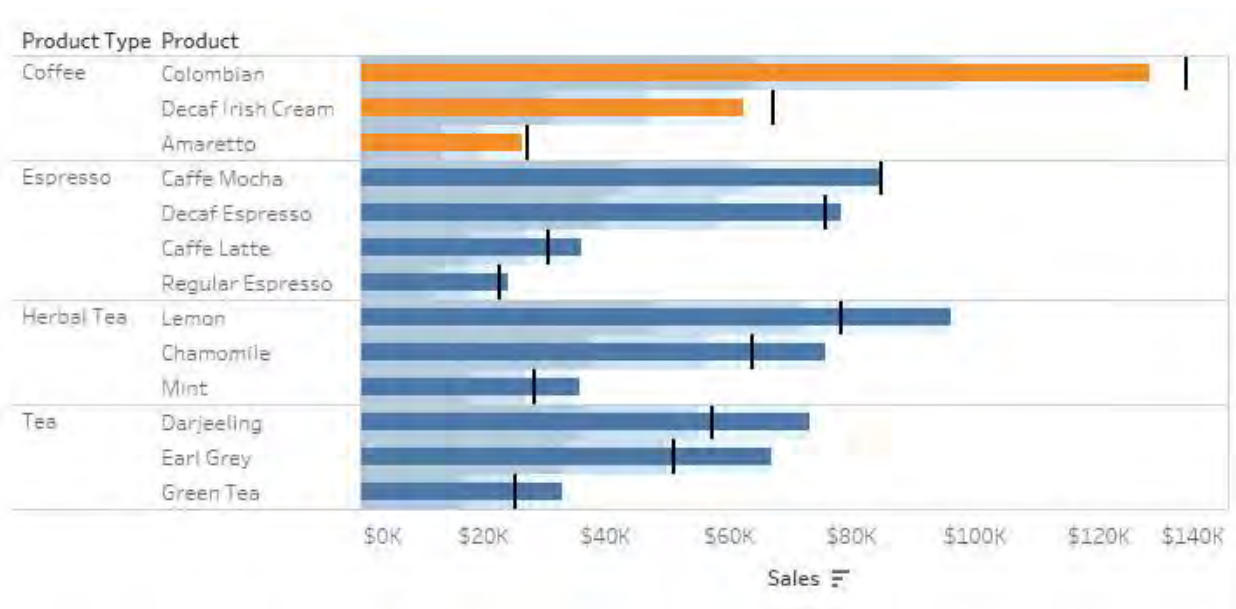


DIRECTIONS

1. Open **Bar in Bar Starter.twbx**.
2. Create a calculated field for **2012 Sales**:
Name: "2012 Sales"
Formula: IF YEAR([Date]) = 2012 THEN [Sales] END
3. Right-click the new **2012 Sales** field, duplicate it, and use the copy to create a **2013 Sales** calculated field, as above but using the year 2013.
4. Create the initial bar chart of **2012 Sales** broken down by **Product Type** and **Product**.
5. Drag **2013 Sales** to the axis for **2012 Sales** to create a combined-axis view.
NOTE This will engage the **Measure Names** and **Measure Values** fields.
6. From **Rows**, drag **Measure Names** to **Color** on the **Marks** card, which will stack the marks.
7. From the **Marks** card, drag a copy of **Measure Names** to **Size** on the **Marks** card.
8. From the **Analysis** menu, click **Stack Marks**, and click **Off** to start both bars at the 0 position.
9. Format the view:
 - Edit the **Color Legend** (Change colors to use blue and gray).
 - Sort the bars in descending order.
 - Resize the width of the bars.
 - Format the axis for currency to thousands with no decimals and rename to Sales.
 - Hide the title for the color legend.
 - Remove the size legend.

Practice: Bullet Graph

Create a bullet graph so you can compare the actual product sales with the budget quota goal. Use a calculated field with color encoding to quickly determine which products have not yet met their goal. Then analyze the distribution to determine how close those products are to meeting the budgeted quota



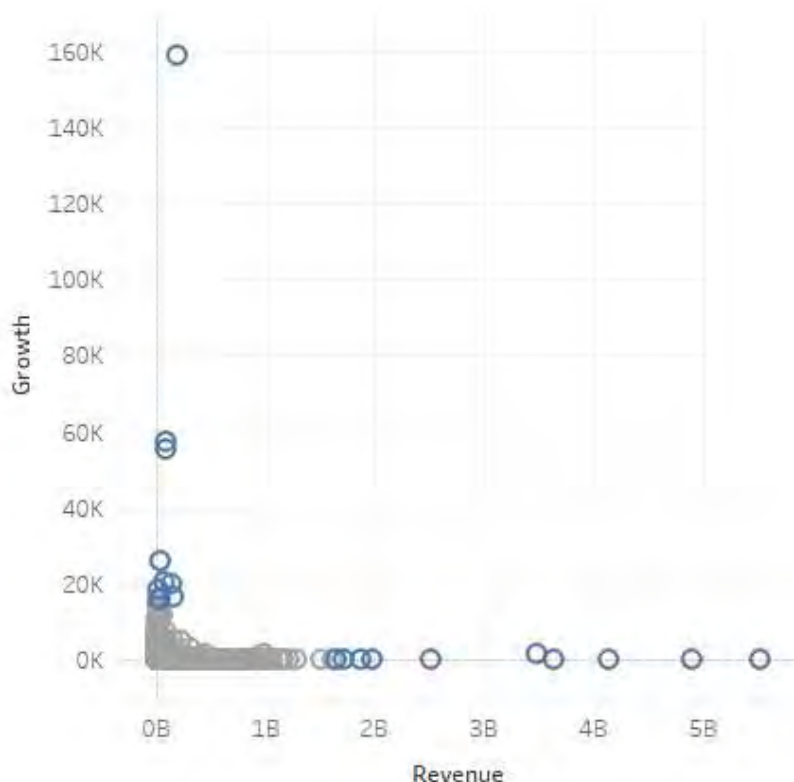
DIRECTIONS

1. Open **Bullet Graph Starter.twbx**.
2. Create the initial bar chart of **Sales** broken down by **Product Type** and **Product**.
3. Sort bars in descending order by **Sales**.
4. Drag **Budget Sales** to **Detail** on the **Marks** card.
TIP This is necessary so that the field can be used in the reference line and distribution.
5. Right-click on the **Sales** axis and choose **Add Reference Line** and select these options:
 - **Line as Type**
 - **Scope = Per Cell**
 - **Value = Sum(Budget Sales)** with an **Average** aggregation
 - **Label = None**
 - Bold line, colored black
6. Right-click on the **Sales** axis a second time and choose **Add Reference Line** and select these options:
 - **Distribution as Type**
 - **Scope = Per Cell**
 - **Computation = Percentages: 50, 75, 100% of SUM(Budget Sales)** with an **Average** aggregation
 - **Label = None**
 - Select **Fill Below**
 - **Fill = Blue Light**
7. Click on **Size** in the **Marks** card and reduce the size of the bars to make it easier to see the distribution behind them.
8. Create the following calculated field to determine if **Sales** are below budget:
 - **Name:** "Sales Exceeds Quota?"
 - **Formula:** `SUM([Sales]) >= SUM([Budget Sales])`

9. Drag **Sales Exceeds Quota?** to **Color** on the **Marks** card and adjust the color so **False** is orange and **True** is dark blue.
10. **Format** the axis for currency in thousands with no decimals.
11. **Format** the **Grid Lines**. Set the **Column Grid Lines** to **None**.

Practice: Creating and Using Sets

You would like to analyze the Top 10 companies by both Growth and Revenue in the mix of companies by Growth and Revenue. Then use color so you can easily visualize which companies are in the combined set.

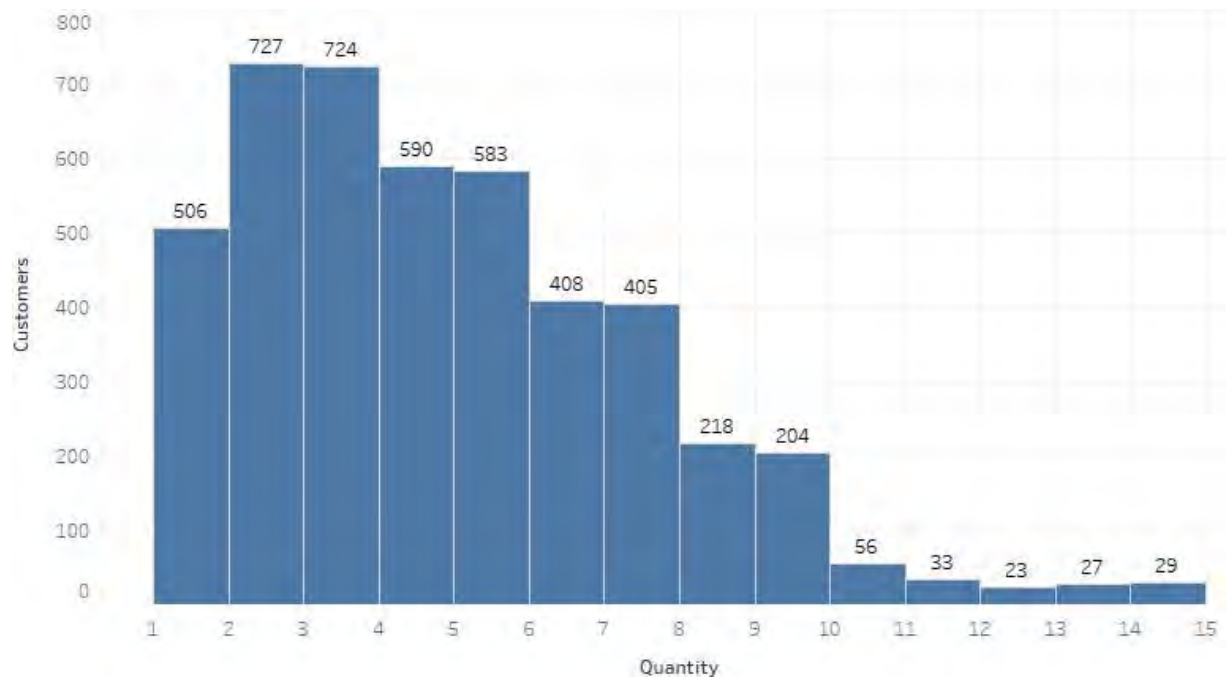


DIRECTIONS

1. Open **Creating_and_Using_Sets_Starter.twbx**.
2. Create a scatter plot showing **Sum of Revenue** and **Sum of Growth**.
3. Add **Company** to **Detail**.
4. From **Company** in the **Data Pane**, create a **Set** for the Top 10 companies by **Sum of Growth** and name it **Top 10 by Growth**.
5. Test the set by adding the **Top 10 by Growth** to **Color**.
6. From **Company** in the **Data Pane**, create a new **Set** for the Top 10 companies by **Sum of Revenue** and name it **Top 10 by Revenue**.
7. Test the set by adding the **Top 10 by Revenue** to **Color** and replacing the previous color encoding.
8. **Create a combined set** to show all companies that are either in the **Top 10 by Revenue set or Top 10 by Growth set**.
9. Add the new combined set to **Color**, replacing the Top 10 by Revenue set and examine the results.

Practice: Histogram with Binned Measures

You would like to see the frequency distribution of quantity of items ordered. Create a histogram to show how many customers ordered in each quantity range. Change the size of the histogram bin to view how that affects the visualization.

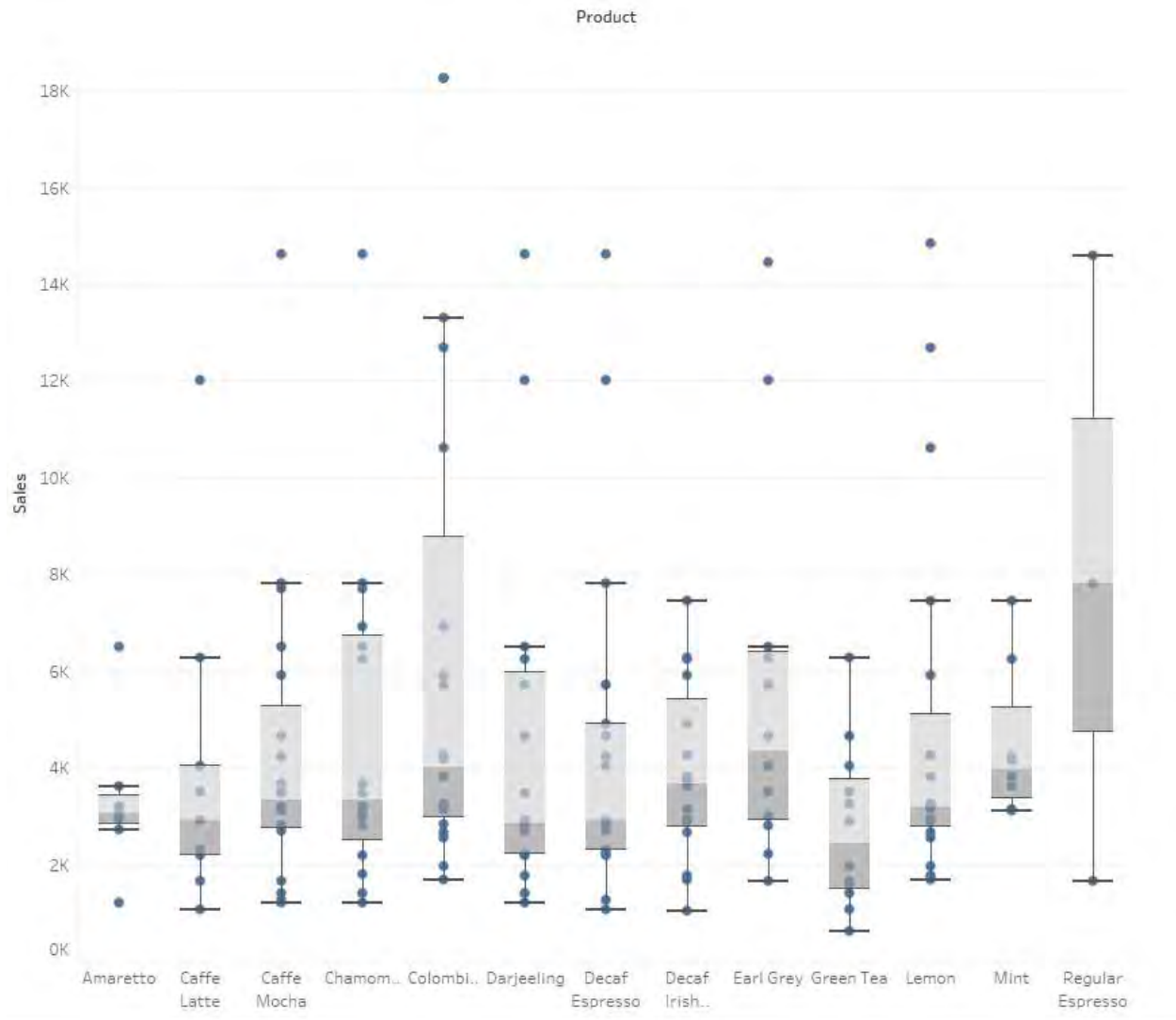


DIRECTIONS

1. Open **Creating a Histogram Starter.twbx**.
2. **Create a bin** using **Quantity**. Keep the default name of Quantity(bin) and change the **Size** of bins to 2.
3. **Convert** Quantity (bin) to a **continuous** dimension.
4. Create the histogram using **CNTD(Customer Name)** on **Rows** and **Quantity (bin)** on **Columns**.
5. Add labels.
6. **Edit the bin size** to use 1 instead of 2.
7. Edit the **axis titles** to better represent the axis values.

Practice: Box and Whisker Plot

You would like to analyze the distribution of Sales by product. Use a box and whisker plot to visualize the range of sales by states.

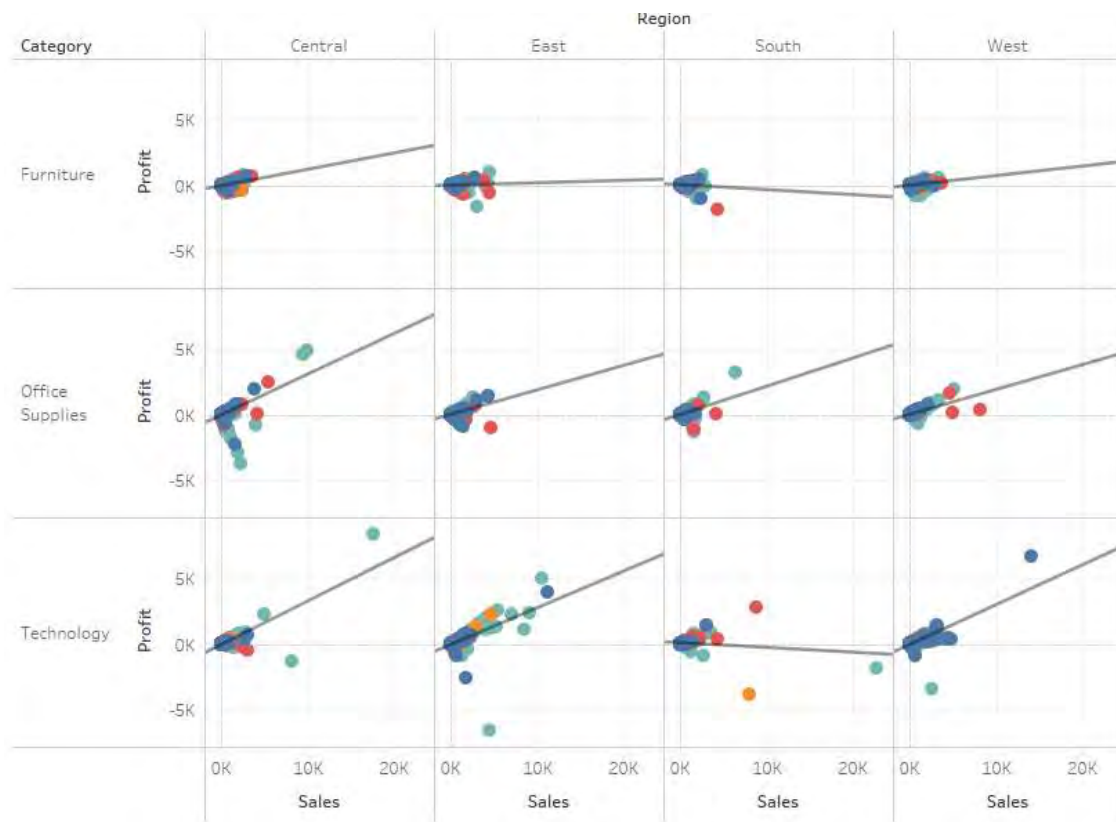


DIRECTIONS

1. Open **Creating a Box and Whisker Plot Starter.twbx**.
2. Use **Show Me** to create the view: select **Sales, States, and Products** and choose **box-and-whisker plot**.
3. Add a **Multi-Select Filter** to allow the user to filter by **Product Type**.
4. Add a **Highlighter** to highlight by **State**.

Practice: Trend Lines with Small Multiples

Small multiple charts allow you to compare patterns in data across multiple dimensions. You would like to show potential relationship between of Sales and Profit by Category and Region using trend lines.

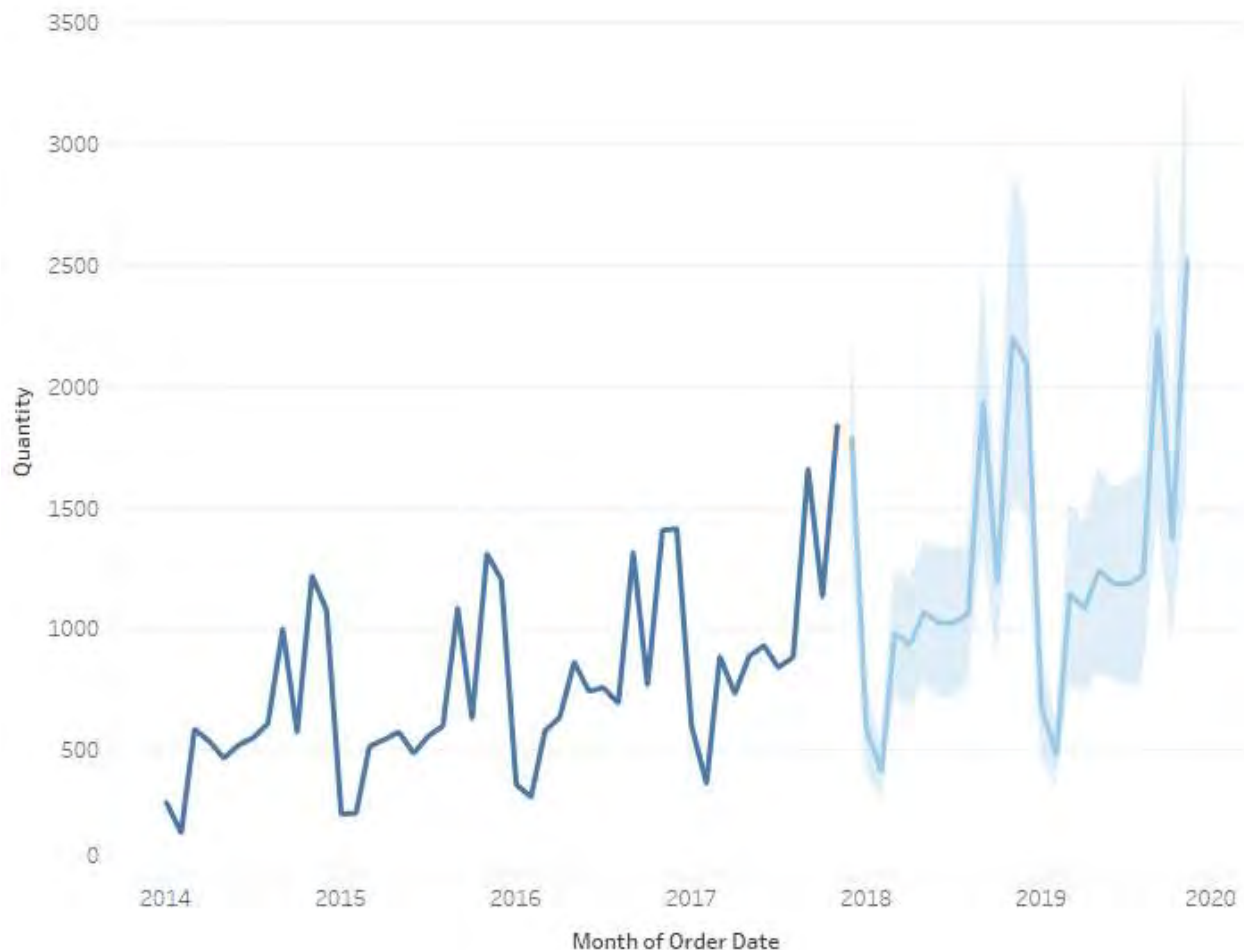


DIRECTIONS

1. Open **Trend Lines with Small Multiples Starter.twbx**.
2. On the **Trend Line with Small Multiples** worksheet, create a view showing **Sales** and **Profit** by **Region**.
3. Disaggregate the marks. HINT: From **Analysis** menu, uncheck **Aggregate Measures**.
4. Add **Category** to **Rows**.
5. Add **Ship Mode** to **Color**.
6. Change the **Mark** type to **Circle**.
7. From the **Analytics Pane** add a **Linear Trend Line**.
8. Right-click in the view and from **Trend Lines**, select **Edit Trend Line**.
9. From the Options dialog box, uncheck **Allow a trend line per color**, uncheck **Show Confidence Bands**, and check **Show recalculated line for highlighted or selected data points**. Click **OK**.
10. From the **Legend**, select **Same Day** and notice how the trend line recalculates based on the selected ship mode.

Practice: Forecasting

You would like to forecast the quantity in the coming months. Use a forecast so that you can see any general patterns that Tableau discovered by smoothing out your data.



DIRECTIONS

1. Open **Forecasting Starter.twbx**.
2. Create the initial line chart showing **Quantity** by **MONTH(Order Date)**.
3. Using the **Analytics Pane**, add a **Forecast** to the view.
4. Right-click in the view and modify the **Forecast Options** to show exactly a two-year forecast.
5. **Describe** the Forecast and review the **Summary** and **Model** for the forecast.

Practice: Creating a Dashboard

Create a dashboard that brings together the three worksheets in the starter workbook. Remove unnecessary legends and change the Summer/Winter Olympics filter to apply to all the worksheets. Then use the map as a filter for the rest of the dashboard. Add a Viz in Tooltip to add additional detail.



DIRECTIONS

Create the Dashboard

1. Open **Creating a Dashboard with Viz in Tooltip Starter.twbx**.
2. Add a **Dashboard** and name it "Olympic Medal History (2000-2012)".
3. Change the settings for the size to **Full Screen** and select **Show Title**.
4. Drag the three worksheets onto the dashboard space as shown.
5. Set the **Total Medals Trend** and **Medals by Sport** view to **Fit Width**.
6. Remove unnecessary legend items or move them closer to the view they reference.
7. Make the **Summer/Winter Olympics** filter global (apply the filter to all worksheets using this data source).
8. Make the **Summer/Winter Olympics** filter **Floating** instead of **Tiled** and move it to take up less space.
9. Make the map interactive by choosing **Use as Filter**.
10. Go to the **Medals by Sport** sheet.

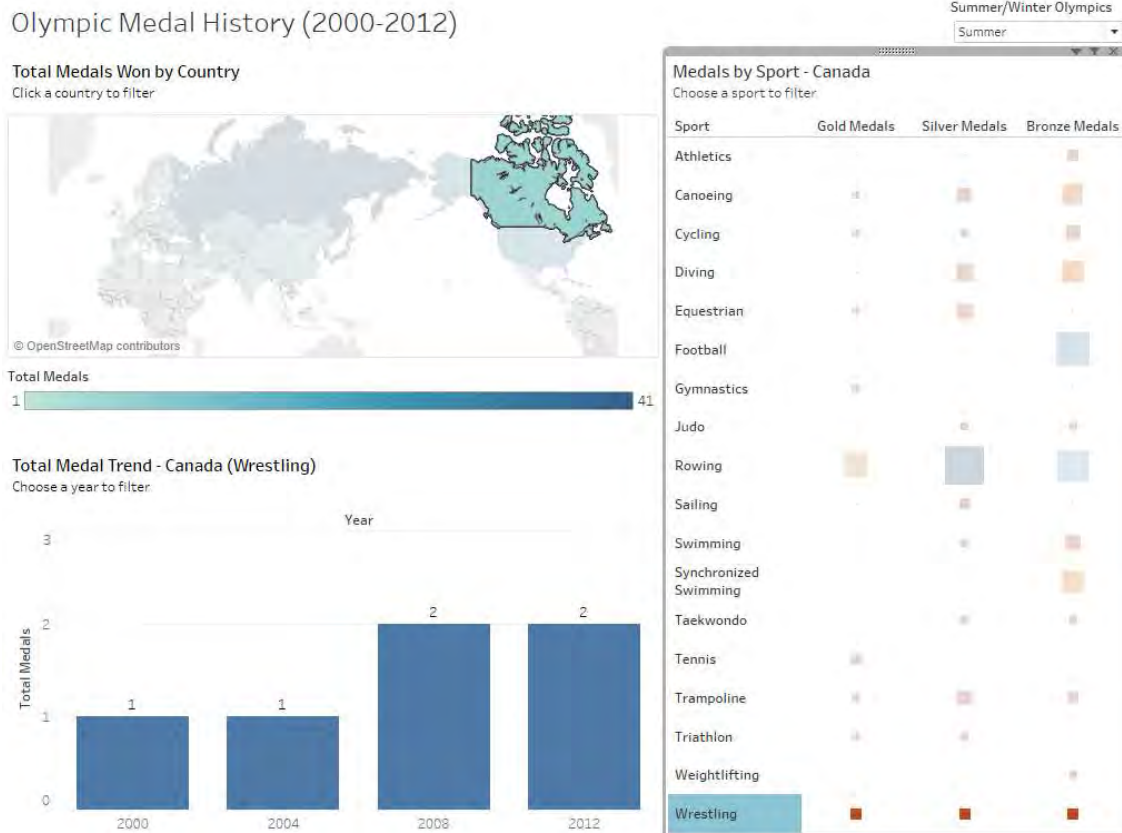
11. Open the tooltip editor and add the title "Medal Breakdown" below the existing text. Make it bold and center the text.
12. Insert the **Tooltip: Tooltip Total** sheet.
13. Modify the settings for the Tooltip. Edit the maxwidth to 350.
<Sheet name="Tooltip Total" maxwidth="350" maxheight="300" filter="<All Fields">>
14. Click **Preview** and adjust the tooltip as needed, then close the editor.
15. Return to the **Olympic Medal History** dashboard and hover over the heat map to view the tooltip for the different sports.
16. From the **Medals by Sport** worksheet, set the Action Filter for **Country** to **Apply to Selected Worksheets**. Be sure to check **Tooltip Total**. This will make the Country filter also flow into the Viz in Tooltip.
17. Test out the interactivity and filters on the dashboard.

Practice: Adding Dashboard Actions

From an existing dashboard, add dashboard actions to support the following interactions:

- Filter all other worksheets when you select a bar on the Total Medals Trend.
- Filter the Total Medals Trend by Sport when you select a mark on the Medals by Sport view.
- Show a web page with more information about individual Olympic sports when you click on a tooltip context menu link.

Add instructive text and field name references to titles to support user interaction.



DIRECTIONS

Add Dashboard Actions

1. Open **Add Actions to a Dashboard Starter.twbx**.
2. Edit the existing Tableau-generated **Filter Action** from the Map. Rename the filter “Filter by Country”.
3. Add a dashboard **Filter Action** called “Filter by Year” to all sheets that runs when a year is selected from the **Total Medals Trend**. Change the settings so that clearing the selection will **Show All Values**.
4. Create a similar filter action from **Medals by Sport** and name it “Filter by Sport”.
5. Test both dashboard filter actions.
6. Create a dashboard **URL Action** called “Learn more about <Sport> in the Olympics” to look up a specific sport on Google from the tooltip context menu on the **Medals by Sport** heat map:
“https://www.google.com/search?q=<Sport>+olympics”
7. Add another **URL Action**. Name it “Look up the <Year> <Summer or Winter Olympics> Olympics on Wikipedia” to look up a specific Olympics on Wikipedia from the tooltip context menu on the **Total Medals Trend** bar chart.
“https://en.wikipedia.org/wiki/<Year>_<Summer or Winter Olympics>_Olympics”
8. Test both URL actions.

Edit Titles to Support User Interaction

1. Edit the title for the map to add instructive text and format the size smaller than the main title:
“Click a country to filter”
2. Similarly, edit the bar chart title to add instructive chart and format.
“Choose a year to filter”
3. Edit the heat map titles to add instructive text and format.
“Choose a sport to filter”
4. Edit the title for the bar chart to leave the reference for the sheet name and add a reference for the Country and Sport.
<Sheet Name> - <Country> (<Sport>)
5. Similarly, edit the title for the heat map to read:
<Sheet Name> - <Country>
6. Test the interactive titles.
7. Hide all worksheets.

Practice: Device Specific Dashboards

You would like to ensure that the Olympic Medal History dashboard can be viewed on different devices. Create device specific layouts so that the dashboard is sized appropriately for a tablet and a phone.



DIRECTIONS

Create a Layout for a Tablet

1. Open **Device Specific Dashboards Starter.twbx**.
2. On the **Dashboard** menu, choose **Device Layouts** and click **Add Tablet Layout**.
When a device layout is added, you will see it appear on the Dashboard tab, under the Default dashboard layout. The default dashboard is the parent dashboard and device specific layouts are the children. In this dashboard, the Tablet layout looks like it may only need sizing changes.
3. On the **Dashboard** tab in the **Size – Tablet**, section, select Fit all button.
4. Adjust as needed.

Create a Layout for a Phone

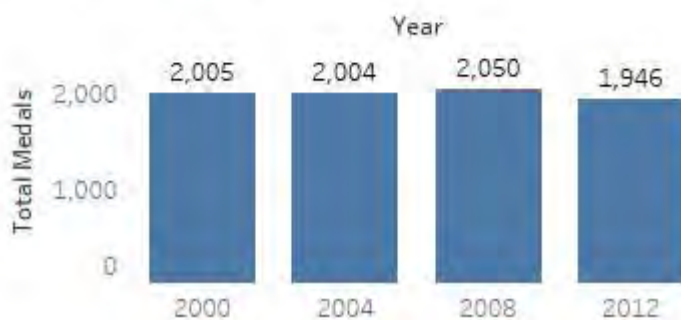
Olympic Medal History
(2000-2012)

Summer/Winter Olympics
Summer

Total Medals Won by Country



Total Medals Trend



1. Create a new **Phone** layout. The Phone layout needs some customization to adjust what is displayed.

2. To customize the new dashboard layout, click the **Custom** button. Objects can be rearranged, removed or formatted as desired. Changes are specific to the device layout. The default dashboard will not be changed.

3. Adjust the **Phone** layout as desired, or as in the example shown above. To match the preview example, do the following:

- Set the size to Fit width and change the height to 1400 px.
- Rearrange the views on the dashboard to stack them rather than having them side by side.
- Resize them as needed.
- Set the Medals by Sport view to Fit Entire View.
- Edit the dashboard title so that it is a smaller font (size 13) with enough room to show the parameter to the right of the title.

Practice: Creating a Story

You would like to lead others, step by step, through some of the analysis you have done on your data. Create a story so you can share your insights with your audience and guide them to your conclusions.

For this practice, you can use the provided starter workbook and follow the specific steps below. Alternatively, use worksheets and dashboards of your own creation, or others you have built in this class, and create a story of your own. You may also use external sources of data.

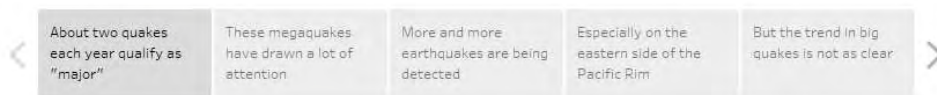
To practice your story-building skills, try to:

- Use three or more worksheets or dashboards (use the worksheets provided or create your own worksheets and dashboards).
- Introduce a problem and present a potential insight or solution.
- Create one or more story points saved at a different state than the original visualization.
- Use at least one description and annotation.
- Make use of formatting options to change the background color and the appearance of the title, navigator, and descriptions.
- Include a story navigator that is sized to fit the captions, if captions are used.

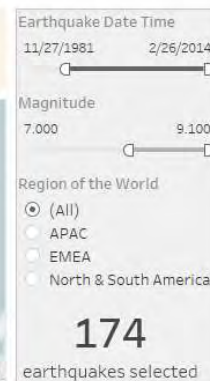
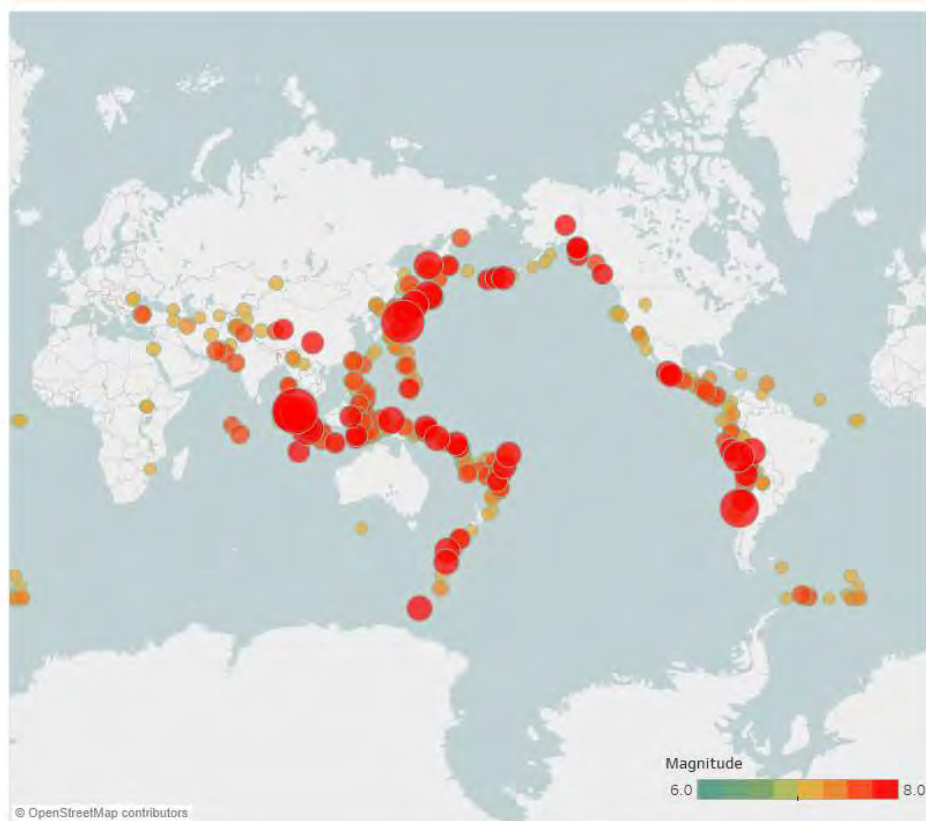
DIRECTIONS

The following shows the story created from the starter workbook as just one example of what you can do.

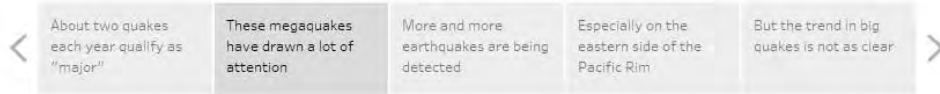
Are big earthquakes on the rise?



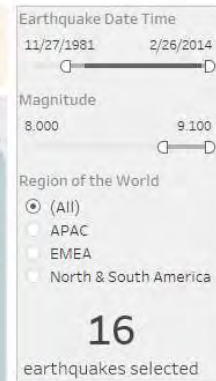
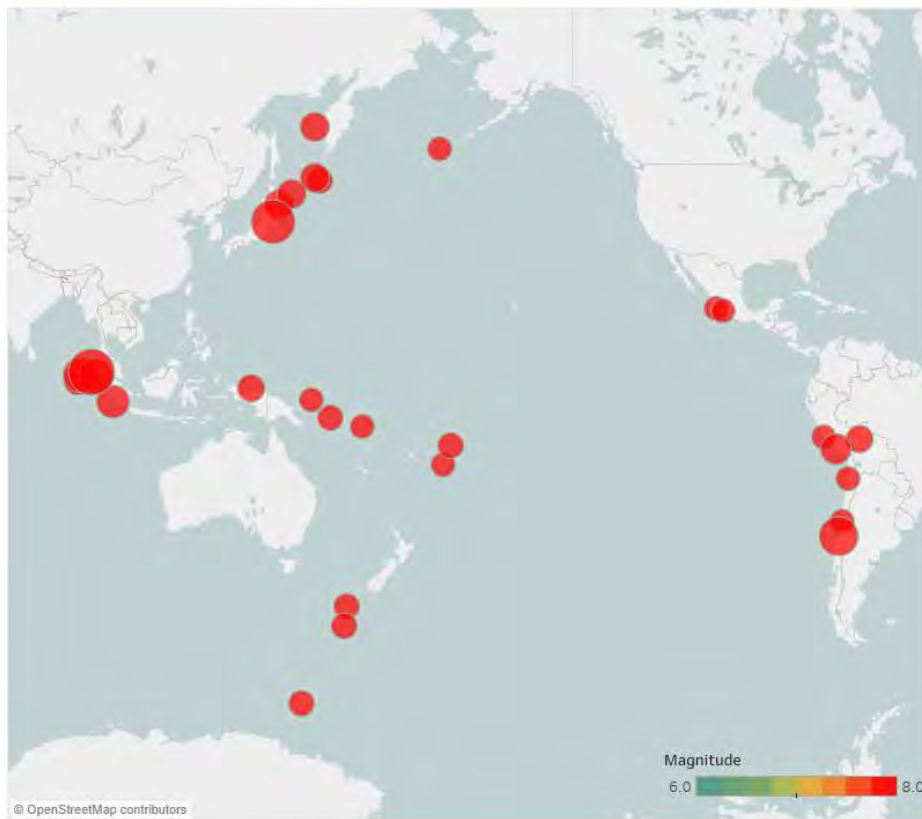
Out of over 130,000 earthquakes since 2004, only 174 were of magnitude 7.0 or greater—about two major earthquakes each year. But many people wonder, "Are earthquakes happening more often?"



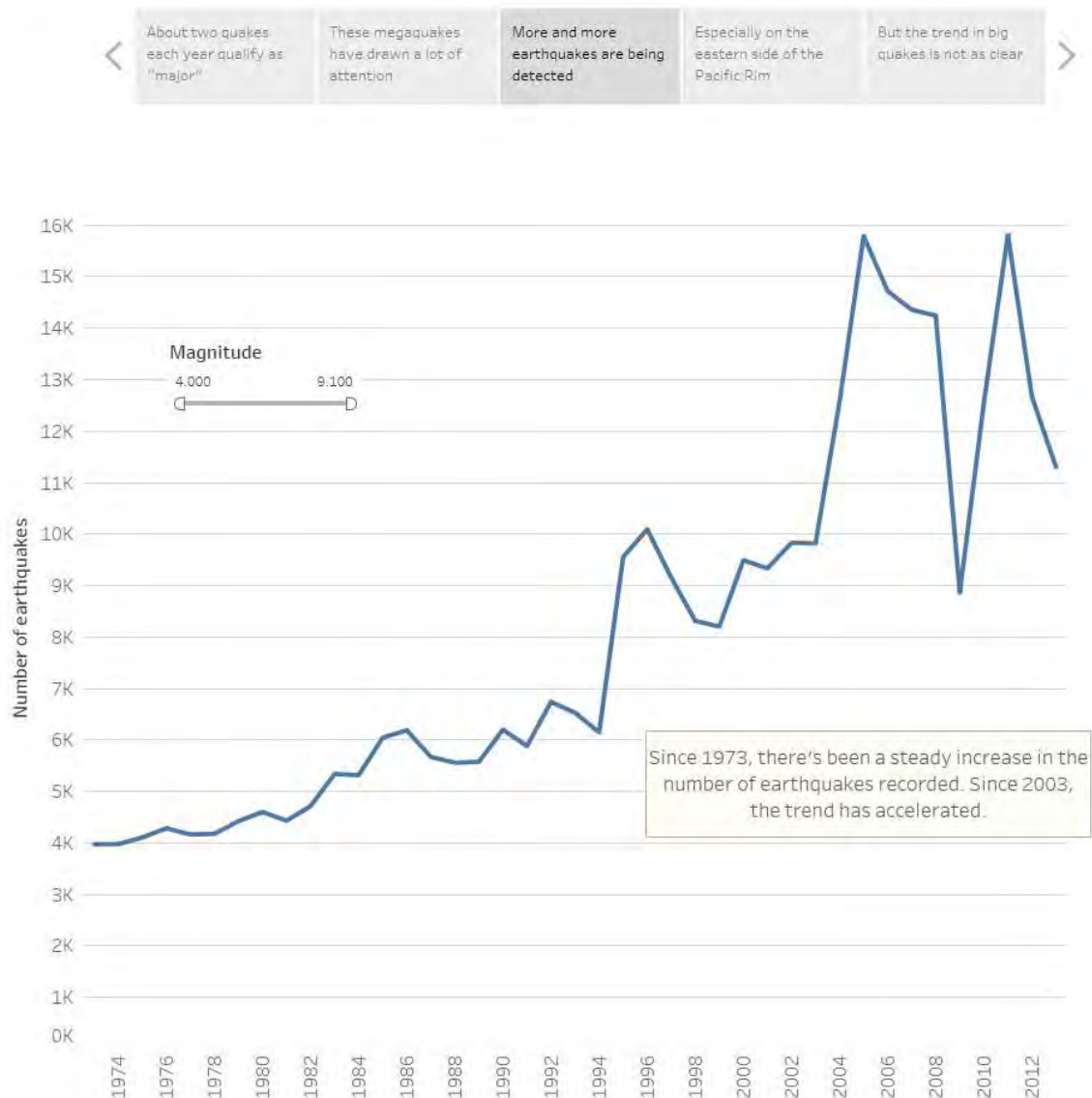
Are big earthquakes on the rise?



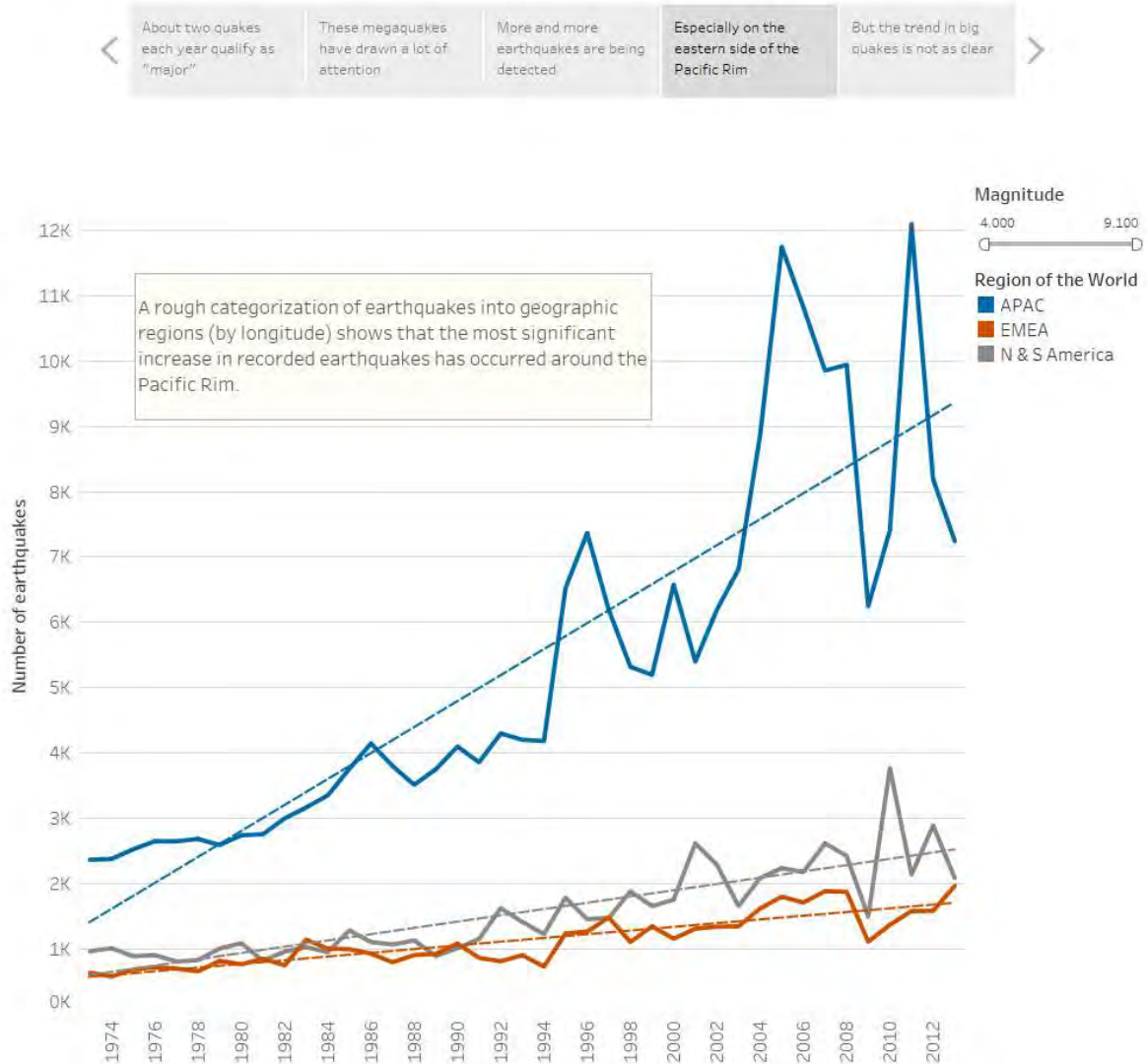
Recent megaquakes of magnitude 8.0 have often caused significant damage and loss of life. Recent undersea megaquakes near Indonesia and Japan have also caused tsunamis that have killed many thousands of people.



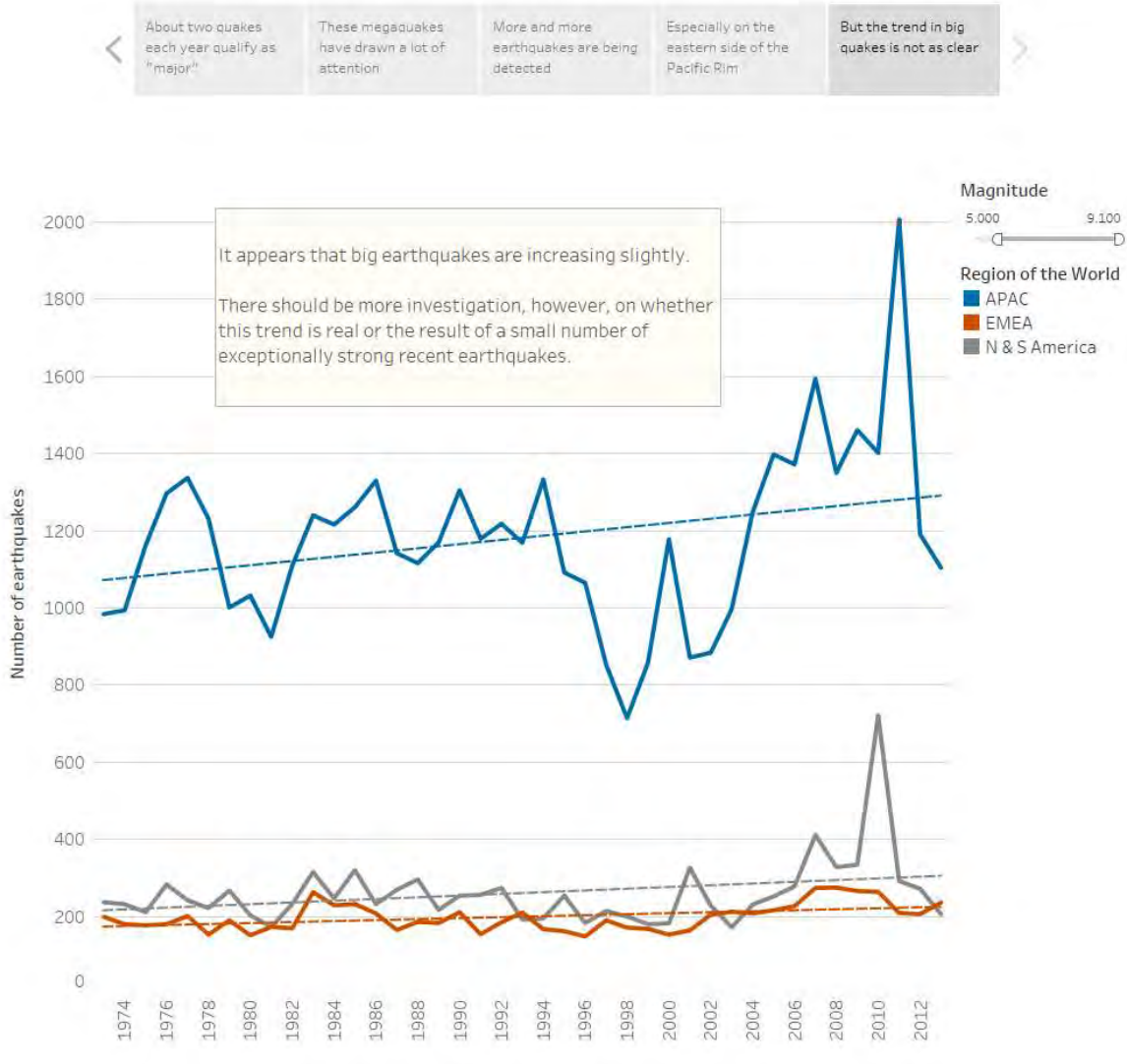
Are big earthquakes on the rise?



Are big earthquakes on the rise?



Are big earthquakes on the rise?



Create and Size the Story

1. Open **Earthquake Story Starter.twbx**.
2. Set the size of the story.
3. Give your story a title, for example, "Are big earthquakes on the rise?"

Add Worksheets and Dashboards, and Put the Story in Order

1. Add worksheets and dashboards until you have enough to tell your story.
2. Arrange the order of the story points so that they tell the best story possible.

In the example, these sheets are used in the following order with the captions and text shown above:

- Map Dashboard (x2)
- Timeline dashboard

- Timeline by region dashboard (x2)

Customize Your Story Points

1. Make sure each story point is set to the state that you want by checking the following:
 - Filter and parameter values
 - Selections
 - Sorts
 - Pan and zoom (for maps)

In the example, these story points are customized as follows:

- Map Dashboard (1st instance) – filtered to magnitude 7.0 and above
- Map Dashboard (2nd instance) – filtered to magnitude 8.0 and above
- Timeline by region dashboard (2nd instance) – filtered to magnitude 5.0 and above.

Add Descriptions and Annotations

Add descriptions to help explain your story.

In the example, the Timeline dashboard and two instances of the Timeline by Region dashboard have added descriptions. The map dashboard is modified for each instance to have a custom title adding more detailed information to the view.

Format Your Story

1. Format your story to change the background color and the appearance of the title, navigator, and descriptions. In the example, the story is formatted as shown above.
2. Resize your captions if necessary.