Data Visualization with Tableau
Session 6

Table of Contents

- Data Aggregation
- Calculated Fields
- Quick Table Calculations
- Table Calculations

Data Aggregation in Tableau

The mathematical functions that produce aggregated data are called **aggregation functions.** Aggregation functions perform a calculation on a set of values and return a single value. For example, a measure that contains the values 1, 2, 3, 3, 4 aggregated as a sum returns a **single value**:

Tableau will apply these aggregations at the appropriate level of detail.

Data Aggregation in Tableau

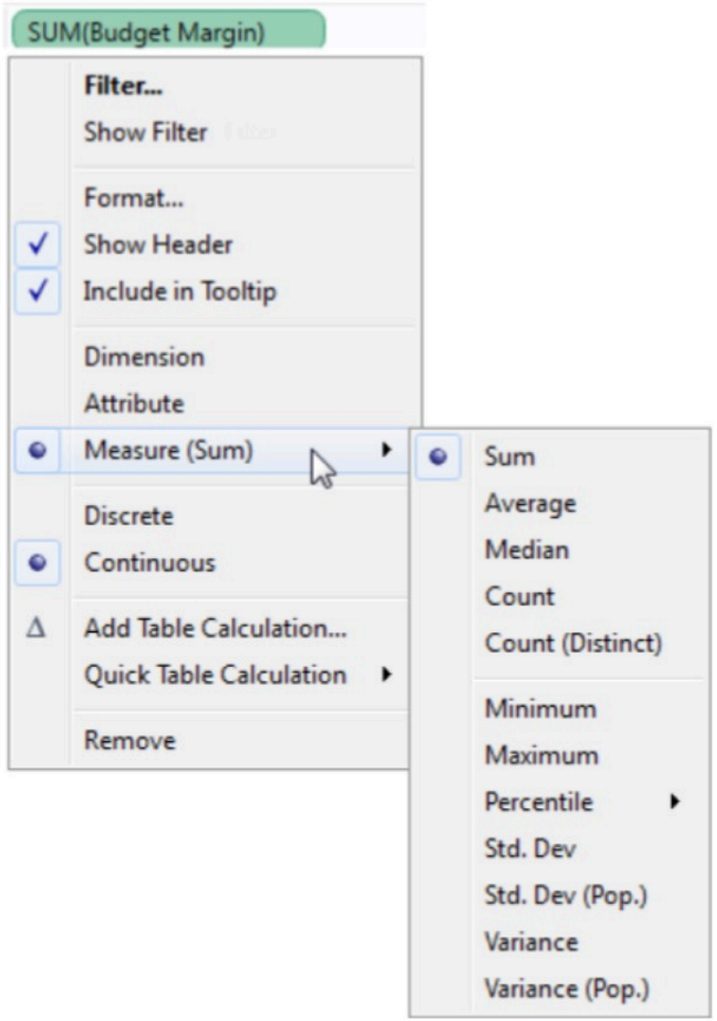
In Tableau, you can **aggregate** either **measures** or **dimensions**, though it is more **common to aggregate measures**. Whenever you add a measure to your view, an **aggregation is applied** to that measure **by default**. The type of aggregation applied varies depending on the context of the view.

Data Aggregation in Tableau

- When you add a measure to the view, Tableau automatically aggregates its values. Sum, average, and median are common aggregations.
- The current aggregation appears as part of the measure's name in the view. For example, **Sales** becomes **SUM(Sales)**. **Every measure** has a **default aggregation** which is set by Tableau when you connect to a data source. You can view or change the default aggregation for a measure.

Data Aggregation in Tableau

You can change the aggregation for a measure in the view from its context menu.



How to Disaggregate Data

Whenever you add a measure to your view, an aggregation is applied to that measure by default. This default is controlled by the **Aggregate Measures** setting in the **Analysis** menu.

If you decide you want to see all of the marks in the view at the most detailed level of granularity, you can disaggregate the view. Disaggregating your data means that Tableau will display a separate mark for every data value in every row of your data source.

How to Disaggregate Data

The level of detail is determined by the dimensions in your view. Disaggregating data can be useful when you are viewing data as a scatter plot.

Level of Detail Concept

The level of detail in a view refers to how granular the data is given the dimension and measure data in the view. As you add dimensions to **Rows** or **Columns**, the number of marks in the view increases. We could continue adding dimensions to **Rows** and **Columns** and observe as the number of total marks continues to increase.

Dragging a dimension to a location on the Marks card such as Color or Size will also increase the number of marks, though it will not increase the number of headings in the view. The process of adding dimensions to the view to increase the number of marks is known as setting the *level of detail*.

Calculations - Calculated Fields

- Calculated fields allow you to create new data from data that already exists in your data source. When you create a calculated field, you are essentially creating a new field (or column) in your data source, the values or members of which are determined by a calculation that you control.
- This new **calculated field is saved to your data source** in Tableau, and can be used to create more robust visualizations. But don't worry: **your original data remains untouched**.

Calculated Fields

You can use calculated fields for many, many reasons. Some examples might include:

- To segment data
- To convert the data type of a field, such as converting a string to a date.
- To aggregate data
- To filter results
- To calculate ratios

Type of Calculations

You create calculated fields using calculations. There are **three main types** of calculations you can use to create calculated fields in Tableau:

- Basic calculations
- Level of Detail (LOD) expressions
- Table calculations

The type of calculation you choose depends on the needs of your analysis and the question you want to answer.

Calculated Fields

- Basic calculations

  Basic calculations allow you to transform values or members at the data source level of detail (a row-level calculation) or at the visualization level of detail (an aggregate calculation).

Quick Table Calculations

- **Quick table calculations** are **table calculations** that you can apply quickly to your visualization in **Tableau**.
- The following quick **table calculations** are available in Tableau for you to use:
  - Running total
  - Difference
  - Percent difference
  - Percent of total
  - Rank
  - Percentile
  - Moving average
  - YTD total
  - Compound growth rate
  - Year of year growth
  - YTD growth

Quick Table Calculations

- You can only perform quick table calculations on measures in the view.
- These predefined calculations are called table calculations because they compute the result based on a virtual table that includes only the numbers on the view.
- A delta symbol appears on the field to indicate that a quick table calculation is being applied to the field.
- Table calculations can be saved for future use as calculated field

Table Calculations

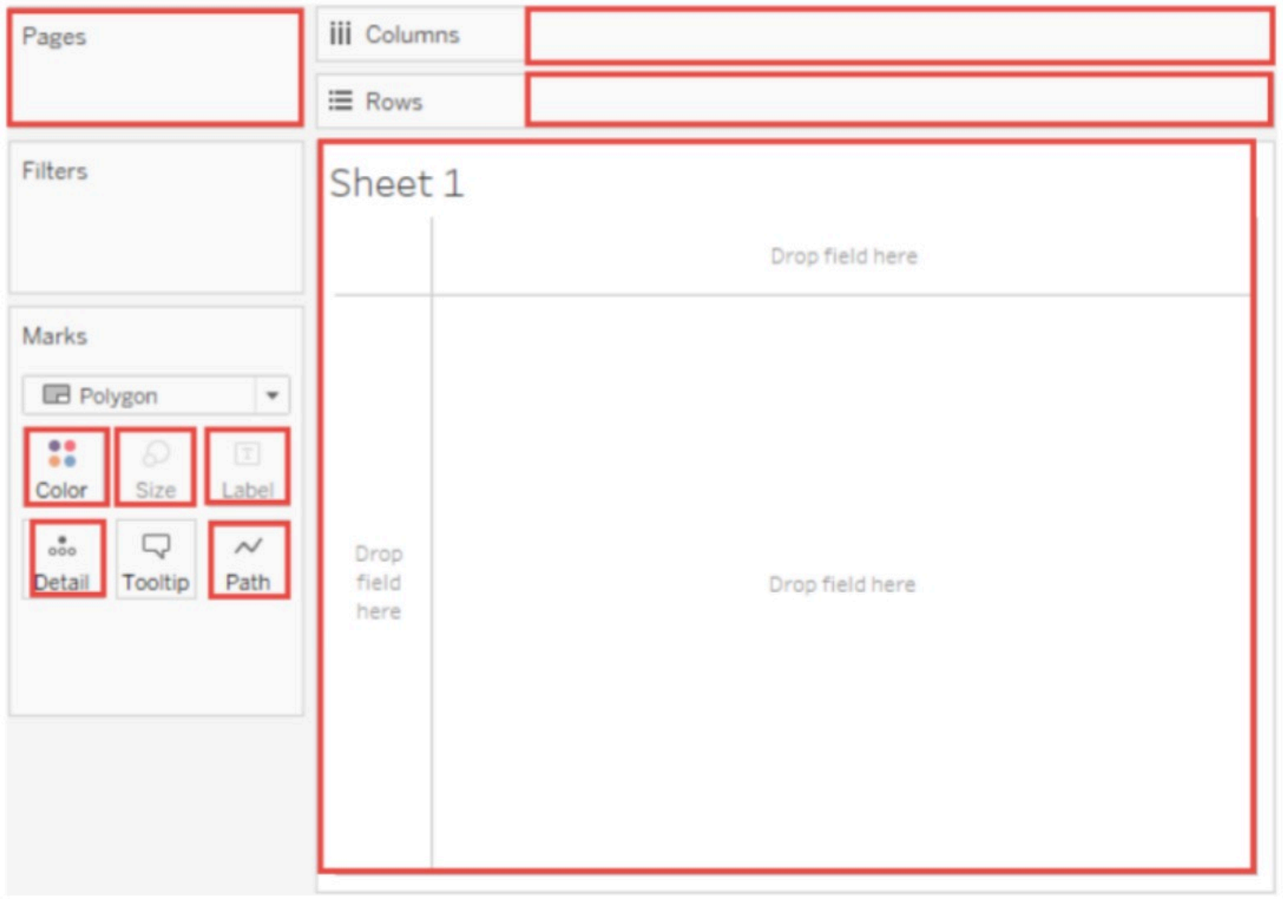
- A table calculation is a transformation you apply to the values in a visualization. Table calculations are a special type of calculated field that computes on the local data in Tableau. They are calculated based on what is currently in the visualization and do not consider any measures or dimensions that are filtered out of the visualization.

Table Calculations

- You can use table calculations for a variety of purposes, including:
  a. Transforming values to rankings
  b. Transforming values to show running totals
  c. Transforming values to show percent of total

Table Calculations

For any Tableau visualization, there is a virtual table that is determined by the dimensions in the view. This table is not the same as the tables in your data source. Specifically, the virtual table is determined by the dimensions within the “level of detail,” which means the dimensions on any of the following shelves or cards in a Tableau worksheet:



Addressing and Partitioning

- When you add a table calculation, you must use all dimensions in the level of detail either for **partitioning** (**scoping**) or for **addressing** (**direction**).
- The remaining dimensions, upon which the table calculation is performed, are called addressing fields, and determine the direction of the calculation.

Addressing and Partitioning

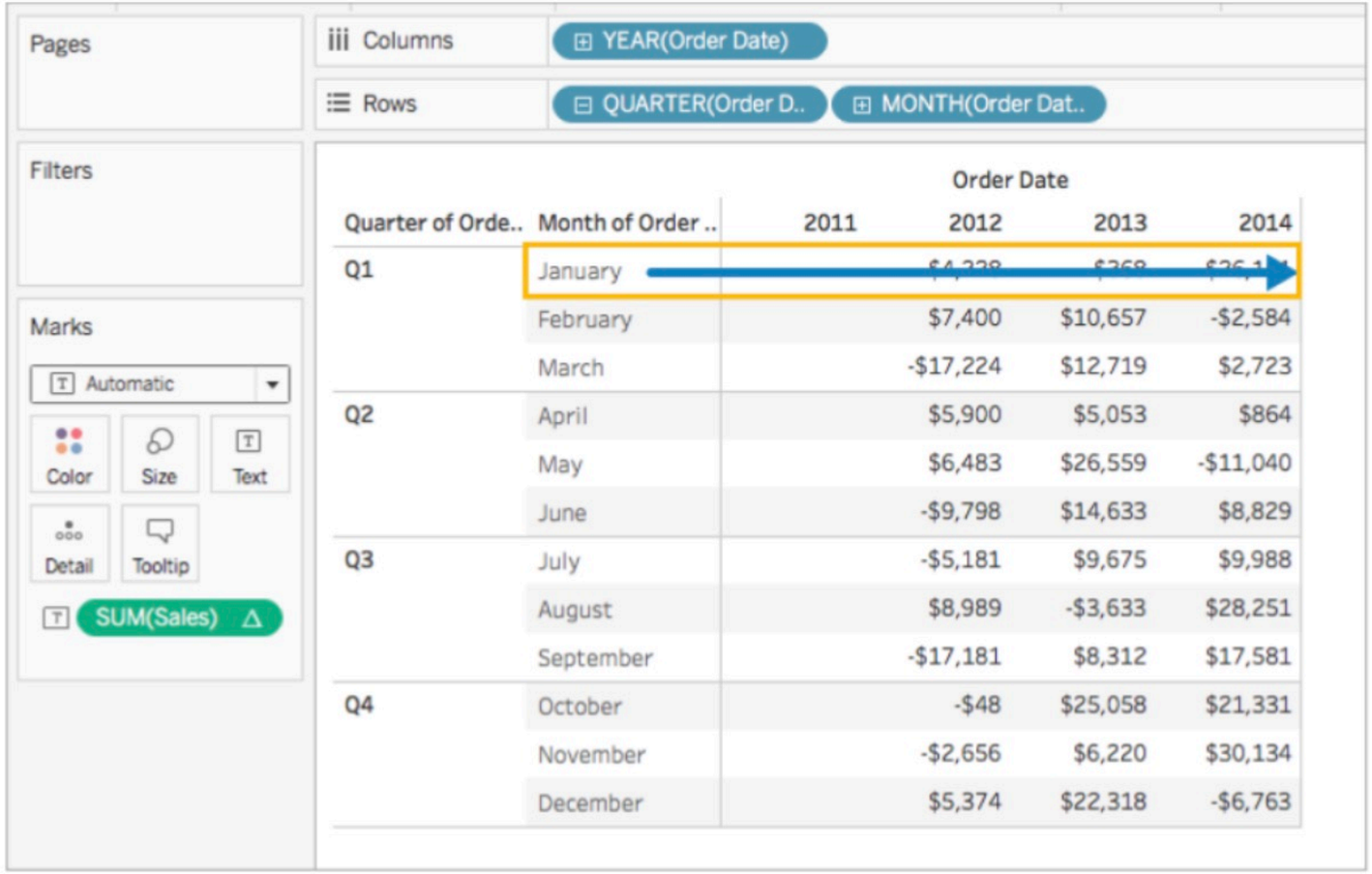
- Partitioning fields break the view up into multiple sub-views (or sub-tables), and then the table calculation is applied to the marks within each such partition. The direction in which the calculation moves (for example, in calculating a running sum, or computing the difference between values) is determined by the addressing fields.

Addressing and Partitioning

- When you add a table calculation using the Compute Using options, Tableau identifies some dimensions as addressing and others as partitioning automatically, as a result of your selections. But when you use Specific Dimensions, then it’s up to you to determine which dimensions are for addressing and which for partitioning.

Table (across)

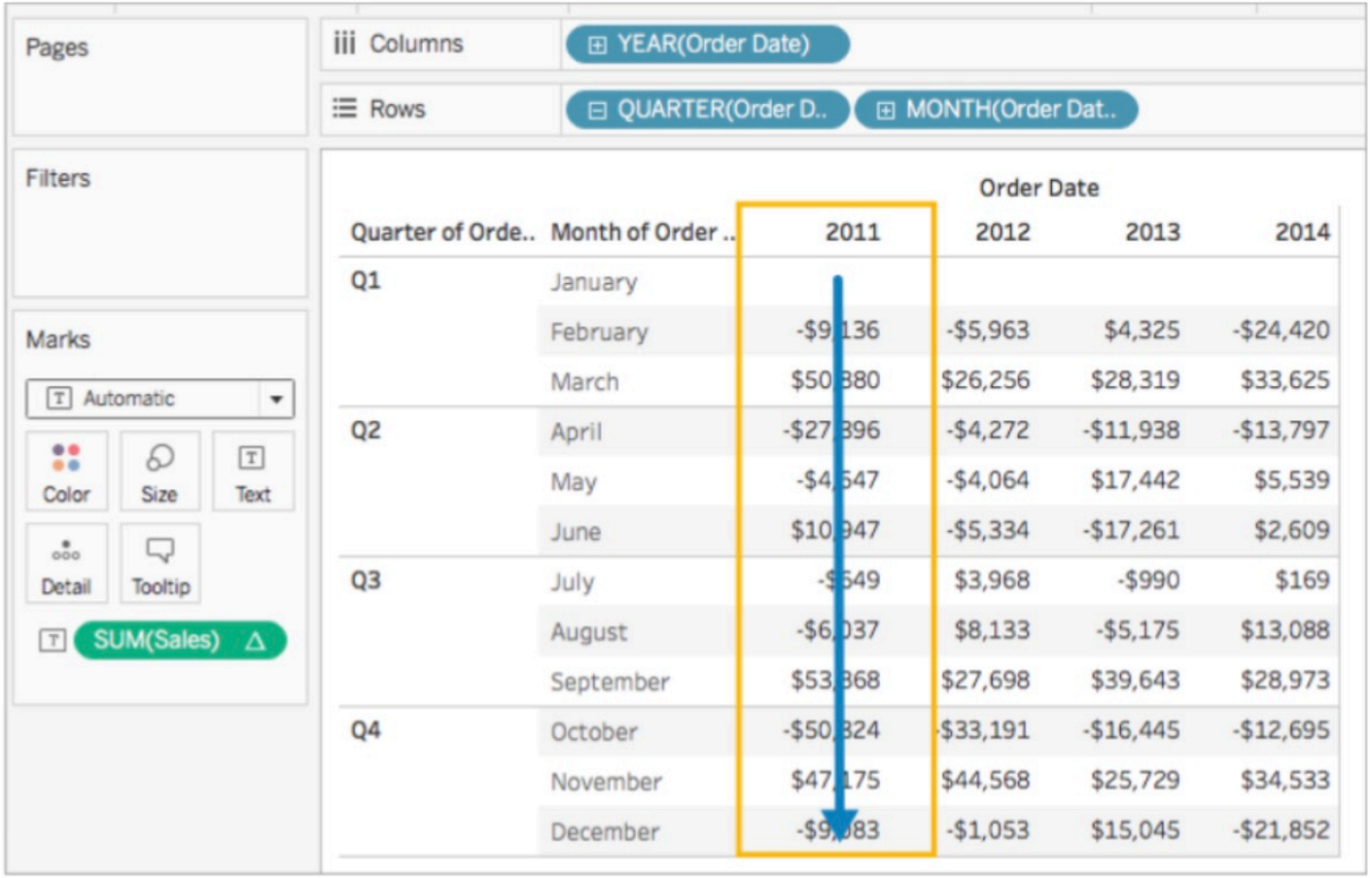
- Computes across the length of the table and restarts after every partition.
- For example, in the following table, the calculation is computed across columns (YEAR(Order Date)) for every row (MONTH(Order Date)).



		Order Date			
Quarter of Orde..	Month of Order ..	2011	2012	2013	2014
Q1	January		[illegible]	[illegible]	[illegible]
	February		$7,400	$10,657	-$2,584
	March		-$17,224	$12,719	$2,723
Q2	April		$5,900	$5,053	$864
	May		$6,483	$26,559	-$11,040
	June		-$9,798	$14,633	$8,829
Q3	July		-$5,181	$9,675	$9,988
	August		$8,989	-$3,633	$28,251
	September		-$17,181	$8,312	$17,581
Q4	October		-$48	$25,058	$21,331
	November		-$2,656	$6,220	$30,134
	December		$5,374	$22,318	-$6,763

Table (down)

- Computes down the length of the table and restarts after every partition.
- For example, in the following table, the calculation is computed down rows (MONTH(Order Date)) for every column (YEAR(Order Date)).



		Order Date			
Quarter of Orde..	Month of Order ..	2011	2012	2013	2014
Q1	January				
	February	-$9,136	-$5,963	$4,325	-$24,420
	March	$50,380	$26,256	$28,319	$33,625
Q2	April	-$27,396	-$4,272	-$11,938	-$13,797
	May	-$4,647	-$4,064	$17,442	$5,539
	June	$10,947	-$5,334	-$17,261	$2,609
Q3	July	-$549	$3,968	-$990	$169
	August	-$6,037	$8,133	-$5,175	$13,088
	September	$53,868	$27,698	$39,643	$28,973
Q4	October	-$50,324	-$33,191	-$16,445	-$12,695
	November	$47,175	$44,568	$25,729	$34,533
	December	-$9,083	-$1,053	$15,045	-$21,852

Table (across then down)

- Computes across the length of the table, and then down the length of the table.
- For example, in the following table, the calculation is computed across columns (YEAR(Order Date)), down a row (MONTH(Order Date)), and then across columns again for the entire table.

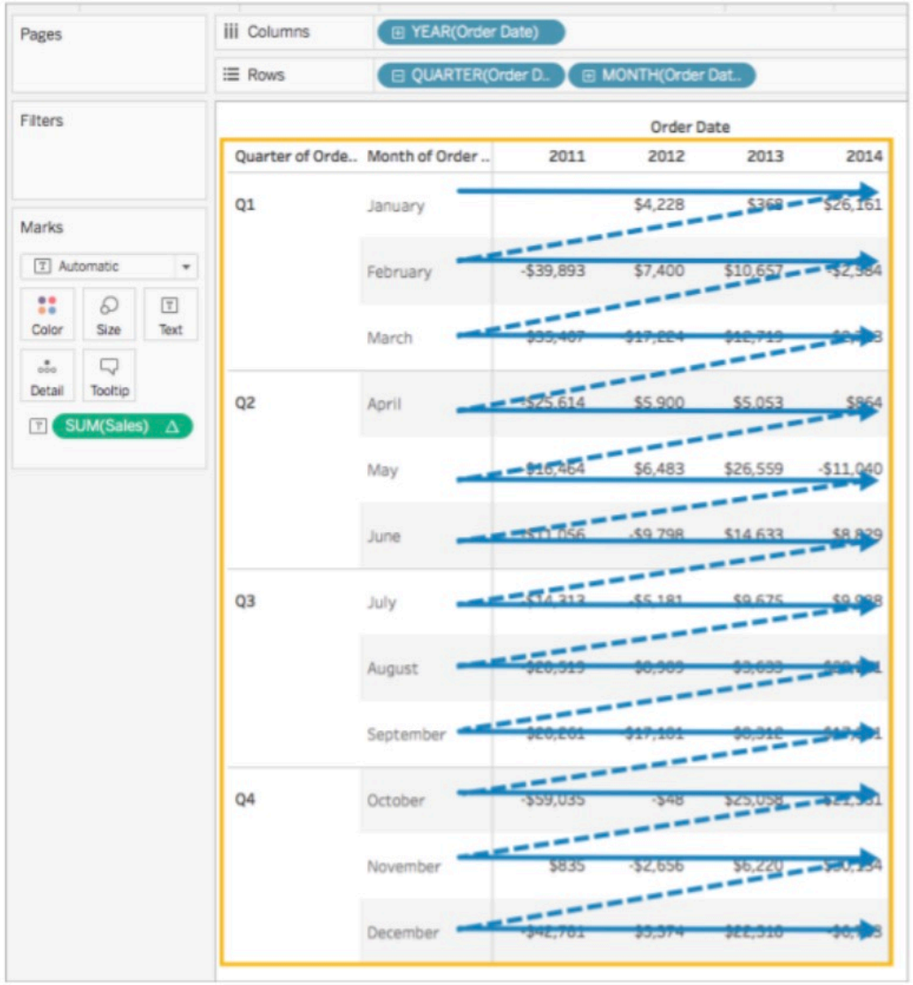
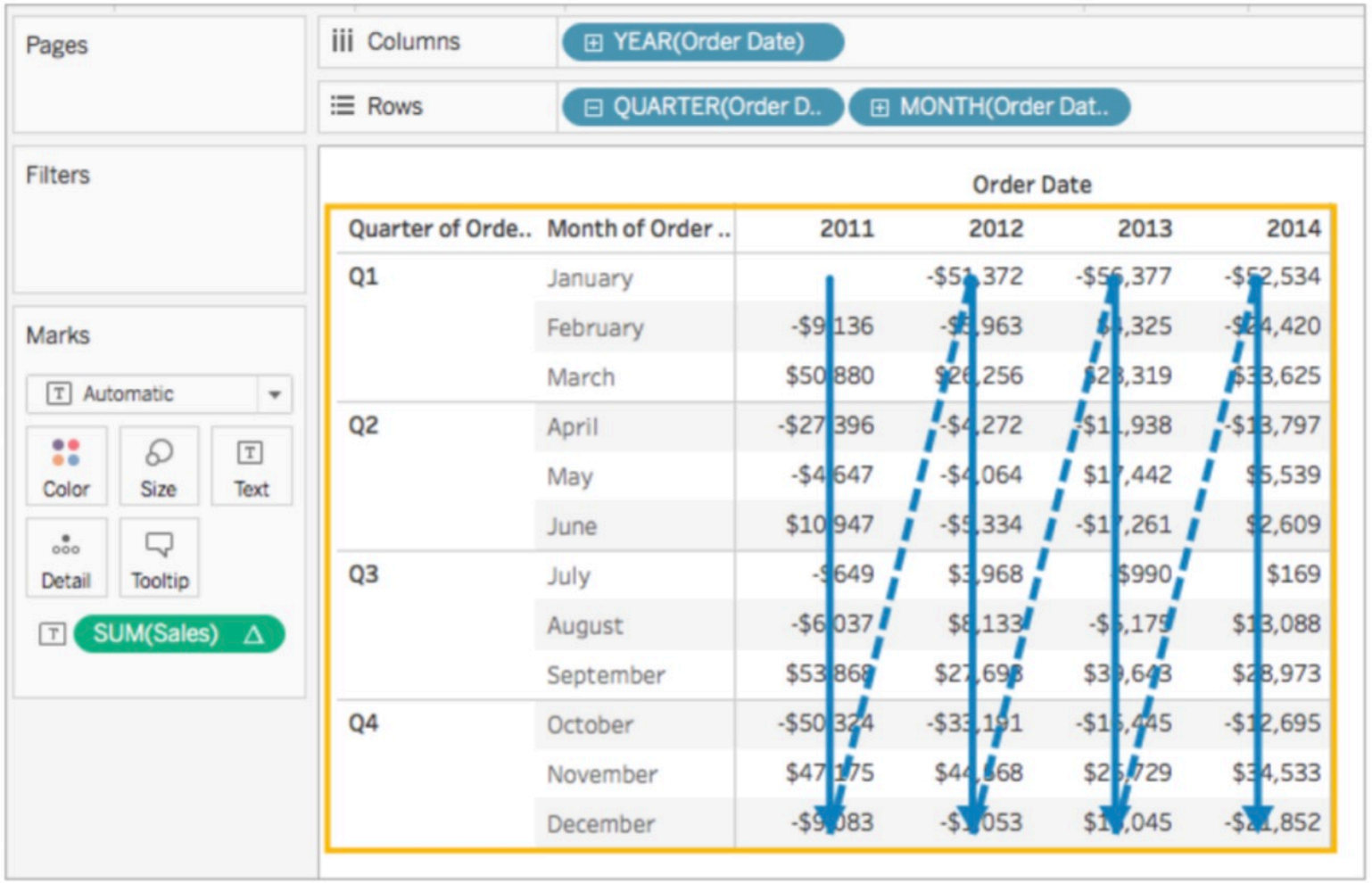


Table (down then across)

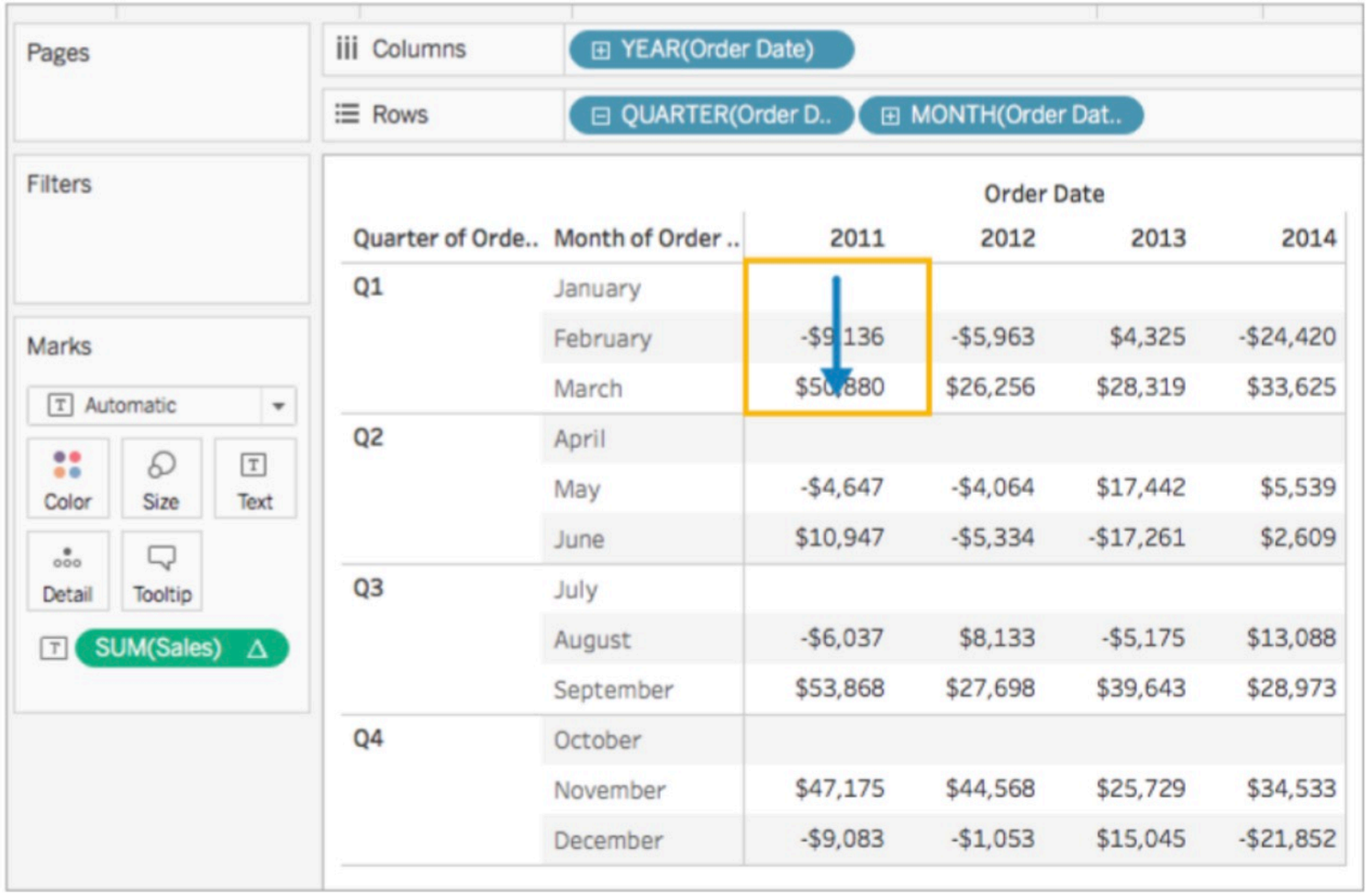
- Computes down the length of the table, and then across the length of the table.
- For example, in the following table, the calculation is computed down rows (MONTH(Order Date)), across a column (YEAR(Order Date), and then down rows again.



		Order Date			
Quarter of Orde..	Month of Order ..	2011	2012	2013	2014
Q1	January		-$51,372	-$56,377	-$52,534
	February	-$9,136	-$1,963	$4,325	-$24,420
	March	$50,880	$26,256	$28,319	$33,625
Q2	April	-$27,396	-$4,272	-$11,938	-$13,797
	May	-$4,647	-$4,064	$17,442	$5,539
	June	$10,947	-$9,334	-$17,261	$2,609
Q3	July	-$649	$3,968	$990	$169
	August	-$6,037	$8,133	-$5,175	$13,088
	September	$53,868	$27,698	$39,643	$28,973
Q4	October	-$50,324	-$33,191	-$16,445	-$12,695
	November	$47,175	$44,668	$26,729	$34,533
	December	-$9,083	-$1,053	$17,045	-$41,852

Pane (down)

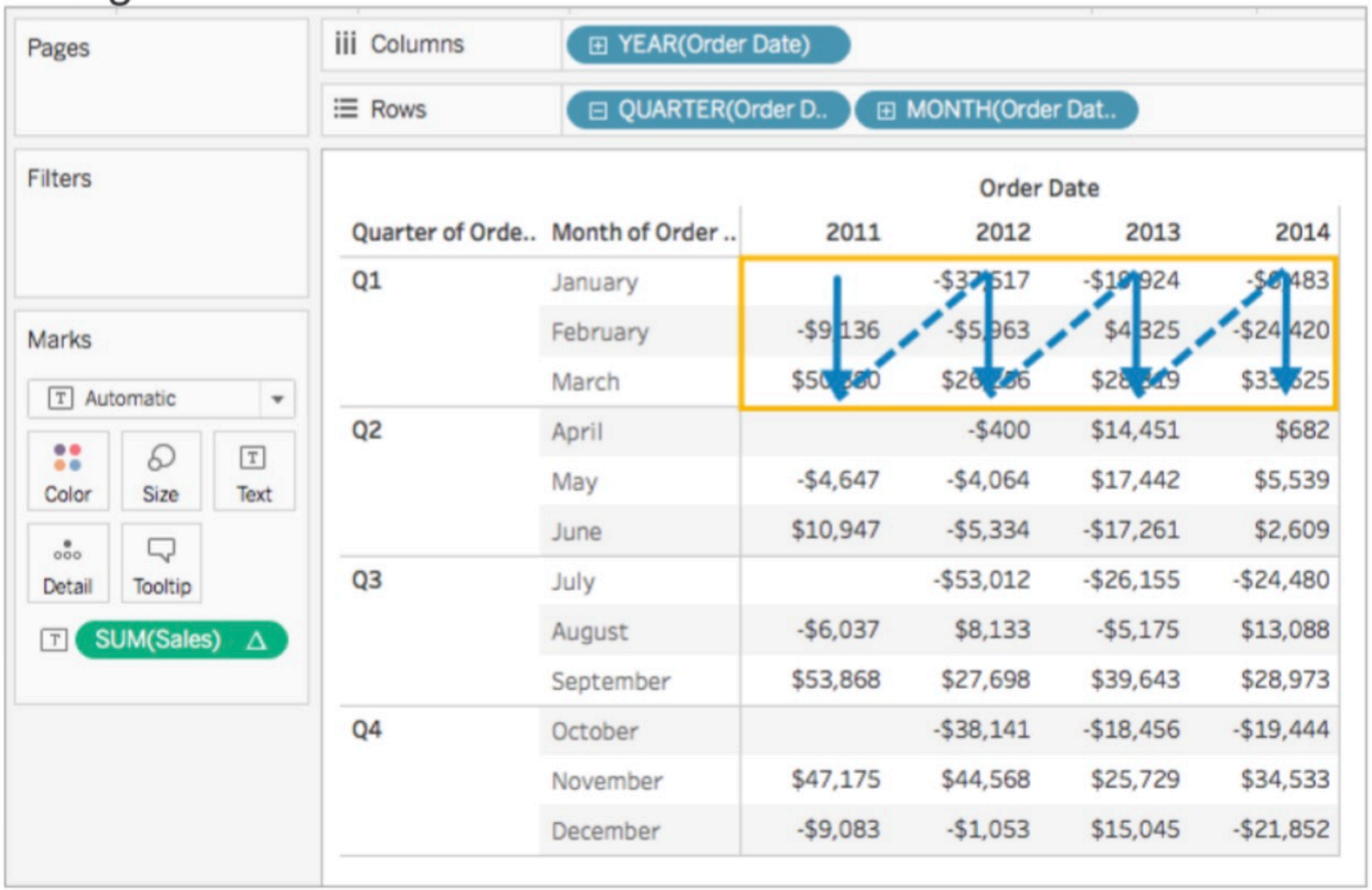
- Computes down an entire pane.
- For example, in the following table, the calculation is computed down rows (MONTH(Order Date)) for a single pane.



		Order Date			
Quarter of Orde..	Month of Order ..	2011	2012	2013	2014
Q1	January				
	February	-$9,136	-$5,963	$4,325	-$24,420
	March	$50,880	$26,256	$28,319	$33,625
Q2	April				
	May	-$4,647	-$4,064	$17,442	$5,539
	June	$10,947	-$5,334	-$17,261	$2,609
Q3	July				
	August	-$6,037	$8,133	-$5,175	$13,088
	September	$53,868	$27,698	$39,643	$28,973
Q4	October				
	November	$47,175	$44,568	$25,729	$34,533
	December	-$9,083	-$1,053	$15,045	-$21,852

Pane (down then across)

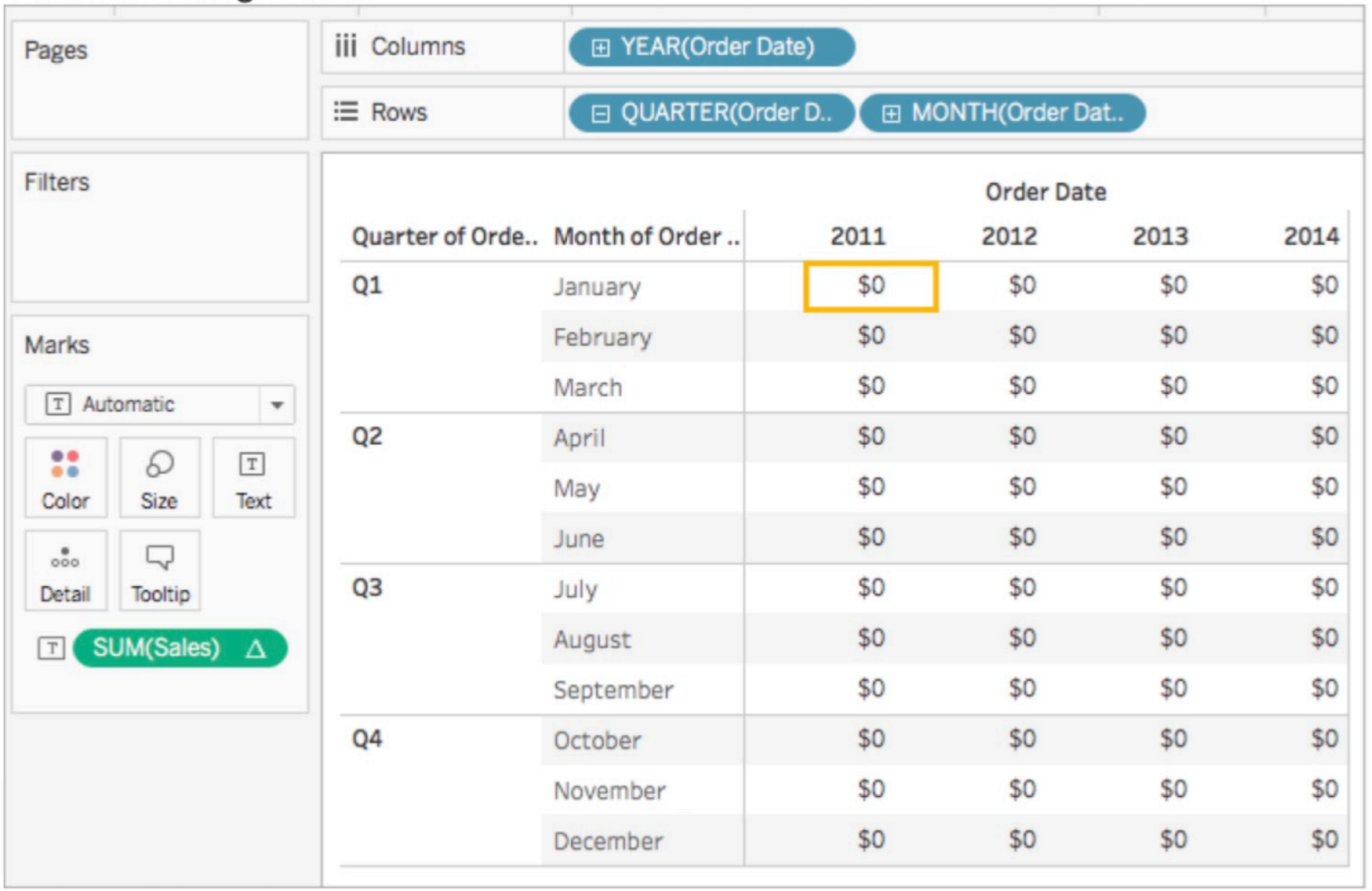
- Computes down an entire pane and then across the pane.
- For example, in the following table, the calculation is computed down rows (MONTH(Order Date)) for the length of the pane, across a column (YEAR(Order Date)), and then down the length of the pane agian.



		Order Date			
Quarter of Orde..	Month of Order ..	2011	2012	2013	2014
Q1	January		-$37,517	-$18,924	-$6,483
	February	-$9,136	-$5,963	$4,325	-$24,420
	March	$50,[illegible]80	$26,[illegible]66	$28,[illegible]49	$33,625
Q2	April		-$400	$14,451	$682
	May	-$4,647	-$4,064	$17,442	$5,539
	June	$10,947	-$5,334	-$17,261	$2,609
Q3	July		-$53,012	-$26,155	-$24,480
	August	-$6,037	$8,133	-$5,175	$13,088
	September	$53,868	$27,698	$39,643	$28,973
Q4	October		-$38,141	-$18,456	-$19,444
	November	$47,175	$44,568	$25,729	$34,533
	December	-$9,083	-$1,053	$15,045	-$21,852

Cell

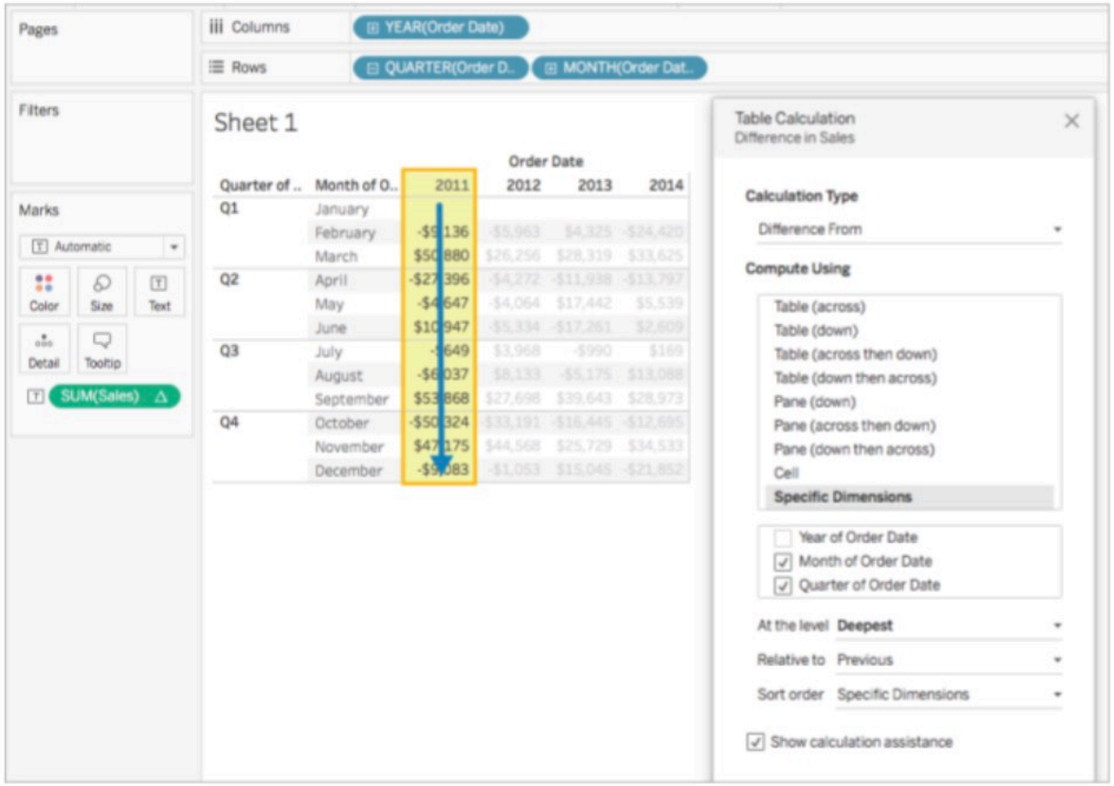
- Computes within a single cell.



		Order Date			
Quarter of Orde..	Month of Order ..	2011	2012	2013	2014
Q1	January	$0	$0	$0	$0
	February	$0	$0	$0	$0
	March	$0	$0	$0	$0
Q2	April	$0	$0	$0	$0
	May	$0	$0	$0	$0
	June	$0	$0	$0	$0
Q3	July	$0	$0	$0	$0
	August	$0	$0	$0	$0
	September	$0	$0	$0	$0
Q4	October	$0	$0	$0	$0
	November	$0	$0	$0	$0
	December	$0	$0	$0	$0

Specific Dimension

- Computes only within the dimensions you specify.
- For example, in the following visualization the dimensions, Month of Order Date and Quarter of Order Date, are the addressing fields (since they are selected), and Year of Order Date is the partitioning field (since it is not selected). So the calculation transforms the difference from each month across all quarters within a year. The calculation starts over for every year. Note that if all dimensions are selected, then the entire table is in scope.



Wrap-up

- Data Aggregation
- Calculated Fields
- Quick Table Calculations
- Table Calculations