Tableau Calculations

João Moura Pires

Notice

- **Author**
  - **João Moura Pires (jmp@fct.unl.pt)**

- **This material can be freely used for personal or academic purposes without any previous authorization from the authors, provided that this notice is maintained/kept.**

- **For commercial purposes the use of any part of this material requires the previous authorization from the authors.**

Table of Contents

- **Introduction**
- **Tableau Calculations**
- **Level of Detail (LOD) expressions**
- **Table Calculations**

Introduction

Drag & Drop => Querying your data

Pages

Filters

Marks

Automatic

Color | Size | Label | Detail | Tooltip

SUM(Numb..

Columns: Drive Train

Rows: Brand, Class

Class by Drive Train - % Class

		Drive Train			
Brand	Class	AWD	FWD	RWD	Grand To..
Acura	Normal		100,00%		100,00%
	Sports			100,00%	100,00%
	SUV	100,00%			100,00%
Audi	Normal	61,54%	38,46%		100,00%
	Sports	50,00%	50,00%		100,00%
	Wagon	100,00%			100,00%
BMW	Normal	15,38%		84,62%	100,00%
	Sports			100,00%	100,00%
	SUV	100,00%			100,00%
	Wagon	100,00%			100,00%
Buick	Normal		100,00%		100,00%
	SUV	50,00%	50,00%		100,00%
Cadillac	Normal		75,00%	25,00%	100,00%
	Pickup	100,00%			100,00%
	Sports			100,00%	100,00%
	SUV		100,00%		100,00%
Chevrolet	Minivcan	50,00%	50,00%		100,00%
	Normal		100,00%		100,00%
	Pickup	60,00%		40,00%	100,00%
	Sports			100,00%	100,00%
	SUV	25,00%	75,00%		100,00%
	Wagon		100,00%		100,00%
Chrysler	Minivcan		100,00%		100,00%
	Normal		100,00%		100,00%
	Sports			100,00%	100,00%
	Wagon			100,00%	100,00%
CMC	SUV		100,00%		100,00%

Drag & Drop => Querying your data

Pages

Filters

Marks

Automatic

Color | Size | Label | Detail | Tooltip

SUM(Numb..

Columns: Drive Train

Rows: Brand, Class

Class by Drive Train - % Class

Brand	Class	Drive Train: AWD	FWD	RWD	Grand To..
Acura	Normal		100,00%		100,00%
	Sports			100,00%	100,00%
	SUV	100,00%			100,00%
Audi	Normal	61,54%	38,46%		100,00%
	Sports	50,00%	50,00%		100,00%
	Wagon	100,00%			100,00%
BMW	Normal	15,38%		84,62%	100,00%
	Sports			100,00%	100,00%
	SUV	100,00%			100,00%
	Wagon	100,00%			100,00%
Buick	Normal		100,00%		100,00%
	SUV	50,00%	50,00%		100,00%
Cadillac	Normal		75,00%	25,00%	100,00%
	Pickup	100,00%			100,00%
	Sports			100,00%	100,00%
	SUV		100,00%		100,00%
Chevrolet	Minivcan	50,00%	50,00%		100,00%
	Normal		100,00%		100,00%
	Pickup	60,00%		40,00%	100,00%
	Sports			100,00%	100,00%
	SUV	25,00%	75,00%		100,00%
	Wagon		100,00%		100,00%
Chrysler	Minivcan		100,00%		100,00%
	Normal		100,00%		100,00%
	Sports			100,00%	100,00%
	Wagon			100,00%	100,00%
CMC	SUV		100,00%		100,00%

View Data: Class by Drive Train - % Class

Show aliases

Brand	Class	Drive Train	% of Total Number of Records
Acura	Sports	RWD	100,0000%
Acura	Normal	FWD	100,0000%
Acura	SUV	AWD	100,0000%
Audi	Sports	FWD	50,0000%
Audi	Normal	FWD	38,4615%
Audi	Wagon	AWD	100,0000%
Audi	Sports	AWD	50,0000%
Audi	Normal	AWD	61,5385%
BMW	Sports	RWD	100,0000%
BMW	Normal	RWD	84,6154%
BMW	Wagon	AWD	100,0000%
BMW	SUV	AWD	100,0000%
BMW	Normal	AWD	15,3846%
Buick	SUV	FWD	50,0000%
Buick	Normal	FWD	100,0000%
Buick	SUV	AWD	50,0000%

Summary | Full Data

Drag & Drop => Querying your data

Pages

Filters

Marks

Automatic

Color | Size | Label | Detail | Tooltip

SUM(Numb..

Columns: Drive Train

Rows: Brand, Class

Class by Drive Train - % Class

Brand	Class	Drive Train: AWD	FWD	RWD	Grand To..
Acura					
Audi					
BMW					
Buick					
Cadillac					
Chevrolet					
Chrysler					
CMC					

View Data: Class by Drive Train - % Class

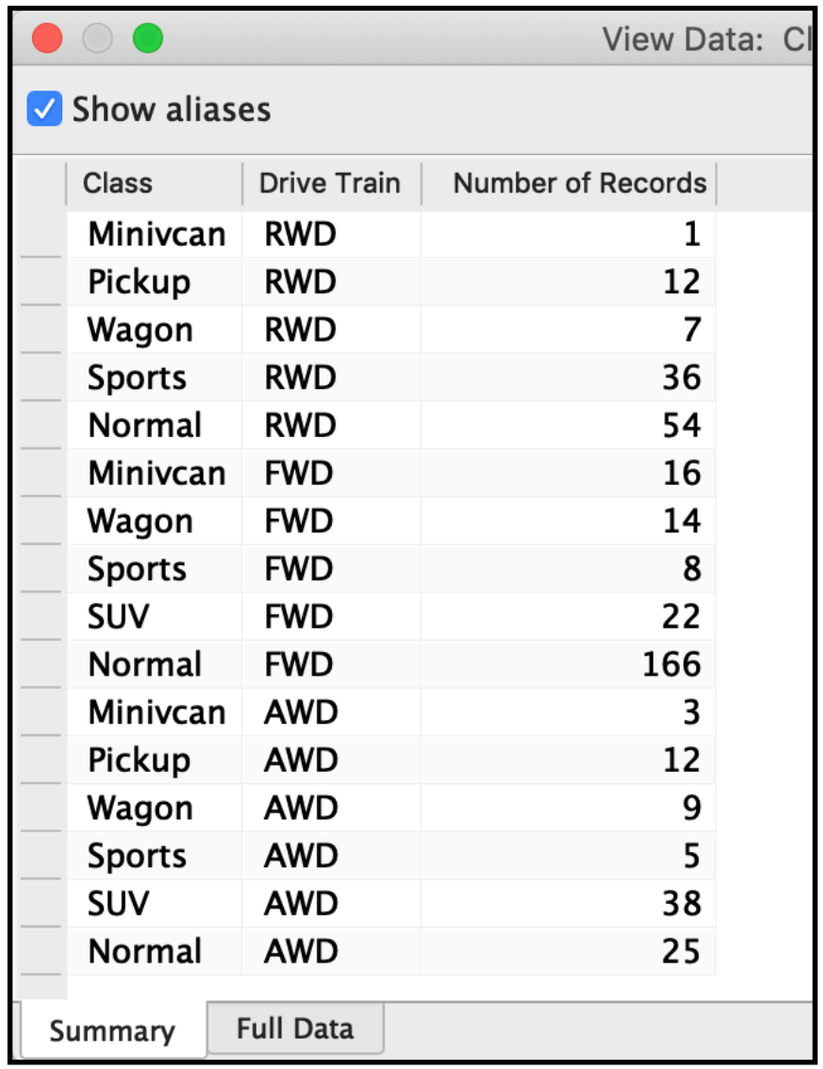
428 | Show aliases | Show all fields | Copy | Export All

AWD	Brand	Class	Cyl	Dealer Cost (bin)	Dealer Cost (bin) (by parameter)	Drive Train	Engine Size (l) (bin
0	Acura	Normal	6	37,848	36,000	FWD	4
0	Acura	Normal	6	37,848	40,000	FWD	4
1	Acura	SUV	6	31,540	32,000	AWD	4
0	Acura	Sports	6	75,696	76,000	RWD	3
0	Acura	Normal	4	18,924	20,000	FWD	2
0	Acura	Normal	6	25,232	28,000	FWD	3
0	Acura	Normal	4	18,924	24,000	FWD	2
0	Audi	Normal	4	18,924	20,000	FWD	2
0	Audi	Normal	6	25,232	28,000	FWD	3
0	Audi	Normal	6	37,848	36,000	FWD	3
1	Audi	Normal	6	25,232	28,000	AWD	3
1	Audi	Normal	6	25,232	28,000	AWD	3
1	Audi	Normal	6	37,848	40,000	AWD	3
0	Audi	Normal	4	31,540	32,000	FWD	2
1	Audi	Normal	6	37,848	36,000	AWD	3
0	Audi	Normal	6	31,540	32,000	FWD	3

Summary | Full Data | 428 rows

Drag & Drop => Querying your data

Drag & Drop => Querying your data

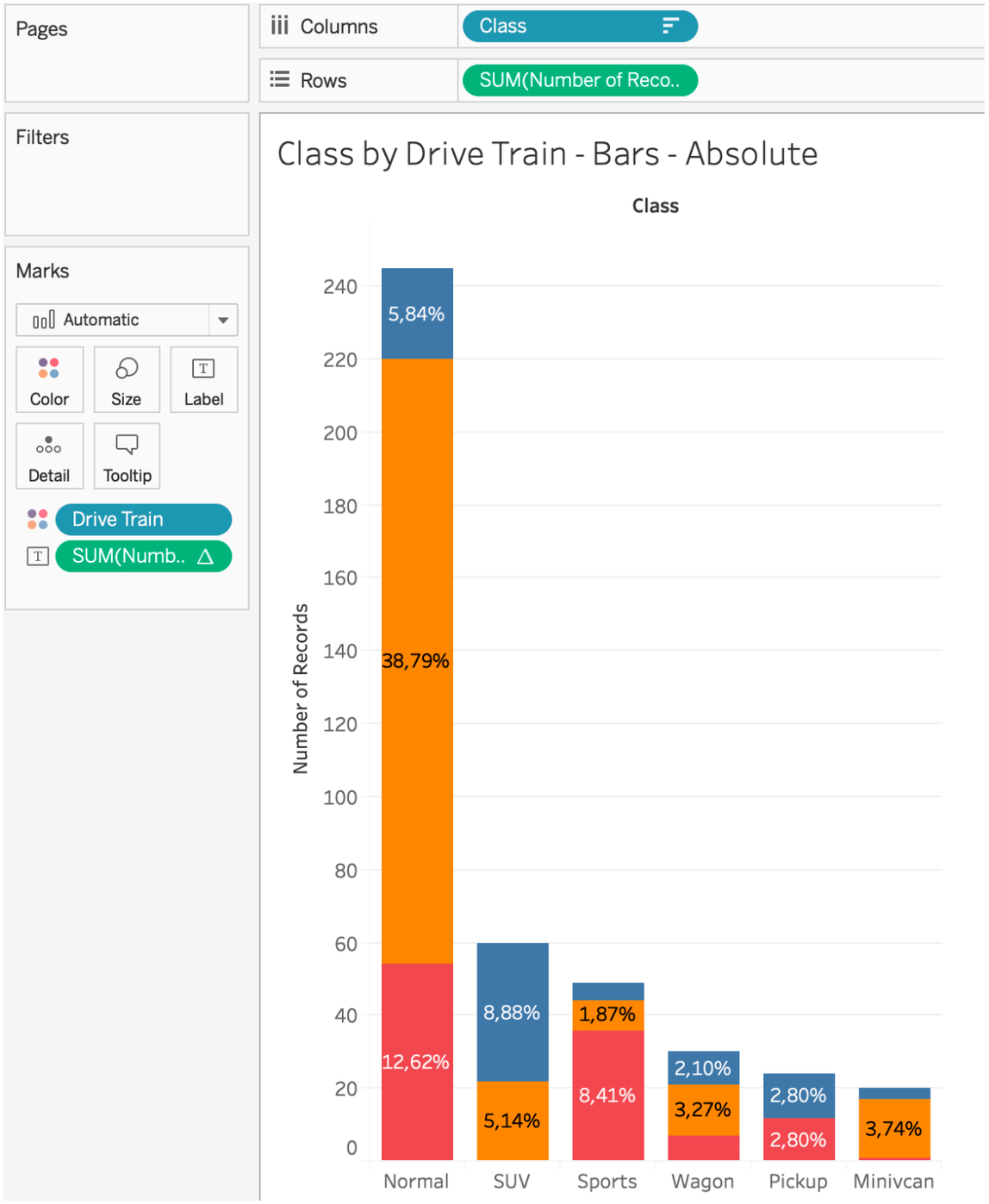

View Data: Cl

Show aliases

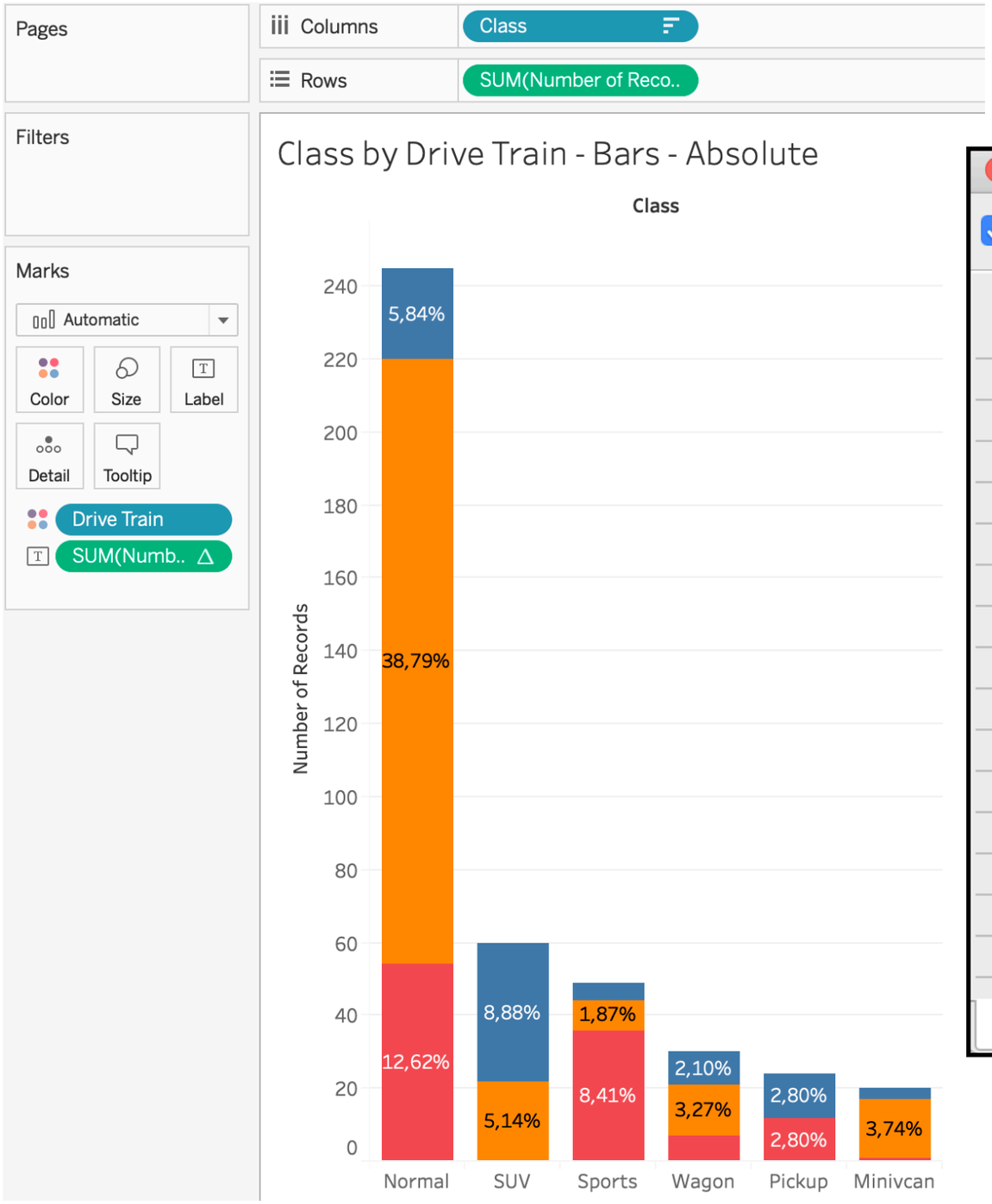
Class	Drive Train	Number of Records
Minivcan	RWD	1
Pickup	RWD	12
Wagon	RWD	7
Sports	RWD	36
Normal	RWD	54
Minivcan	FWD	16
Wagon	FWD	14
Sports	FWD	8
SUV	FWD	22
Normal	FWD	166
Minivcan	AWD	3
Pickup	AWD	12
Wagon	AWD	9
Sports	AWD	5
SUV	AWD	38
Normal	AWD	25

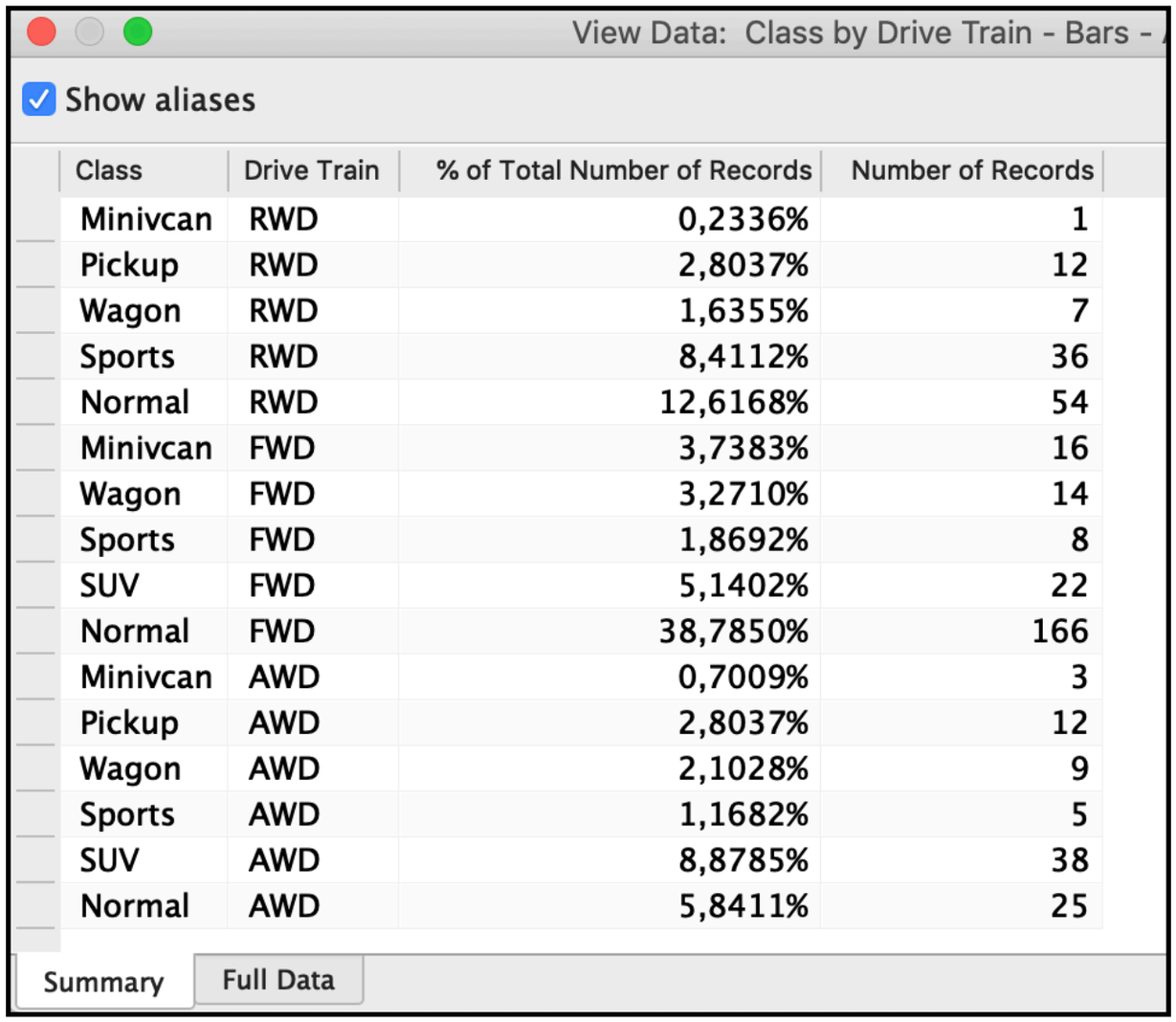
Summary | Full Data

Drag & Drop => Querying your data



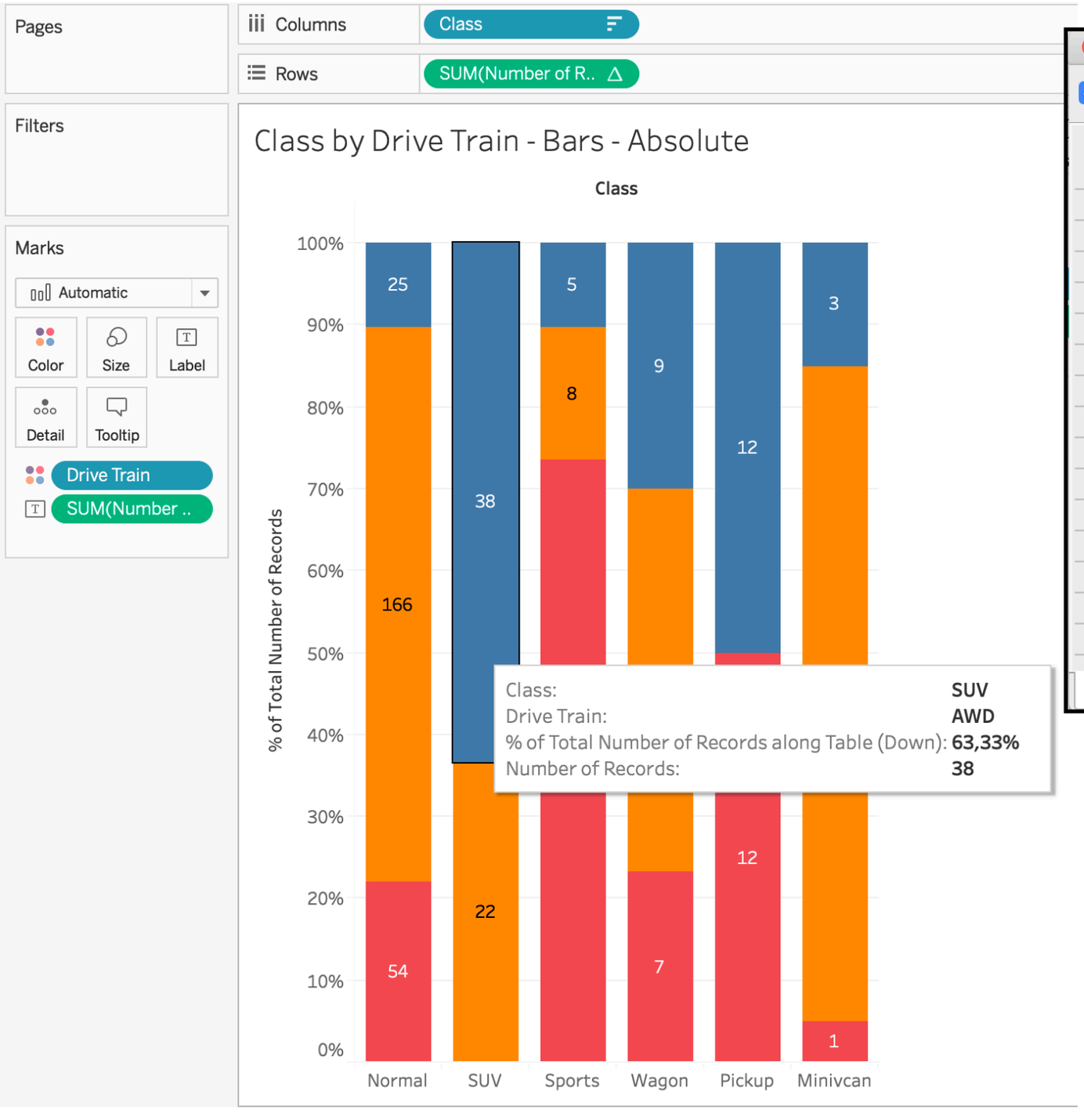
Drag & Drop => Querying your data





Class	Drive Train	% of Total Number of Records	Number of Records
Minivcan	RWD	0,2336%	1
Pickup	RWD	2,8037%	12
Wagon	RWD	1,6355%	7
Sports	RWD	8,4112%	36
Normal	RWD	12,6168%	54
Minivcan	FWD	3,7383%	16
Wagon	FWD	3,2710%	14
Sports	FWD	1,8692%	8
SUV	FWD	5,1402%	22
Normal	FWD	38,7850%	166
Minivcan	AWD	0,7009%	3
Pickup	AWD	2,8037%	12
Wagon	AWD	2,1028%	9
Sports	AWD	1,1682%	5
SUV	AWD	8,8785%	38
Normal	AWD	5,8411%	25

Drag & Drop => Querying your data



View Data: Class by Drive Train - Bars - Absolute

Show aliases

Class	Drive Train	% of Total Number of Records	Number of Records
Minivcan	RWD	5,0000%	1
Pickup	RWD	50,0000%	12
Wagon	RWD	23,3333%	7
Sports	RWD	73,4694%	36
Normal	RWD	22,0408%	54
Minivcan	FWD	80,0000%	16
Wagon	FWD	46,6667%	14
Sports	FWD	16,3265%	8
SUV	FWD	36,6667%	22
Normal	FWD	67,7551%	166
Minivcan	AWD	15,0000%	3
Pickup	AWD	50,0000%	12
Wagon	AWD	30,0000%	9
Sports	AWD	10,2041%	5
SUV	AWD	63,3333%	38
Normal	AWD	10,2041%	25

Summary | Full Data

Tableau Calculations

Calculations

- **Why use calculations**
  - To create new data from data that already exists in your data source
  - Perform computations on your data to perform complex analyzes and add fields to your data source on your own and on the fly.

Calculations

- **Why use calculations**
  - To create new data from data that already exists in your data source
  - Perform computations on your data to perform complex analyzes and add fields to your data source on your own and on the fly.
- **When to use calculations (some examples)**
  - To segment data

Calculations

- **Why use calculations**
  - To create new data from data that already exists in your data source
  - Perform computations on your data to perform complex analyzes and add fields to your data source on your own and on the fly.
- **When to use calculations (some examples)**
  - To segment data
  - To convert the data type of a field, such as converting a string to a date.

Calculations

- **Why use calculations**
  - To create new data from data that already exists in your data source
  - Perform computations on your data to perform complex analyzes and add fields to your data source on your own and on the fly.
- **When to use calculations (some examples)**
  - To segment data
  - To convert the data type of a field, such as converting a string to a date.
  - To aggregate data

Calculations

- **Why use calculations**
  - To create new data from data that already exists in your data source
  - Perform computations on your data to perform complex analyzes and add fields to your data source on your own and on the fly.
- **When to use calculations (some examples)**
  - 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

Calculations

- **Why use calculations**
  - To create new data from data that already exists in your data source
  - Perform computations on your data to perform complex analyzes and add fields to your data source on your own and on the fly.
- **When to use calculations (some examples)**
  - 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

Types of calculations

- **Basic expressions**

https://onlinehelp.tableau.com/current/pro/desktop/en-us/calculations_calculatedfields_understand_types.htm

Types of calculations

- **Basic expressions**
  - Calculation at **source level of detail** (**a row-level calculation**)

https://onlinehelp.tableau.com/current/pro/desktop/en-us/calculations_calculatedfields_understand_types.htm

Types of calculations

- **Basic expressions**
  - Calculation at **source level of detail** (**a row-level calculation**)
  - Calculation at the **visualization level of detail** (**an aggregate calculation**)

https://onlinehelp.tableau.com/current/pro/desktop/en-us/calculations_calculatedfields_understand_types.htm

Types of calculations

- **Basic expressions**
  - Calculation at **source level of detail** (**a row-level calculation**)
  - Calculation at the **visualization level of detail** (**an aggregate calculation**)
- **Level of Detail (LOD) expressions**
  - FIXED Level of detail - set of dimensions
  - INCLUDE or EXCLUDE - set of dimensions

https://onlinehelp.tableau.com/current/pro/desktop/en-us/calculations_calculatedfields_understand_types.htm

Types of calculations

- **Basic expressions**
  - Calculation at **source level of detail** (**a row-level calculation**)
  - Calculation at the **visualization level of detail** (**an aggregate calculation**)
- **Level of Detail (LOD) expressions**
  - FIXED Level of detail - set of dimensions
  - INCLUDE or EXCLUDE - set of dimensions
- **Table calculations**
  - Are performed **after the query returns** and therefore can only operate over values that are in the query result set.

https://onlinehelp.tableau.com/current/pro/desktop/en-us/calculations_calculatedfields_understand_types.htm

Basic expressions - row level calculation

Book ID	Book Name	Series	Year Released	Author
1	The Lion, the Witch and the Wardrobe	The Chronicles of Narnia	1950	C. S. Lewis
2	Prince Caspian: The Return to Narnia	The Chronicles of Narnia	1951	C. S. Lewis
3	The Voyage of the Dawn Treader	The Chronicles of Narnia	1952	C. S. Lewis
4	The Silver Chair	The Chronicles of Narnia	1953	C. S. Lewis
5	The Horse and His Boy	The Chronicles of Narnia	1954	C. S. Lewis
6	The Magician's Nephew	The Chronicles of Narnia	1955	C. S. Lewis
7	The Last Battle	The Chronicles of Narnia	1956	C. S. Lewis
8	Harry Potter and the Philosopher's Stone	Harry Potter	1997	J. K. Rowling

Basic expressions - row level calculation

Book ID	Book Name	Series	Year Released	Author
1	The Lion, the Witch and the Wardrobe	The Chronicles of Narnia	1950	C. S. Lewis
2	Prince Caspian: The Return to Narnia	The Chronicles of Narnia	1951	C. S. Lewis
3	The Voyage of the Dawn Treader	The Chronicles of Narnia	1952	C. S. Lewis
4	The Silver Chair	The Chronicles of Narnia	1953	C. S. Lewis
5	The Horse and His Boy	The Chronicles of Narnia	1954	C. S. Lewis
6	The Magician's Nephew	The Chronicles of Narnia	1955	C. S. Lewis
7	The Last Battle	The Chronicles of Narnia	1956	C. S. Lewis
8	Harry Potter and the Philosopher's Stone	Harry Potter	1997	J. K. Rowling

Compute a new column with only the author's last name

```
SPLIT([Author], '.', 3 )
```

Author Last Name

Basic expressions - row level calculation

Book ID	Book Name	Series	Year Released	Author	Author Last Name
1	The Lion, the Witch and the Wardrobe	The Chronicles of Narnia	1950	C. S. Lewis	Lewis
2	Prince Caspian: The Return to Narnia	The Chronicles of Narnia	1951	C. S. Lewis	Lewis
3	The Voyage of the Dawn Treader	The Chronicles of Narnia	1952	C. S. Lewis	Lewis
4	The Silver Chair	The Chronicles of Narnia	1953	C. S. Lewis	Lewis
5	The Horse and His Boy	The Chronicles of Narnia	1954	C. S. Lewis	Lewis
6	The Magician's Nephew	The Chronicles of Narnia	1955	C. S. Lewis	Lewis
7	The Last Battle	The Chronicles of Narnia	1956	C. S. Lewis	Lewis
8	Harry Potter and the Philosopher's Stone	Harry Potter	1997	J. K. Rowling	Rowling

Compute a new column with only the author's last name

```
SPLIT([Author], '.', 3 )
```

Author Last Name

Basic expressions - aggregate calculation

Book ID	Book Name	Series	Year Released	Author
1	The Lion, the Witch and the Wardrobe	The Chronicles of Narnia	1950	C. S. Lewis
2	Prince Caspian: The Return to Narnia	The Chronicles of Narnia	1951	C. S. Lewis
3	The Voyage of the Dawn Treader	The Chronicles of Narnia	1952	C. S. Lewis
4	The Silver Chair	The Chronicles of Narnia	1953	C. S. Lewis
5	The Horse and His Boy	The Chronicles of Narnia	1954	C. S. Lewis
6	The Magician's Nephew	The Chronicles of Narnia	1955	C. S. Lewis
7	The Last Battle	The Chronicles of Narnia	1956	C. S. Lewis
8	Harry Potter and the Philosopher's Stone	Harry Potter	1997	J. K. Rowling

To create a column that displays how many books are in each series

```
COUNT([Series])
```

Number of Books in Series - at Series level of detail

Basic expressions - aggregate calculation

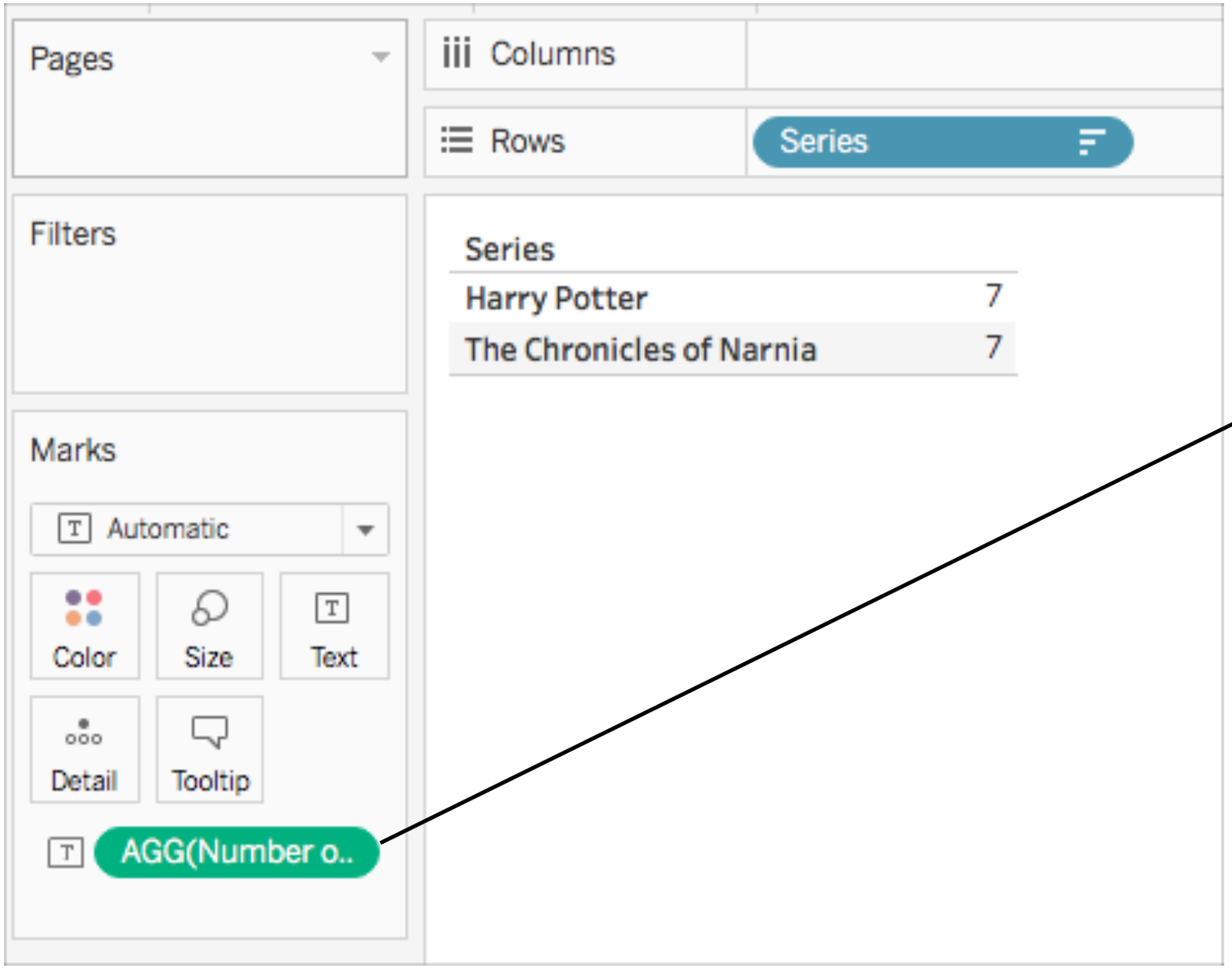
Series	Number of Books in Series - at Series level of detail
The Chronicles of Narnia	7
The Chronicles of Narnia	
The Chronicles of Narnia	
The Chronicles of Narnia	
The Chronicles of Narnia	
The Chronicles of Narnia	
The Chronicles of Narnia	
Harry Potter	7
Harry Potter	
Harry Potter	
Harry Potter	
Harry Potter	
Harry Potter	
Harry Potter	

To create a column that displays how many books are in each series

```
COUNT([Series])
```

Number of Books in Series - at Series level of detail

Basic expressions - aggregate calculation

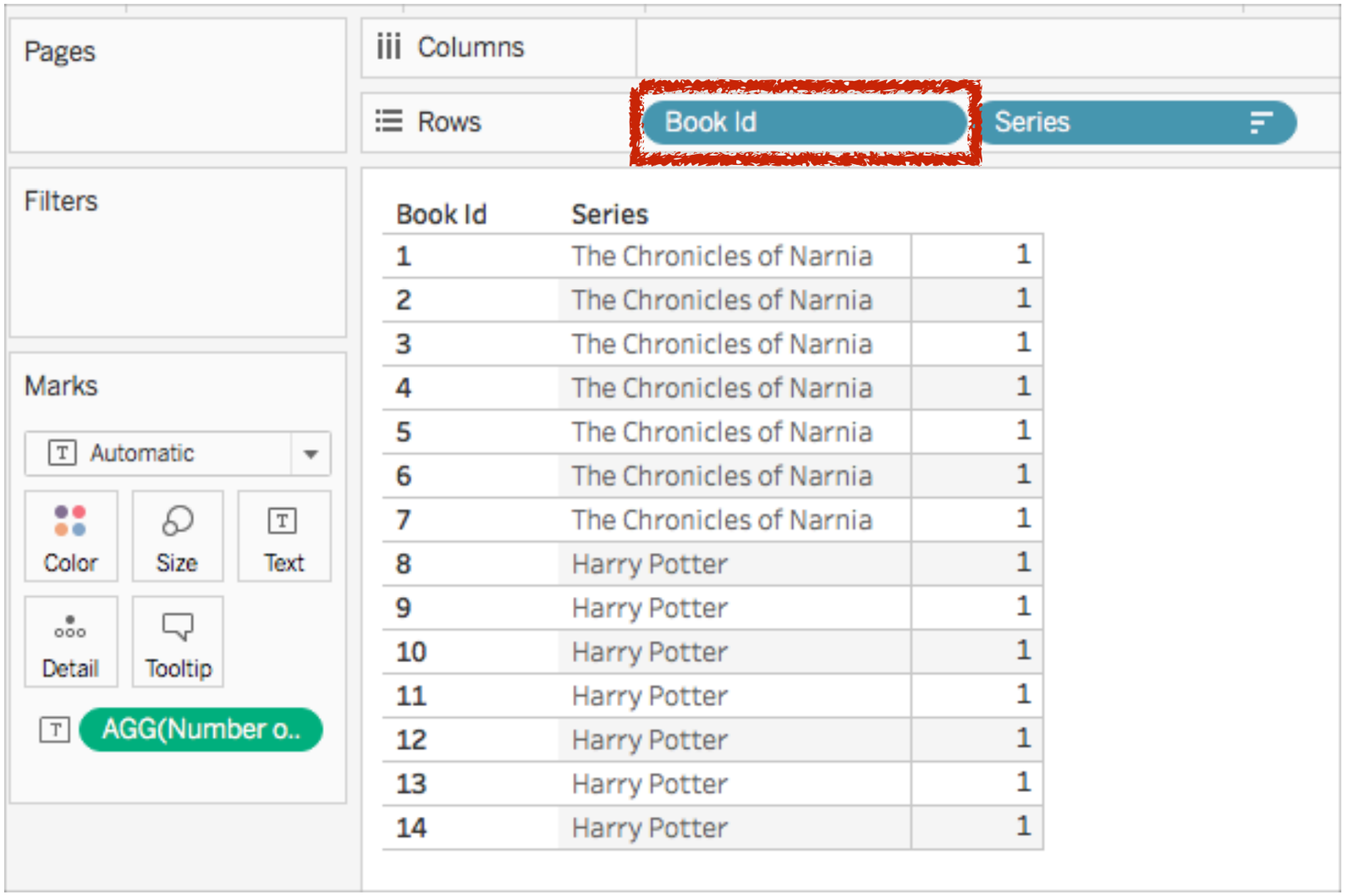


To create a column that displays how many books are in each series

```
COUNT([Series])
```

Number of Books in Series - at Series level of detail

Basic expressions - aggregate calculation



Book Id	Series	
1	The Chronicles of Narnia	1
2	The Chronicles of Narnia	1
3	The Chronicles of Narnia	1
4	The Chronicles of Narnia	1
5	The Chronicles of Narnia	1
6	The Chronicles of Narnia	1
7	The Chronicles of Narnia	1
8	Harry Potter	1
9	Harry Potter	1
10	Harry Potter	1
11	Harry Potter	1
12	Harry Potter	1
13	Harry Potter	1
14	Harry Potter	1

To create a column that displays how many books are in each series

```
COUNT([Series])
```

Number of Books in Series - at Series level of detail

Aggregate calculations are performed at the visualization level of detail

Level of Detail (LOD) expressions

Level of Detail (LOD) expressions

- Just like basic expressions, LOD expressions **allow you to compute values at the data source level and the visualization level**.

Level of Detail (LOD) expressions

- Just like basic expressions, LOD expressions **allow you to compute values at the data source level and the visualization level**.
- However, LOD expressions give you even **more control on the level of granularity you want to compute**. They can be performed:
  - at a more granular level (**INCLUDE**),

Level of Detail (LOD) expressions

- Just like basic expressions, LOD expressions **allow you to compute values at the data source level and the visualization level**.
- However, LOD expressions give you even **more control on the level of granularity you want to compute**. They can be performed:
  - at a more granular level (**INCLUDE**),
  - a less granular level (**EXCLUDE**),

Level of Detail (LOD) expressions

- Just like basic expressions, LOD expressions **allow you to compute values at the data source level and the visualization level**.
- However, LOD expressions give you even **more control on the level of granularity you want to compute**. They can be performed:
  - at a more granular level (**INCLUDE**),
  - a less granular level (**EXCLUDE**),
  - or an entirely independent level (**FIXED**)

Level of Detail (LOD) expressions

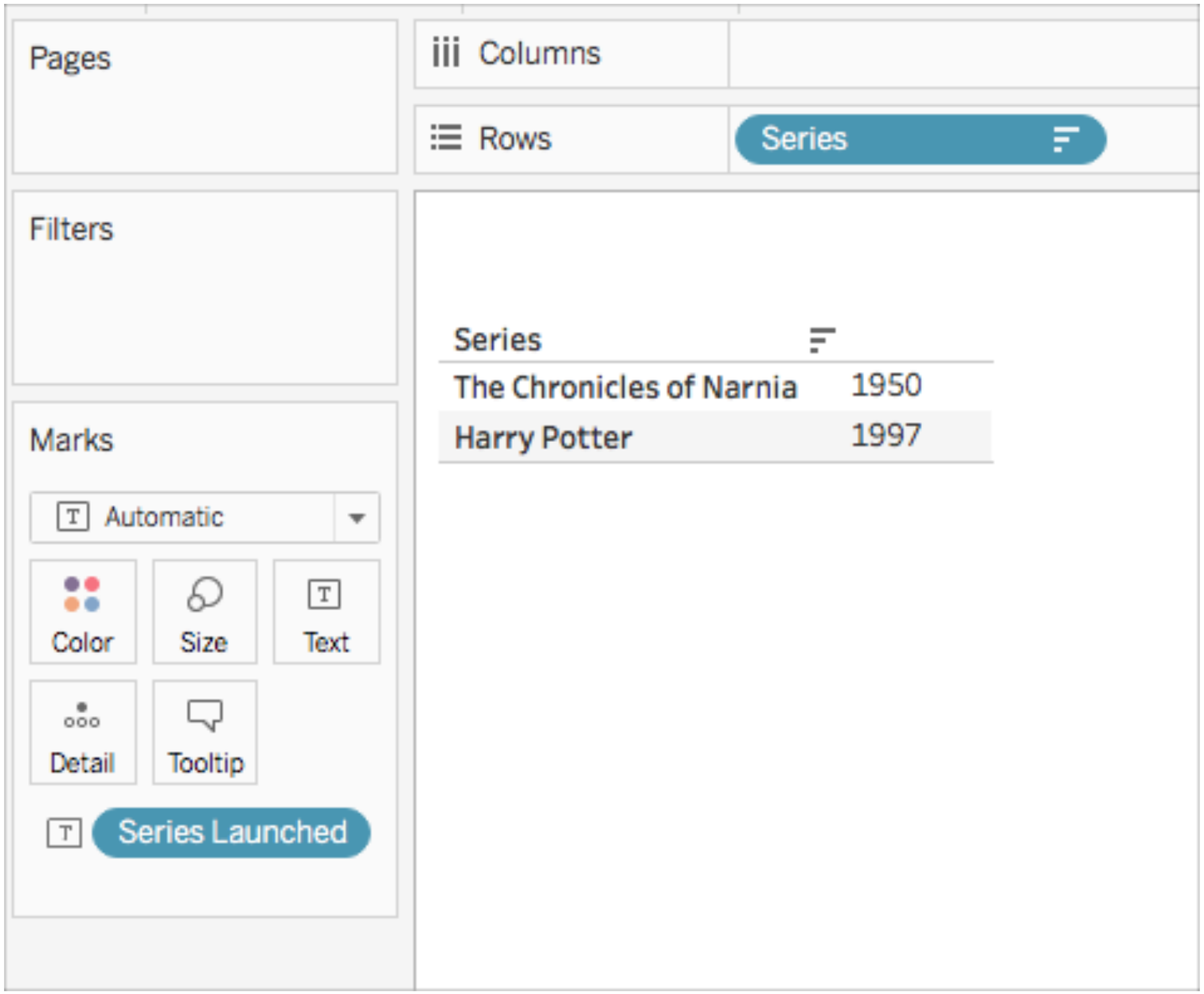
Book ID	Book Name	Series	Year Released	Author	Series Launched
1	The Lion, the Witch and the Wardrobe	The Chronicles of Narnia	1950	C. S. Lewis	1950
2	Prince Caspian: The Return to Narnia	The Chronicles of Narnia	1951	C. S. Lewis	1950
3	The Voyage of the Dawn Treader	The Chronicles of Narnia	1952	C. S. Lewis	1950
4	The Silver Chair	The Chronicles of Narnia	1953	C. S. Lewis	1950
5	The Horse and His Boy	The Chronicles of Narnia	1954	C. S. Lewis	1950
6	The Magician's Nephew	The Chronicles of Narnia	1955	C. S. Lewis	1950
7	The Last Battle	The Chronicles of Narnia	1956	C. S. Lewis	1950
8	Harry Potter and the Philosopher's Stone	Harry Potter	1997	J. K. Rowling	1997
9	Harry Potter and Chamber of Secrets	Harry Potter	1998	J. K. Rowling	1997

wanted to compute when a book series was launched

```
{ FIXED [Series]:(MIN([Year Released]))}
```

Series Launched

Level of Detail (LOD) expressions

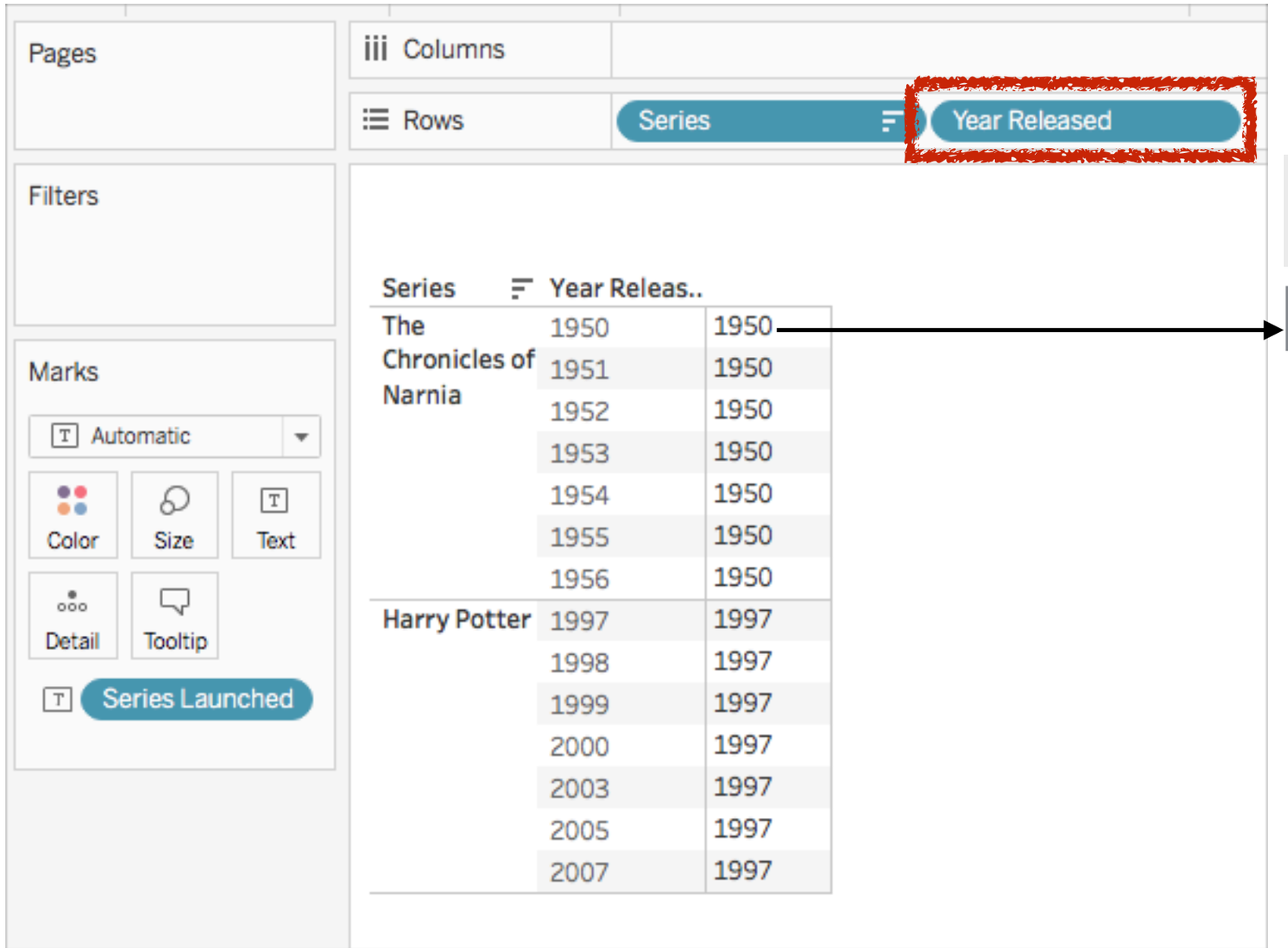


wanted to compute when a book series was launched

```
{ FIXED [Series]:(MIN([Year Released]))}
```

Series Launched

Level of Detail (LOD) expressions



Series	Year Releas..	
The Chronicles of Narnia	1950	1950
	1951	1950
	1952	1950
	1953	1950
	1954	1950
	1955	1950
	1956	1950
Harry Potter	1997	1997
	1998	1997
	1999	1997
	2000	1997
	2003	1997
	2005	1997
	2007	1997

wanted to compute when a book series was launched

```
{ FIXED [Series]:(MIN([Year Released]))}
```

Series Launched

Table calculations

- Table calculations allow you to **transform** values at the **level of detail of the visualization only**.
- The computation **works on the data table that is used for the data visualization** !
- To compute the number of years since the author released their last book, you might use the following table calculation:

```
ATTR([Year Released]) - LOOKUP(ATTR([Year Released]), -1)
```

Number of Books in Series - at Series level of detail

Table calculations

```
ATTR([Year Released]) - LOOKUP(ATTR([Year Released]), -1)
```

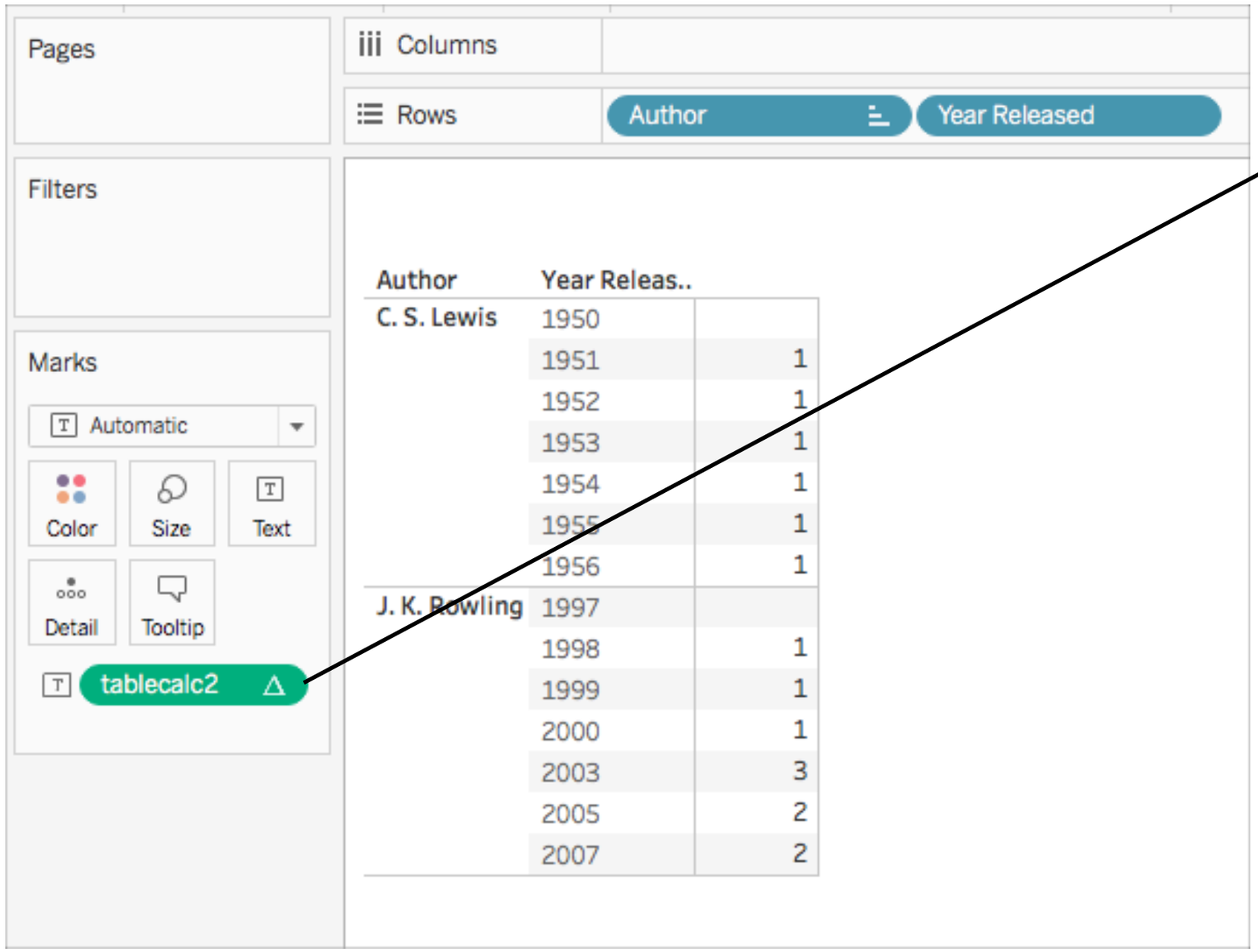
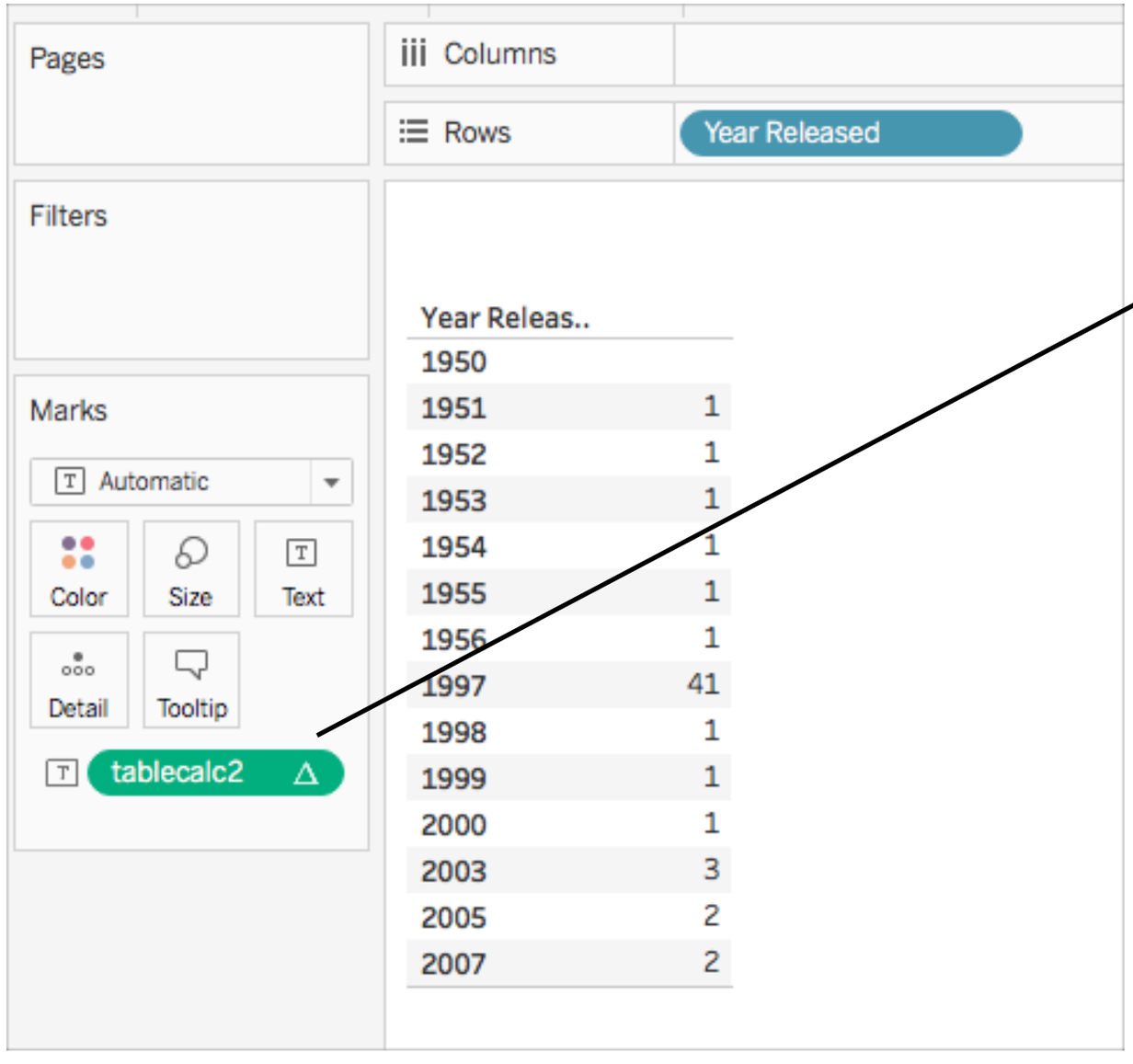


Table calculations

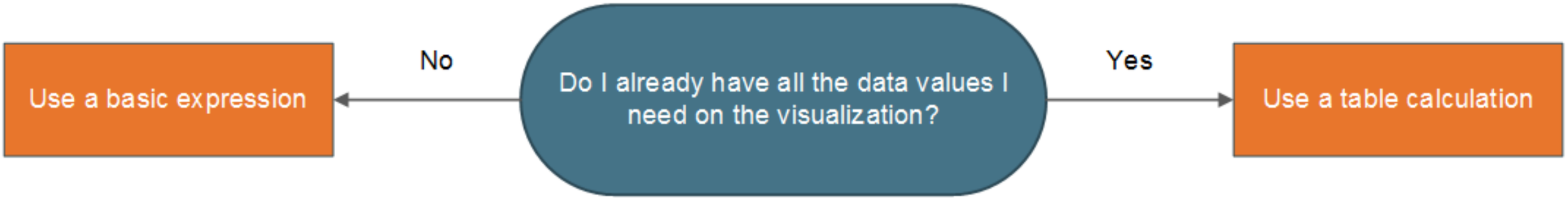
```
ATTR([Year Released]) - LOOKUP(ATTR([Year Released]), -1)
```



Number of Books in Series - at Series level of detail

Choosing the Right Calculation Type

- **Basic expression or table calculation?**
  - **Question 1**: Do you already have all the data values you need on the visualization?
  - If the answer is yes: You can use a **table calculation**.
  - If the answer is no: Use a **basic calculation**.



https://onlinehelp.tableau.com/current/pro/desktop/en-us/calculations_calculatedfields_understand_which.htm

Choosing the Right Calculation Type

Basic expression or Level of Detail (LOD) expression?

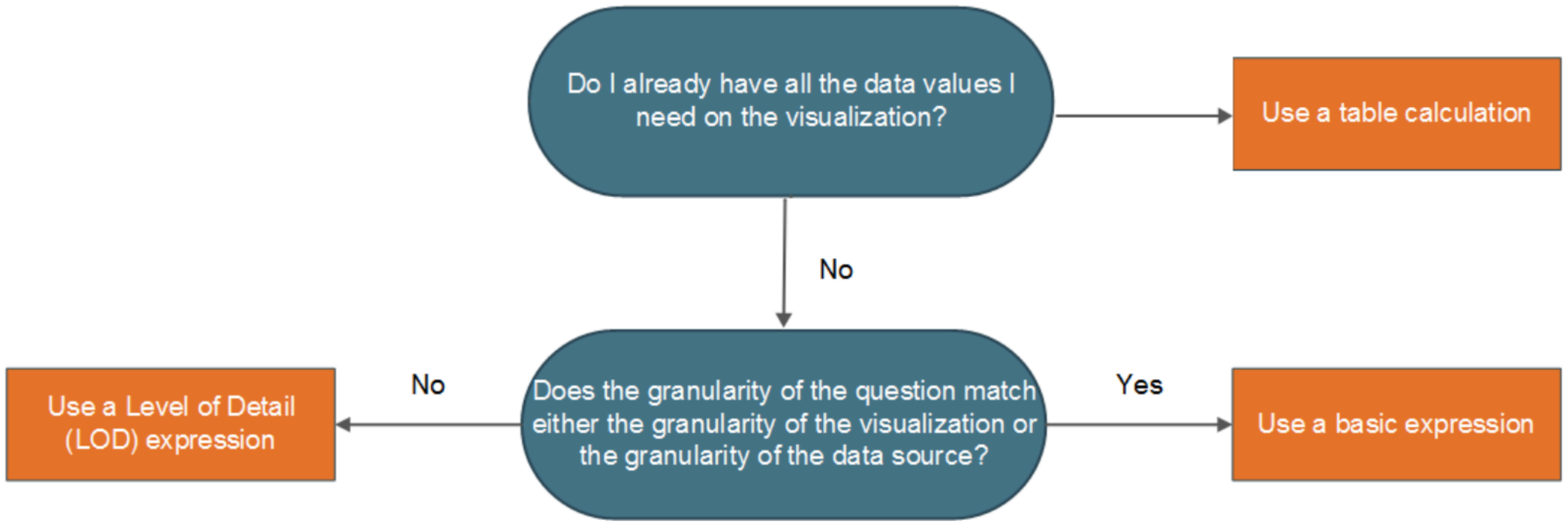
If you don't have all the data you need on the visualization, you need your calculation to be passed through to the data source. This means you must use a basic calculation or an LOD Expression.

If you answered **no** to question 1 ask yourself this:

Question 2: Does the granularity of your question match either the granularity of the visualization or the granularity of the data source?

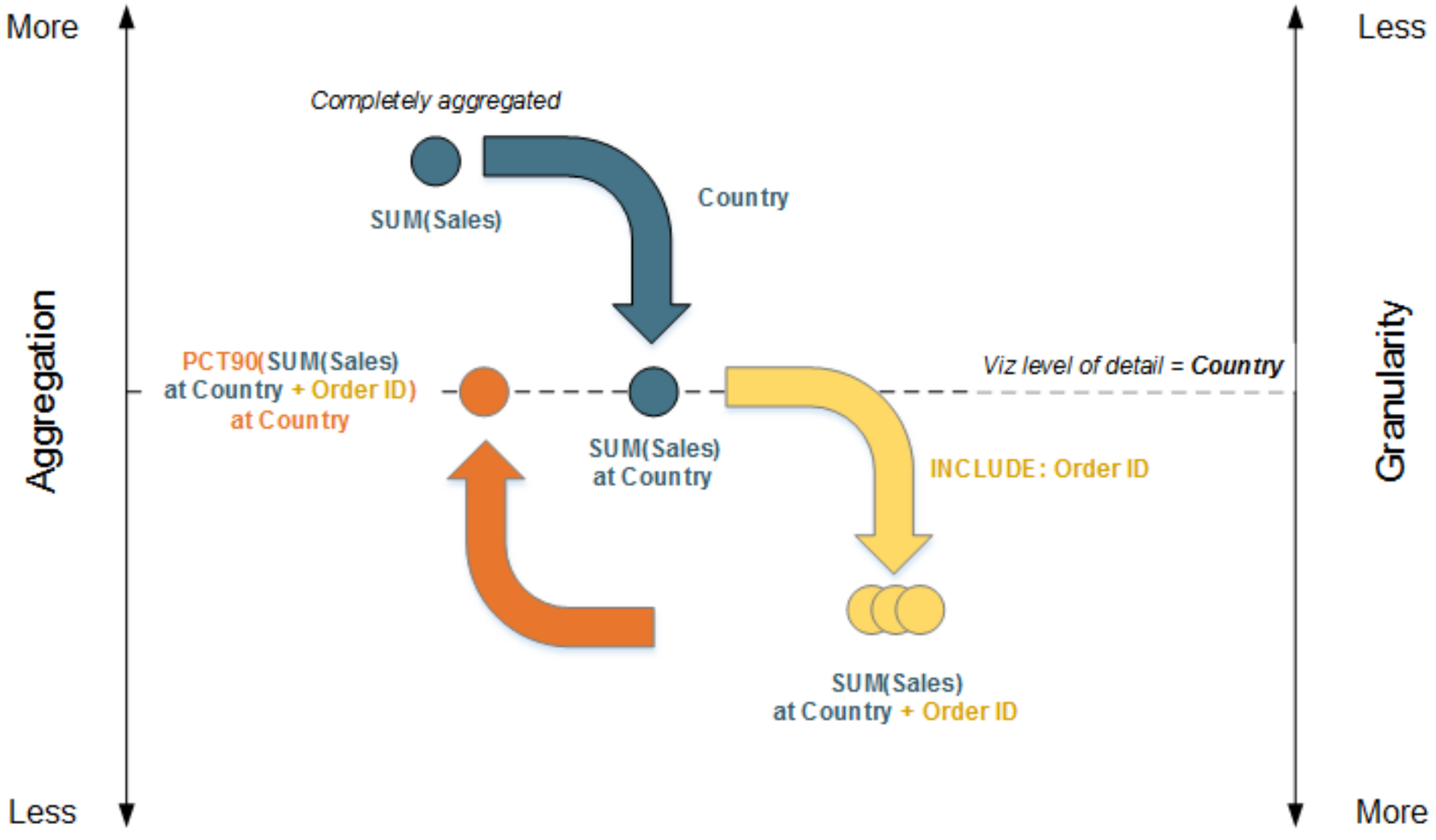
If the answer is **yes**: Use a basic expression.

If the answer is **no**: Use a Level of Detail (LOD) expression.



Choosing the Right Calculation Type

- **Basic expression or Level of Detail (LOD) expression?**

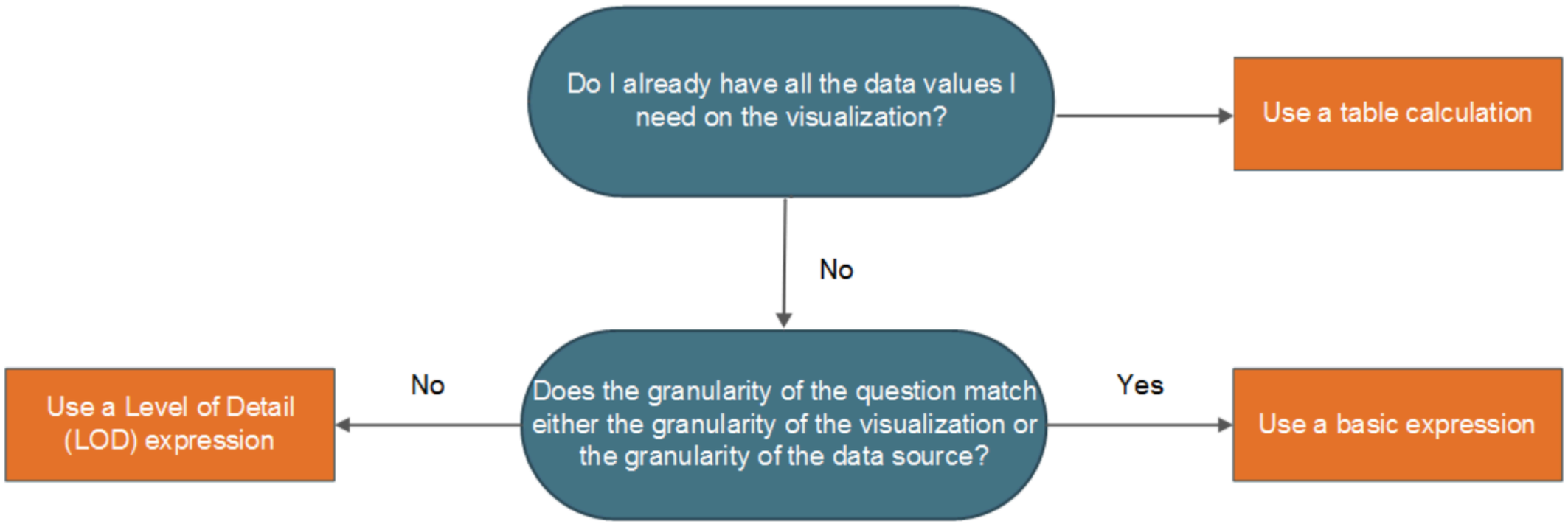


Choosing the Right Calculation Type

Table calculation or Level of Detail (LOD) expression?

Do you already have all the data values you need on the visualization?

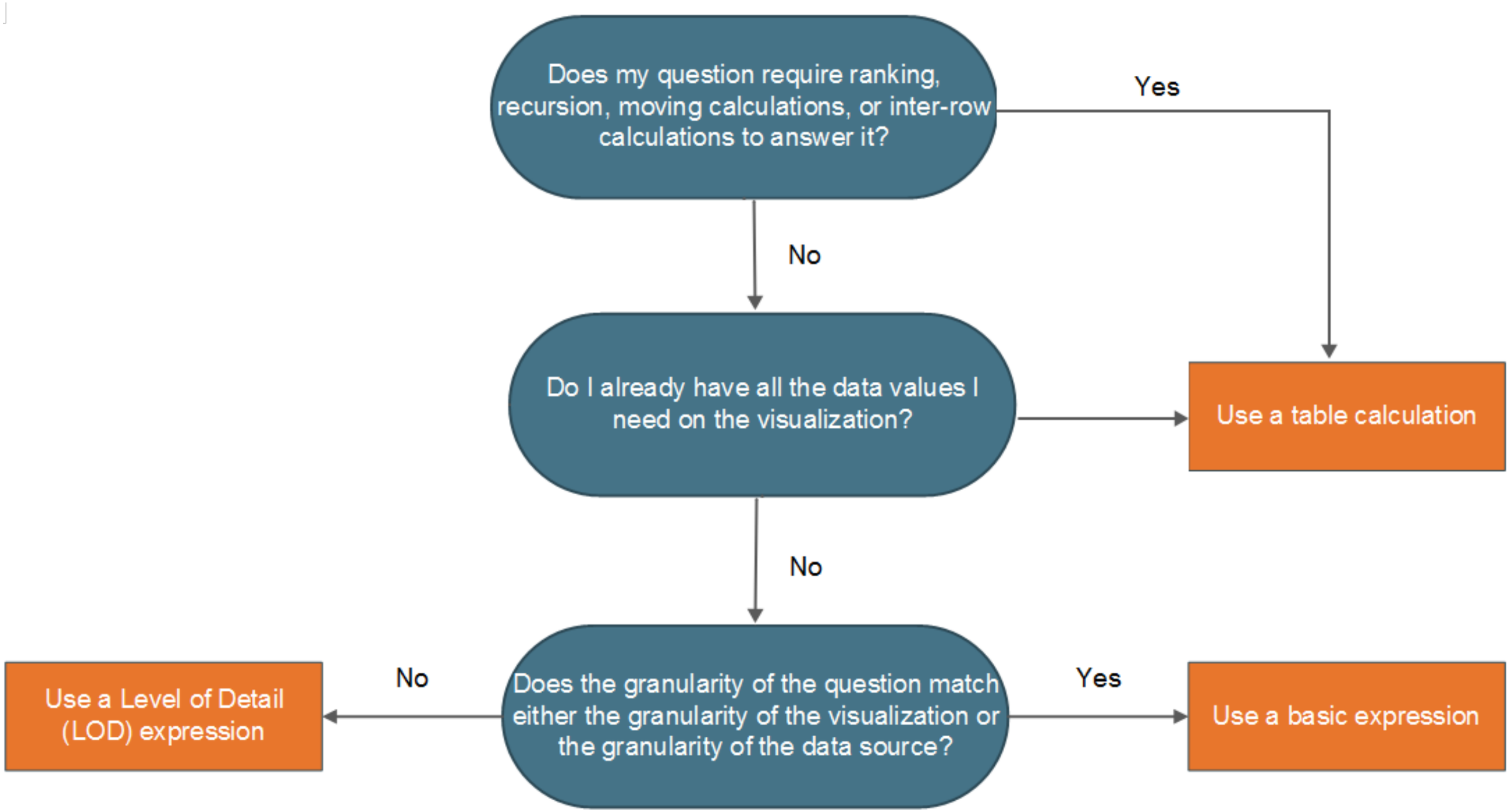
- If the answer is **Yes**, then use a table calculation.
- If the answer is **No**, then ask yourself: *Does the granularity of the question match either the granularity of the visualization or the granularity of the data source?* If the answer is **No**, then use an LOD calculation.



Choosing the Right Calculation Type

- **Table calculations only**
  - **There are some scenarios where only a table calculation will do, including:**
    - Ranking
    - Recursion (e.g. cumulative totals)
    - Moving calculations (e.g. rolling averages)
    - Inter-row calculations (e.g. period vs. period calculations)

Choosing the Right Calculation Type



Functions in tableau

- **Take a look at:**
  - **https://onlinehelp.tableau.com/current/pro/desktop/en-us/functions.htm**
- Numbers
  - HEXBINX and HEXBINY
  - ZN
- Strings
  - SPLIT
- Logical
  - IFF, Case, When
  - IFNULL, ISNULL

Functions in tableau

- **Take a look at:**
  - **https://onlinehelp.tableau.com/current/pro/desktop/en-us/functions.htm**
- **Aggregate**
  - ATTR
  - COLLECT
  - CORR, COVAR, COVARP
  - MEDIAN, PERCENTILE
  - STD, etc
  - COUNT and COUNTD

Functions in tableau

- **Take a look at:**
  - **https://onlinehelp.tableau.com/current/pro/desktop/en-us/functions.htm**
- **Table Calculation Functions**
  - https://onlinehelp.tableau.com/current/pro/desktop/en-us/functions_functions_tablecalculation.htm
  - FIRST( ), INDEX( ), LAST( )
  - LOOKUP(), PREVIOUS_VALUE
  - RANK … many
  - RUNNING_….. many
  - WINDOW_ ….. many

Level of Detail (LOD) expressions

Level of Detail (LOD) expressions

- **Check this tutorial: Create Level of Detail Expressions in Tableau**
  - https://onlinehelp.tableau.com/current/pro/desktop/en-us/calculations_calculatedfields_lod.htm
  - Using the sample workbook - **Sample-Superstore**

Level of Detail (LOD) expressions: **INCLUDED**

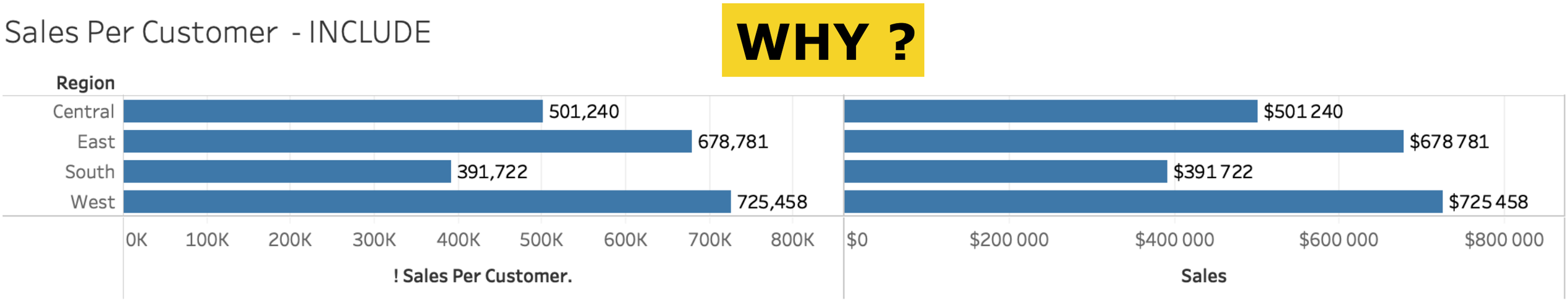
- **In the same view we want**
  - SUM of sales per Region
  - AVG of sales per Customer
- Create ***Sales Per Customer***.

```
{ INCLUDE [Customer Name] : SUM([Sales]) }
```

- Include both in a view with region

Columns: SUM(! Sales Per Cust..) SUM(Sales)

Rows: Region

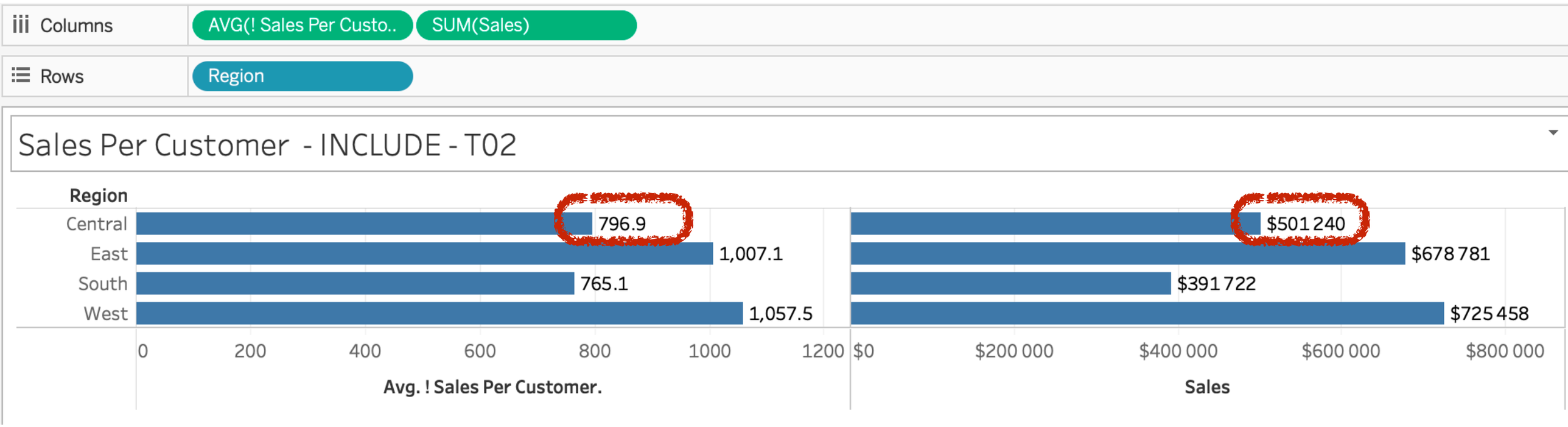


Level of Detail (LOD) expressions: **INCLUDED**

- Create ***Sales Per Customer***.

```
{ INCLUDE [Customer Name] : SUM([Sales]) }
```

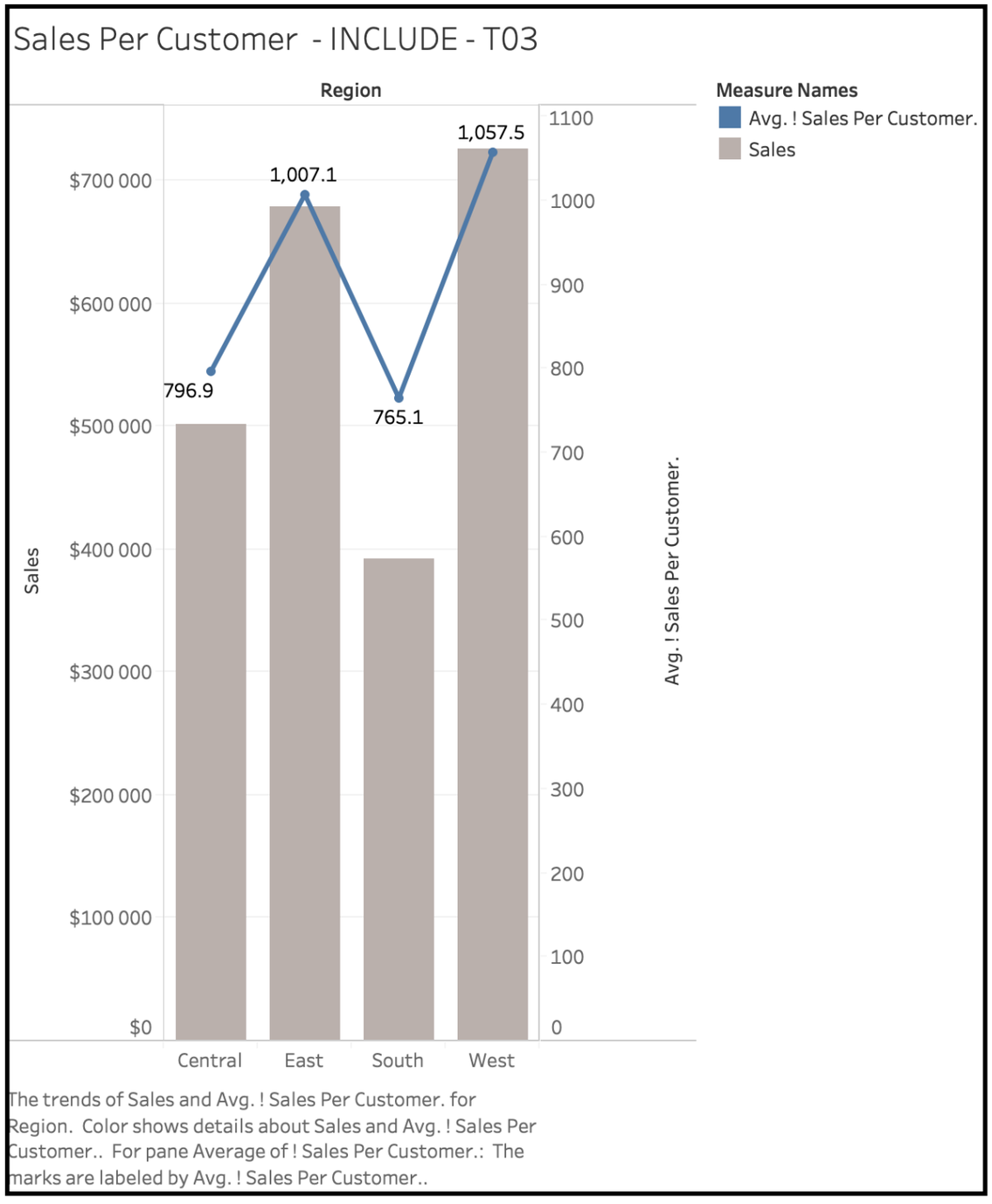
- Include both in a view with region, but aggregate the Sales Per Customer using AVG



WHY ?

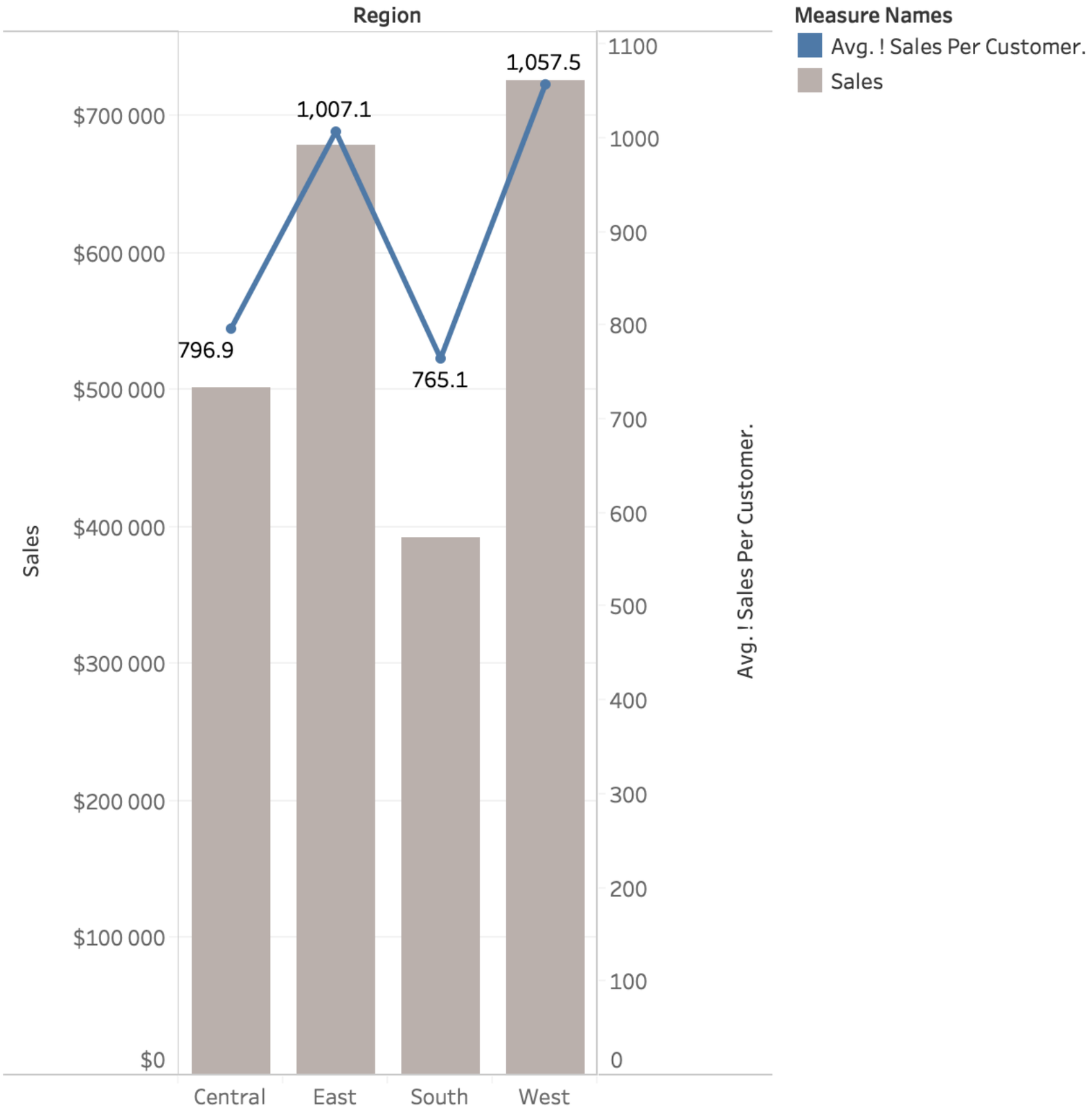
Level of Detail (LOD) expressions: **INCLUDED**

Improve your Data Vis



Improve your Data Vis

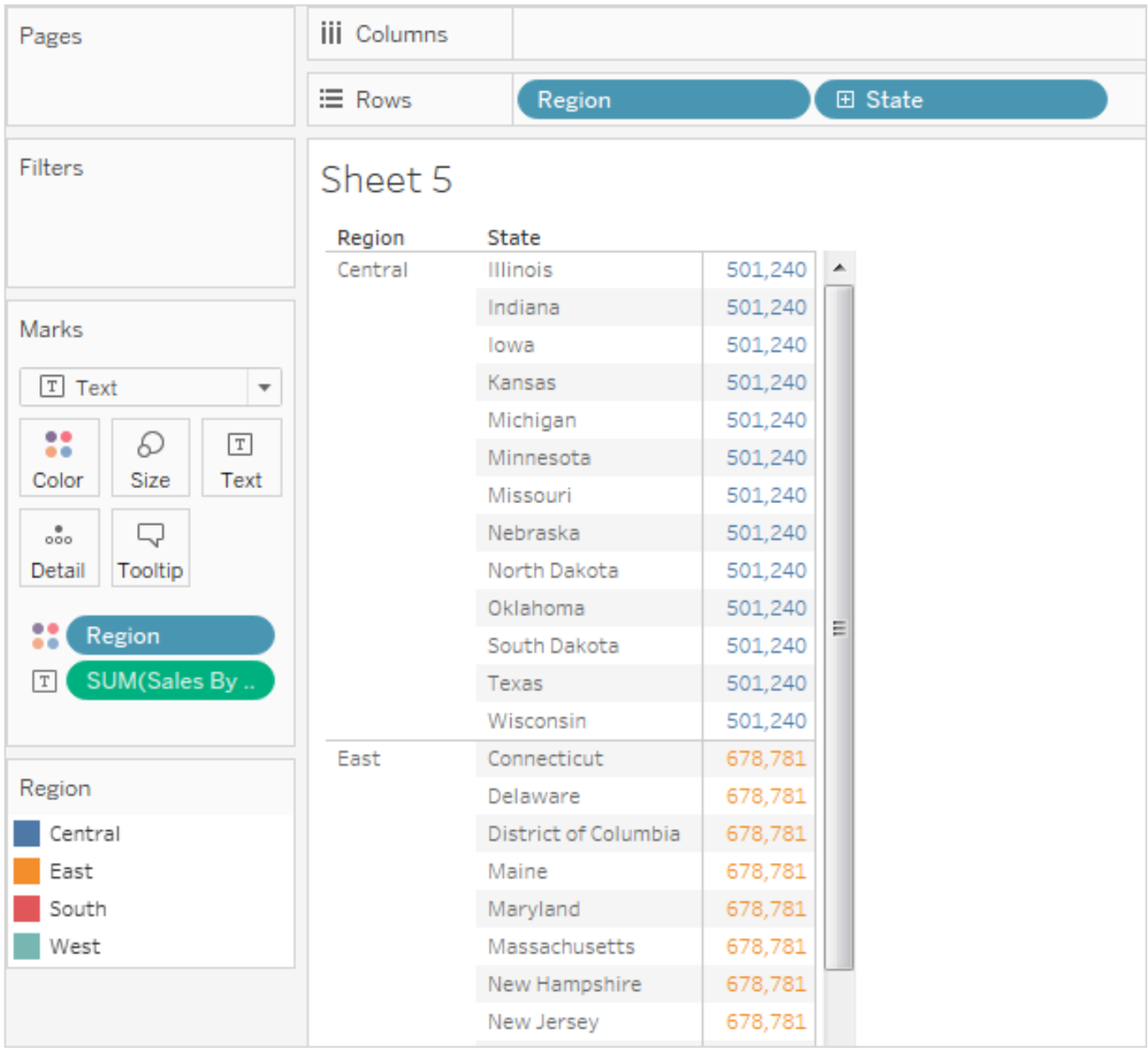
Sales Per Customer - INCLUDE - T03



The trends of Sales and Avg. ! Sales Per Customer. for Region. Color shows details about Sales and Avg. ! Sales Per Customer.. For pane Average of ! Sales Per Customer.: The marks are labeled by Avg. ! Sales Per Customer..

Level of Detail (LOD) expressions: **FIXED**

- Create ***Sales Per Region*** `{FIXED [Region] : SUM([Sales])}`
- Include both in a view with region and Sales Per Region in the view
- Add State to view and interpret

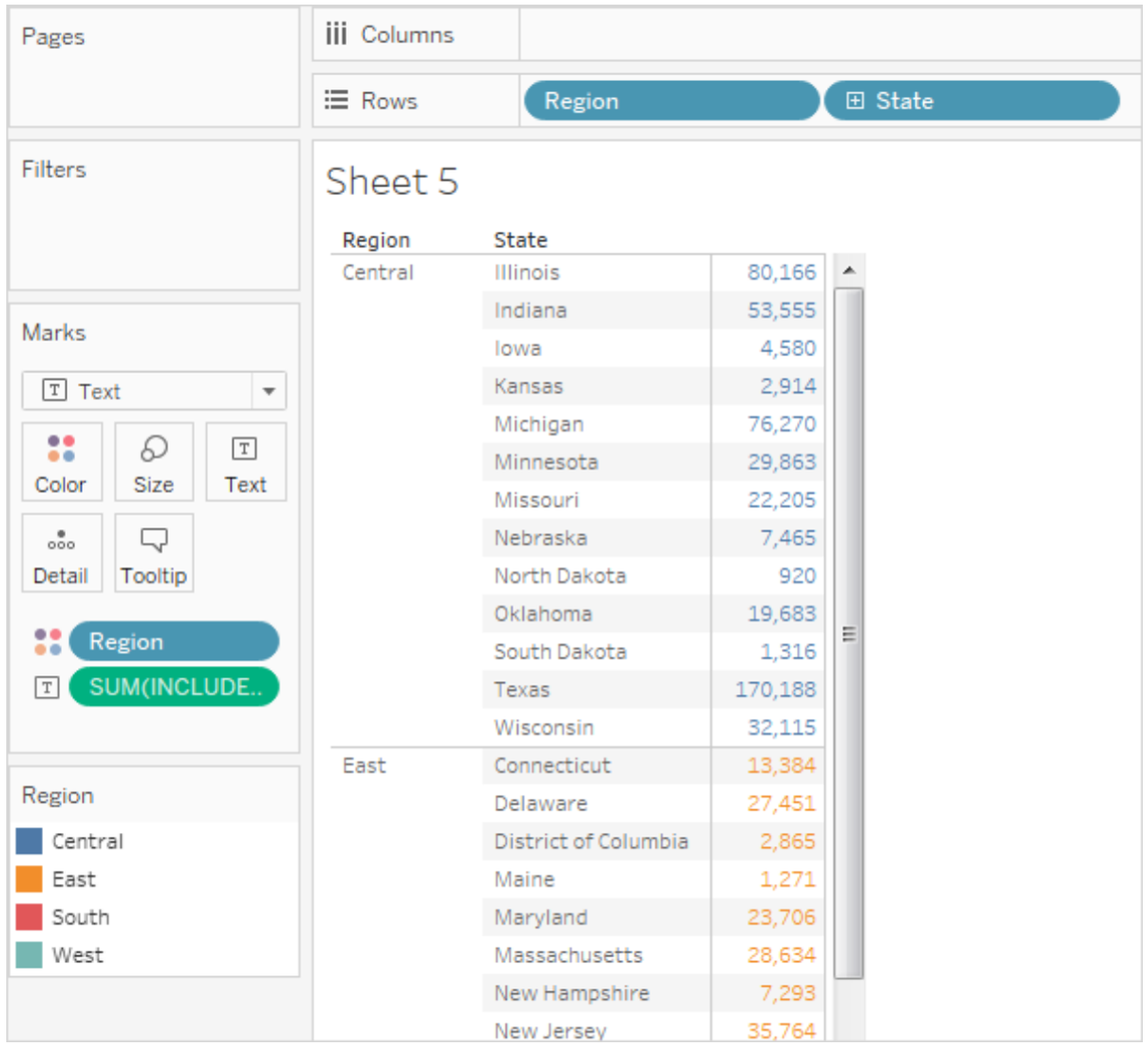


Level of Detail (LOD) expressions: **FIXED**

- Create ***Sales Per Region***

```
{FIXED [Region] : SUM([Sales])}
```

- Change the definition to use INCLUDE instead of FIXED
- Add State to view and interpret

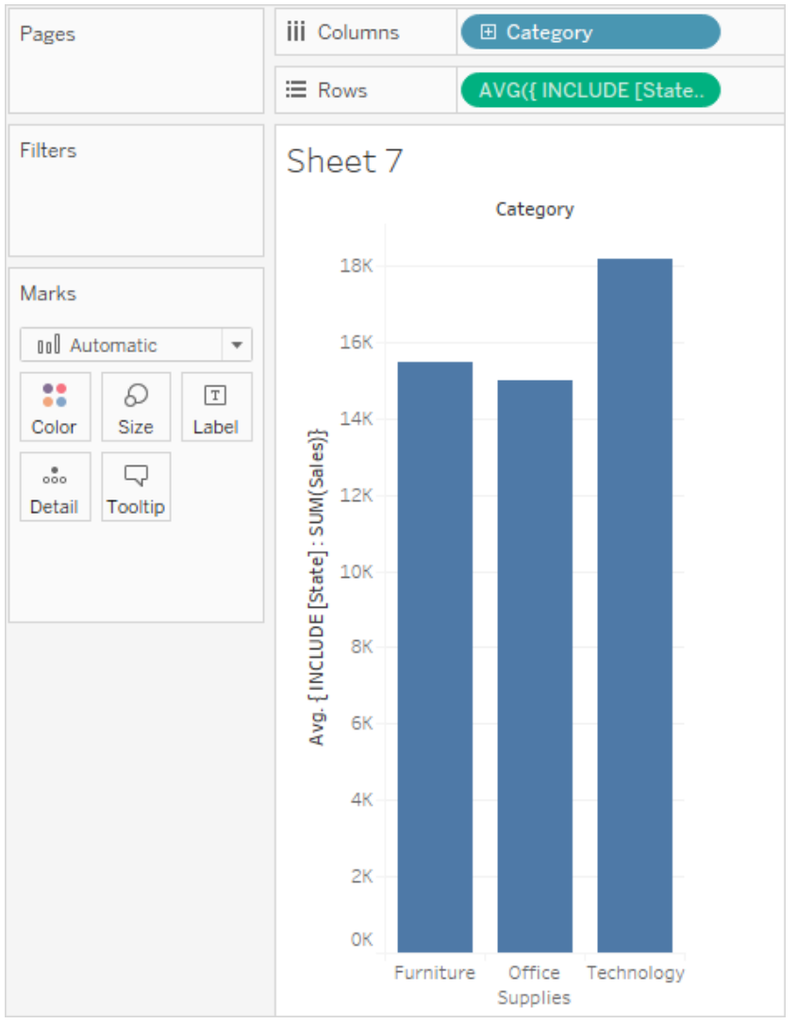


Level of Detail (LOD) expressions: **INCLUDE**

- Create ***Sales Per State***

```
{ INCLUDE [State] : SUM(Sales)}
```

- The calculation is placed on the Rows shelf and is **aggregated as an average**. The resulting visualization **averages the sum of sales by state across categories.**



Pages

Filters

Marks

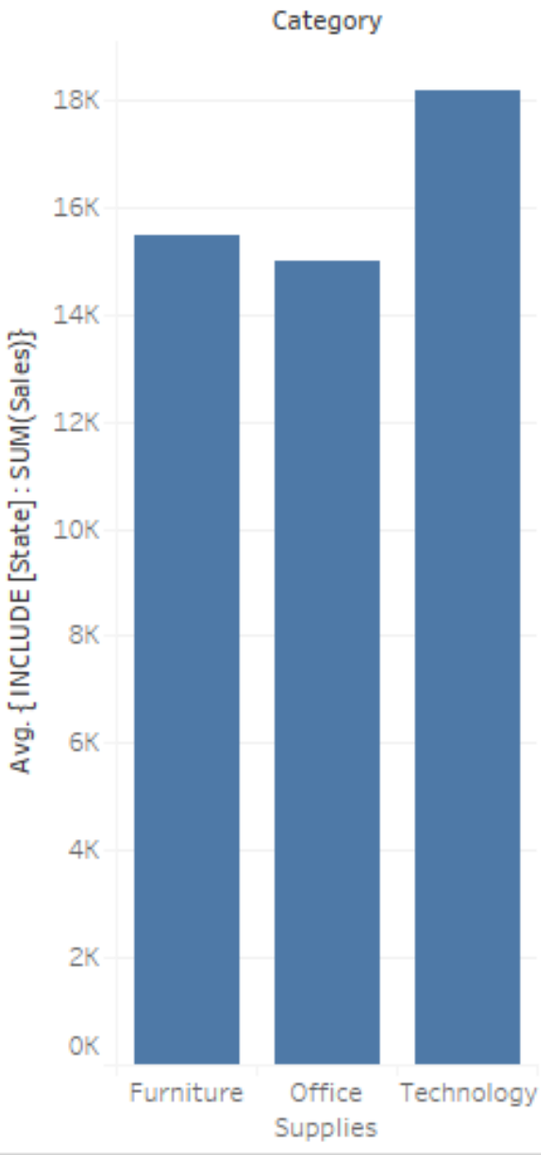
Automatic

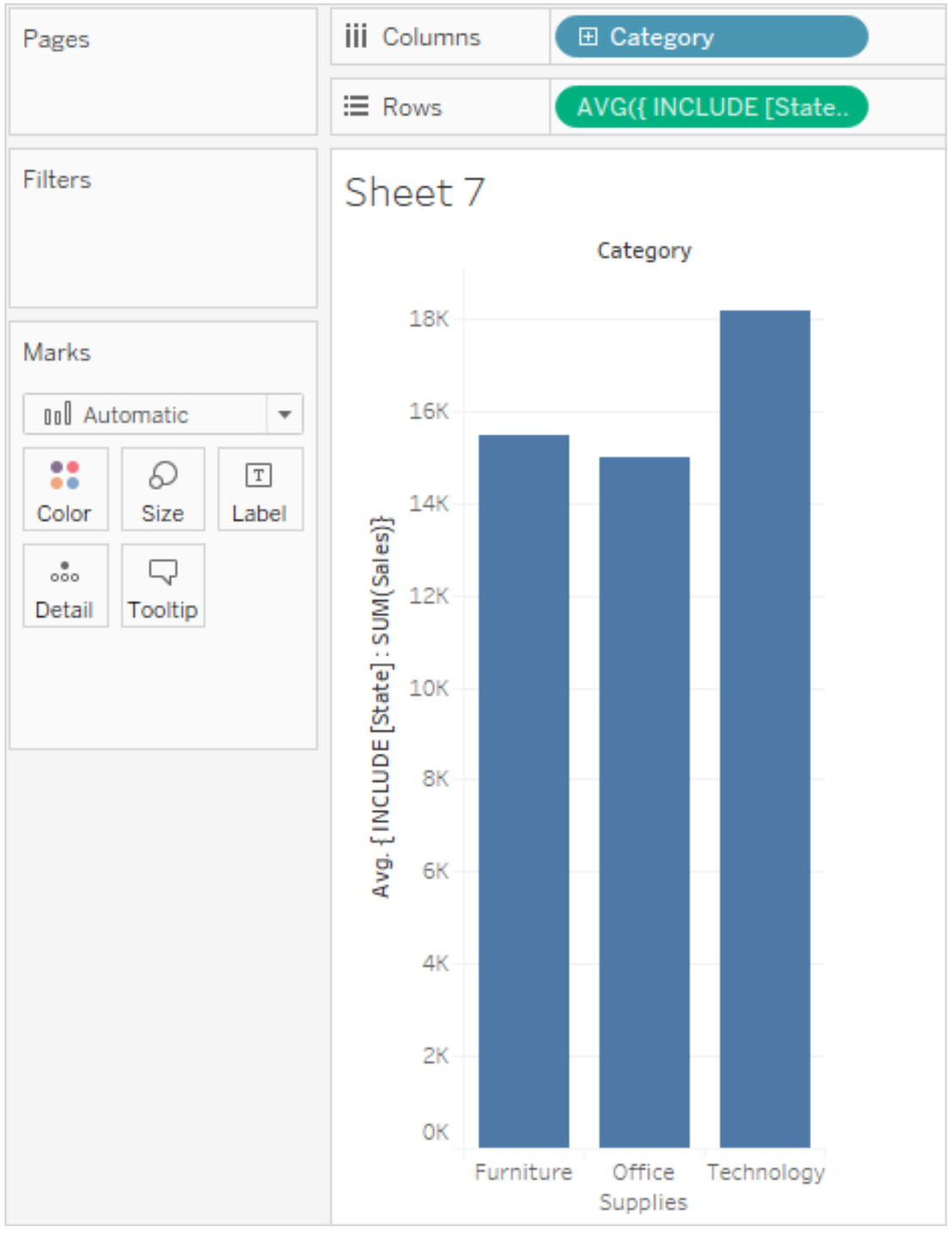
Color | Size | Label | Detail | Tooltip

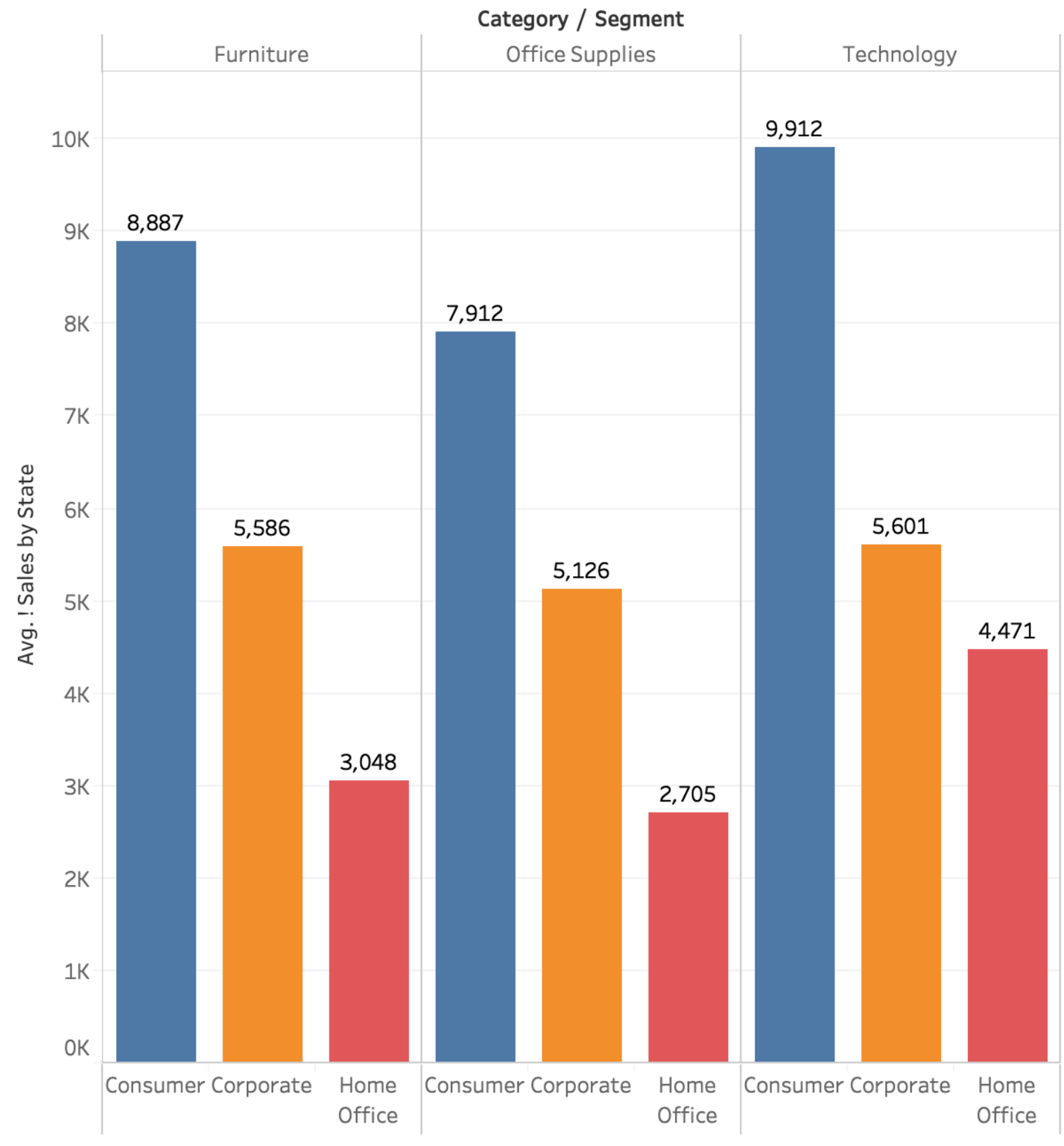
Columns: Category

Rows: AVG({ INCLUDE [State..

Sheet 7







Average of ! Sales by State for each Segment broken down by Category. Color shows details about Segment. The marks are labeled by average of ! Sales by State.

Pages

Columns: Category, Segment

Rows: AVG(! Sales by State)

Filters

Marks

Automatic

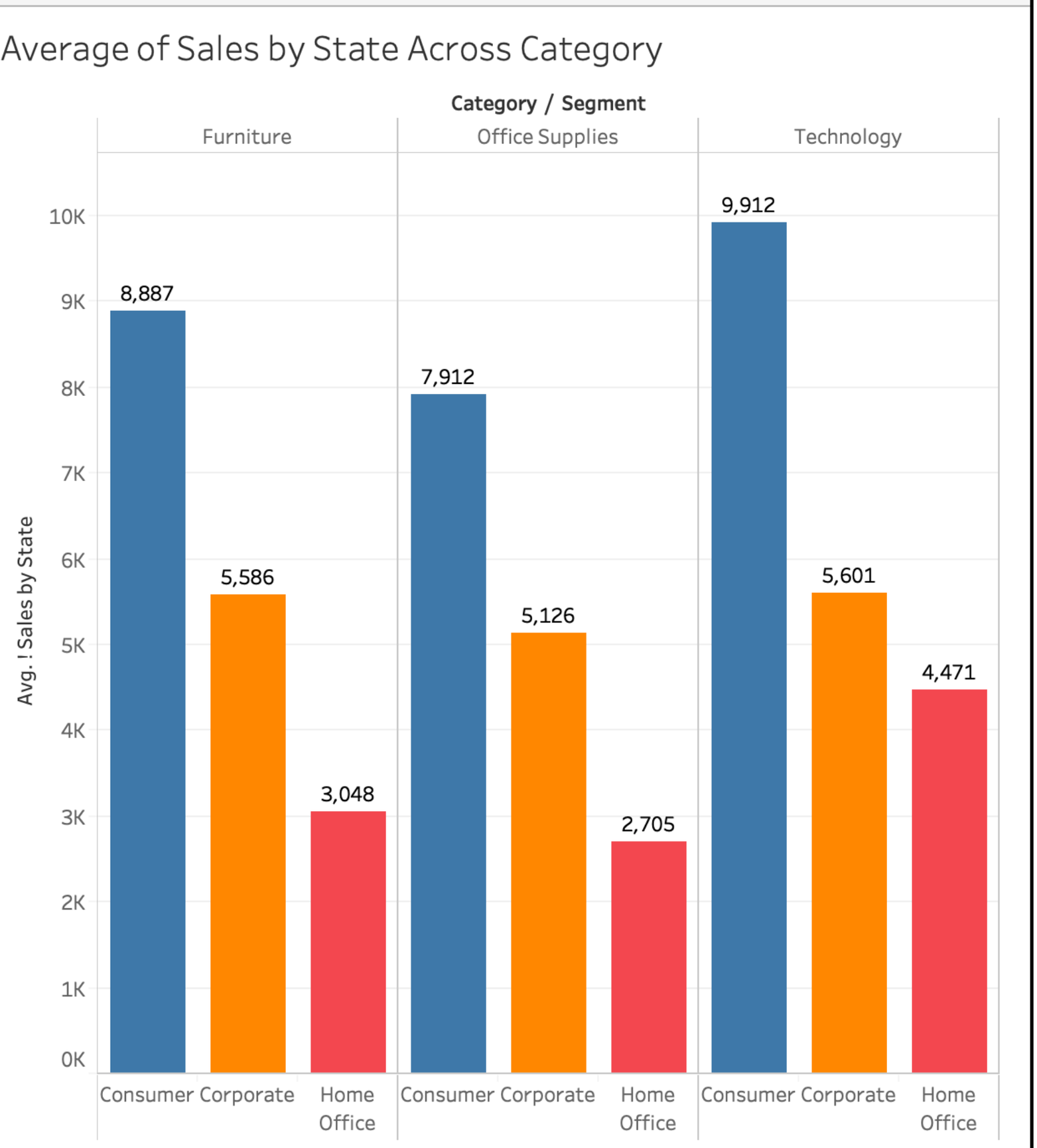
Color | Size | Label | Detail | Tooltip

Segment

AVG(! Sales by ..

Segment

- Consumer
- Corporate
- Home Office



Level of Detail (LOD) expressions: **EXCLUDE**

- EXCLUDE level of detail expressions **declare dimensions to omit from the view level of detail**.

Level of Detail (LOD) expressions: **EXCLUDE**

- EXCLUDE level of detail expressions **declare dimensions to omit from the view level of detail**.
- EXCLUDE level of detail expressions are useful for ‘percent of total’ or ‘difference from overall average’ scenarios. ***They are comparable to such features as Totals and Reference Lines.***

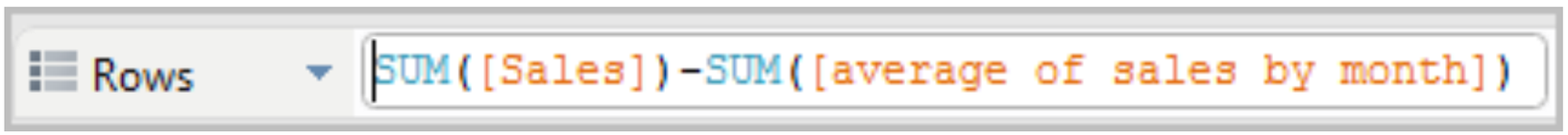
Level of Detail (LOD) expressions: **EXCLUDE**

- EXCLUDE level of detail expressions **declare dimensions to omit from the view level of detail**.
- EXCLUDE level of detail expressions are useful for ‘percent of total’ or ‘difference from overall average’ scenarios. ***They are comparable to such features as Totals and Reference Lines.***
- EXCLUDE level of detail expression **cannot be used in row-level expressions** (where there are no dimensions to omit), but can be used to modify either a view level calculation or anything in between (that is, you can use an EXCLUDE calculation to remove dimension from some other level of detail expression).

Level of Detail (LOD) expressions: **EXCLUDE**

```
{EXCLUDE DATETRUNC('month', [Order Date]) : AVG({FIXED DATETRUNC('month', [Order Date]) : SUM([Sales])})}
```

average sales total per month

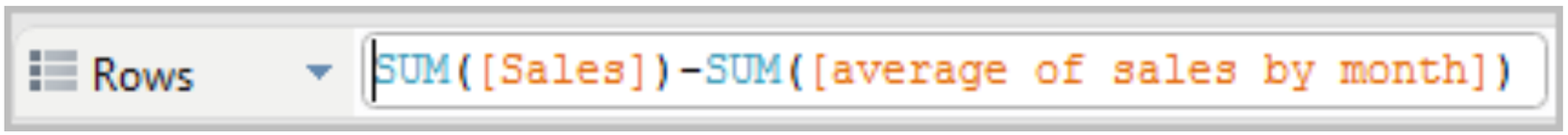


Level of Detail (LOD) expressions: **EXCLUDE**

- The following EXCLUDE level of detail expression computes the **average sales total per month** and then excludes the month component:

```
{EXCLUDE DATETRUNC('month', [Order Date]) : AVG({FIXED DATETRUNC('month', [Order Date]) : SUM([Sales])})}
```

average sales total per month

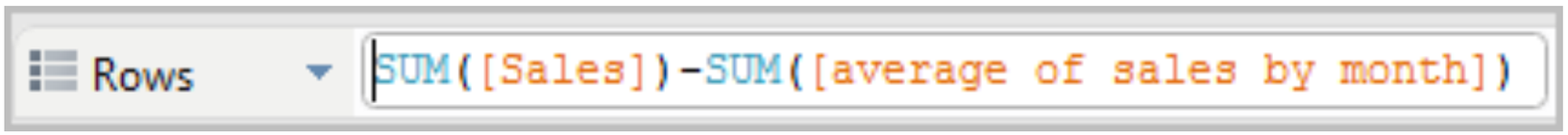


Level of Detail (LOD) expressions: **EXCLUDE**

- The following EXCLUDE level of detail expression computes the **average sales total per month** and then excludes the month component:

```
{EXCLUDE DATETRUNC('month', [Order Date]) : AVG({FIXED DATETRUNC('month', [Order Date]) : SUM([Sales])})}
```

average sales total per month

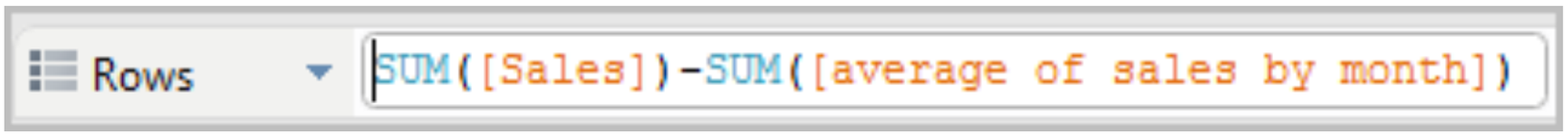


Level of Detail (LOD) expressions: **EXCLUDE**

- The following EXCLUDE level of detail expression computes the **average sales total per month** and then excludes the month component:

```
{EXCLUDE DATETRUNC('month', [Order Date]) : AVG({FIXED DATETRUNC('month', [Order Date]) : SUM([Sales])})}
```

average sales total per month



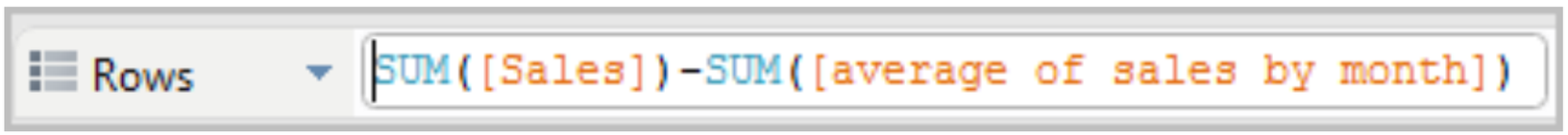
Level of Detail (LOD) expressions: **EXCLUDE**

- The following EXCLUDE level of detail expression computes the **average sales total per month** and then excludes the month component:

```
{EXCLUDE DATETRUNC('month', [Order Date]) : AVG({FIXED DATETRUNC('month', [Order Date]) : SUM([Sales])})}
```

average sales total per month

- Build a view



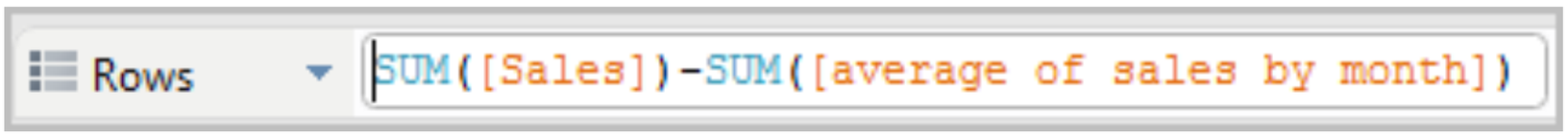
Level of Detail (LOD) expressions: **EXCLUDE**

- The following EXCLUDE level of detail expression computes the **average sales total per month** and then excludes the month component:

```
{EXCLUDE DATETRUNC('month', [Order Date]) : AVG({FIXED DATETRUNC('month', [Order Date]) : SUM([Sales])})}
```

average sales total per month

- Build a view



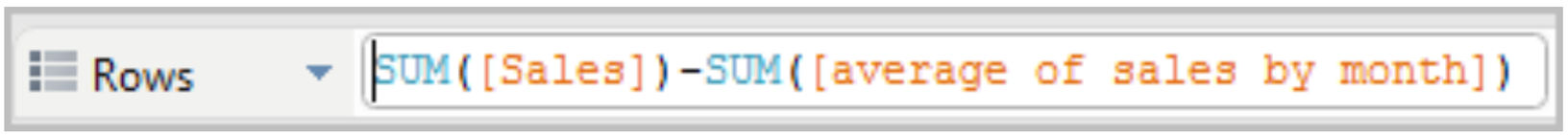
Level of Detail (LOD) expressions: **EXCLUDE**

- The following EXCLUDE level of detail expression computes the **average sales total per month** and then excludes the month component:

```
{EXCLUDE DATETRUNC('month', [Order Date]) : AVG({FIXED DATETRUNC('month', [Order Date]) : SUM([Sales])})}
```

average sales total per month

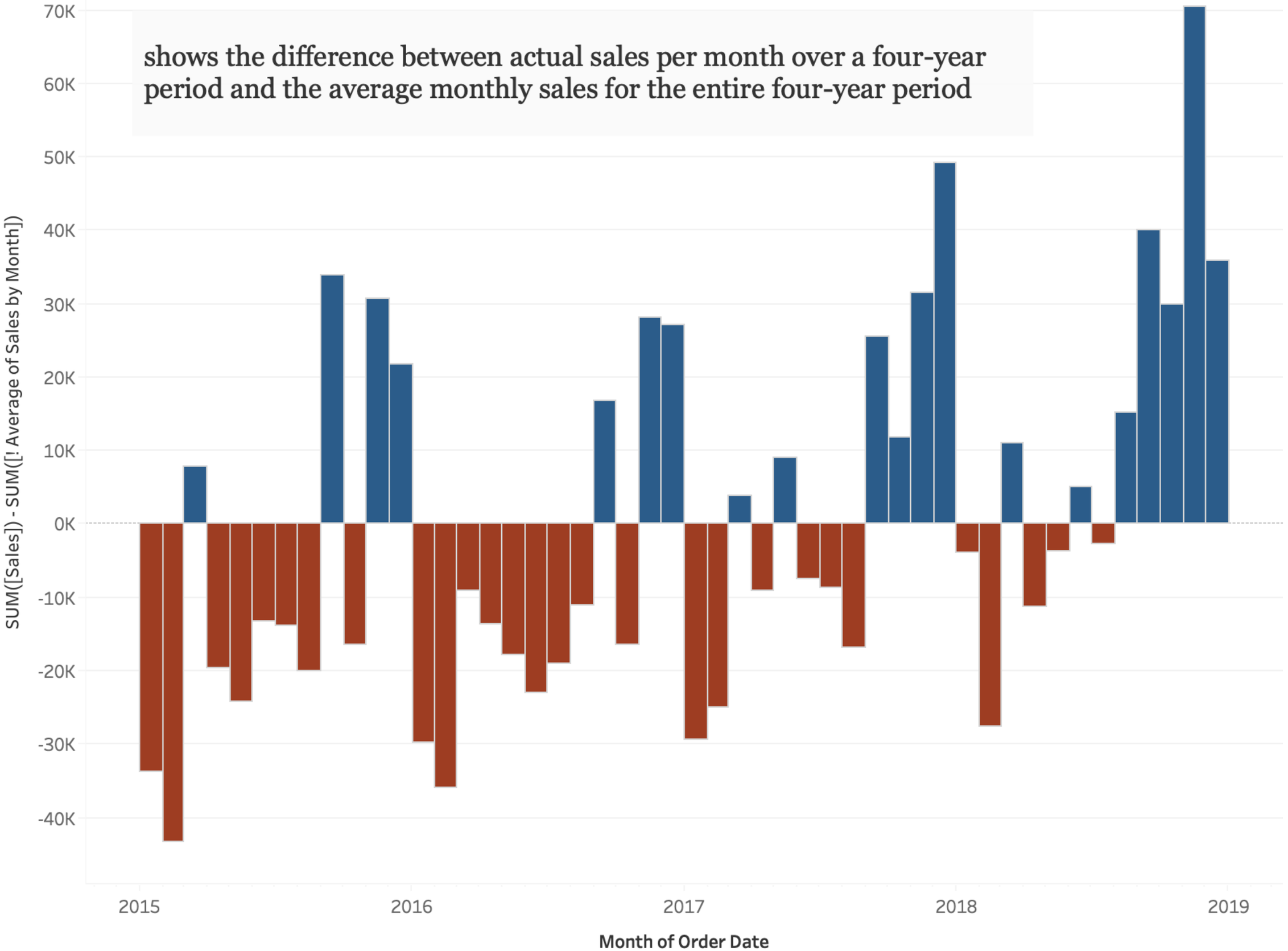
- Build a view



  - And With Month([Order Date]) on the Columns shelf

EXCLUDE - Average of Sales by Month

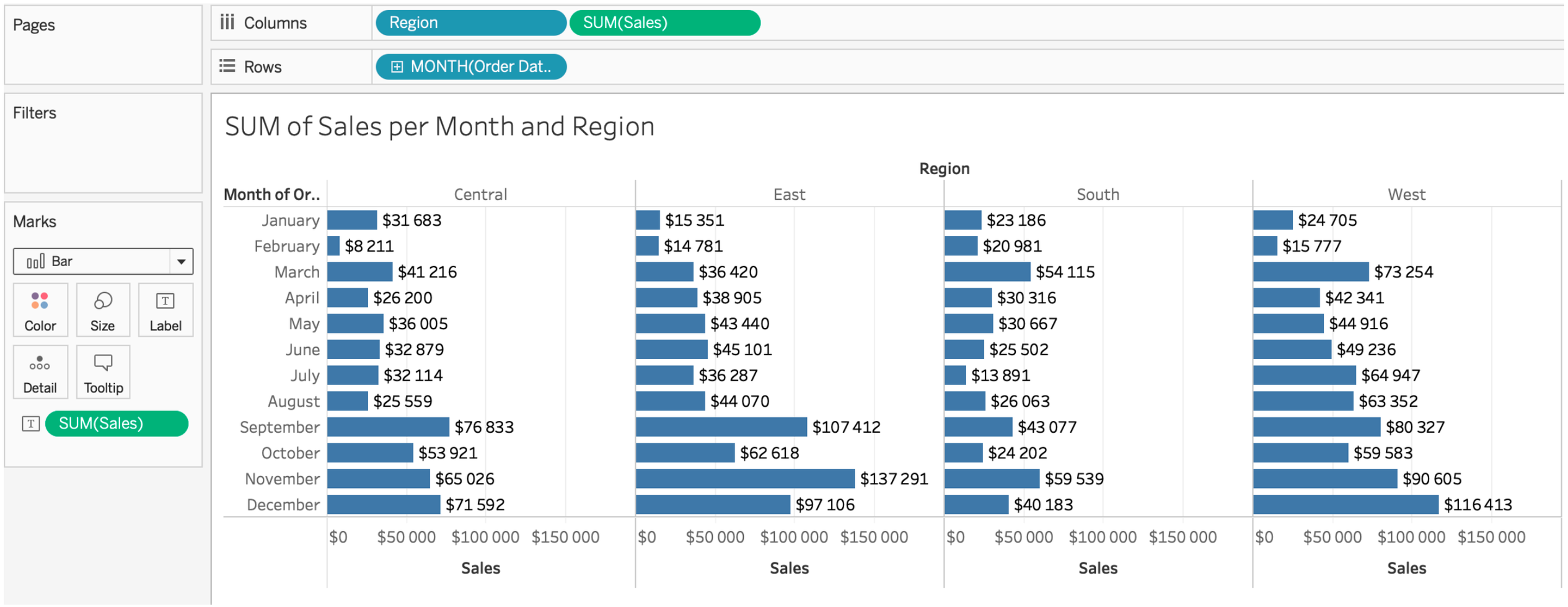
shows the difference between actual sales per month over a four-year period and the average monthly sales for the entire four-year period



The plot of SUM([Sales]) - SUM([! Average of Sales by Month]) for Order Date Month. Color shows SUM([Sales]) - SUM([! Average of Sales by Month]).

Level of Detail (LOD) expressions: **EXCLUDE**

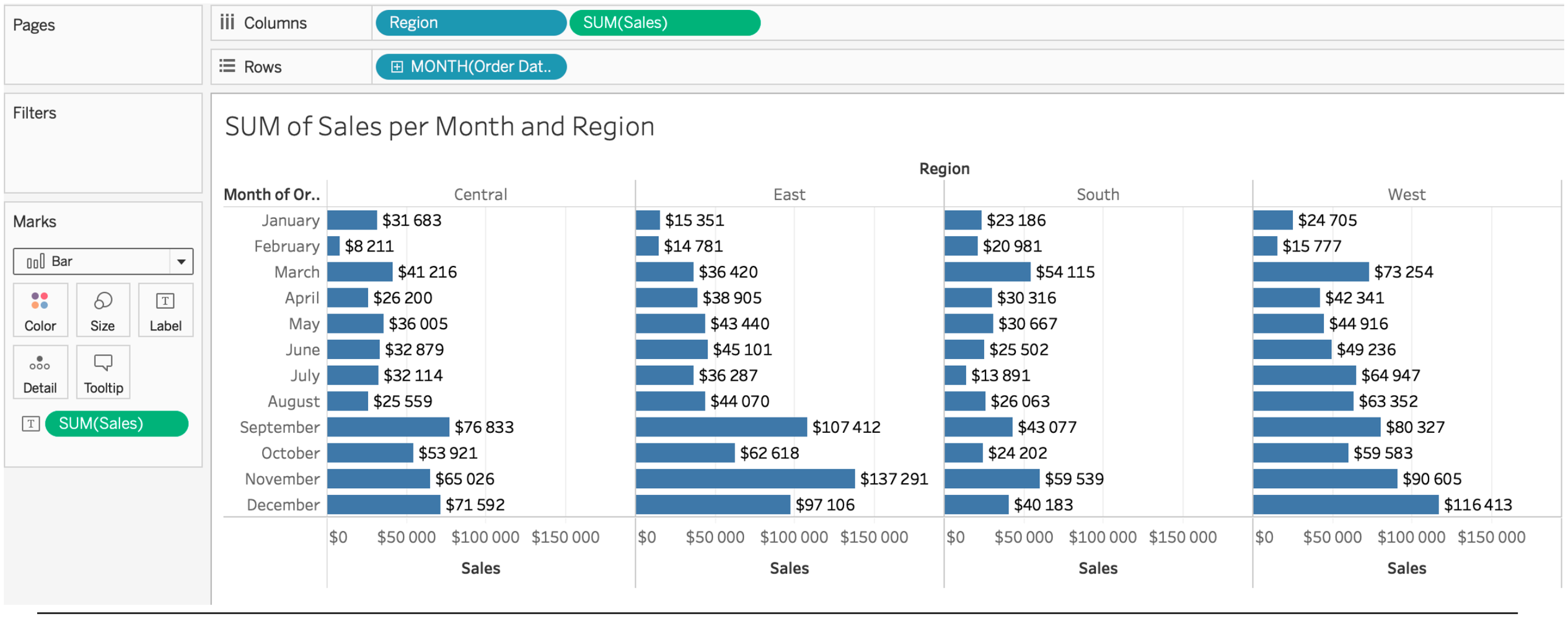
```
{EXCLUDE [Region]: SUM([Sales])}
```



Level of Detail (LOD) expressions: **EXCLUDE**

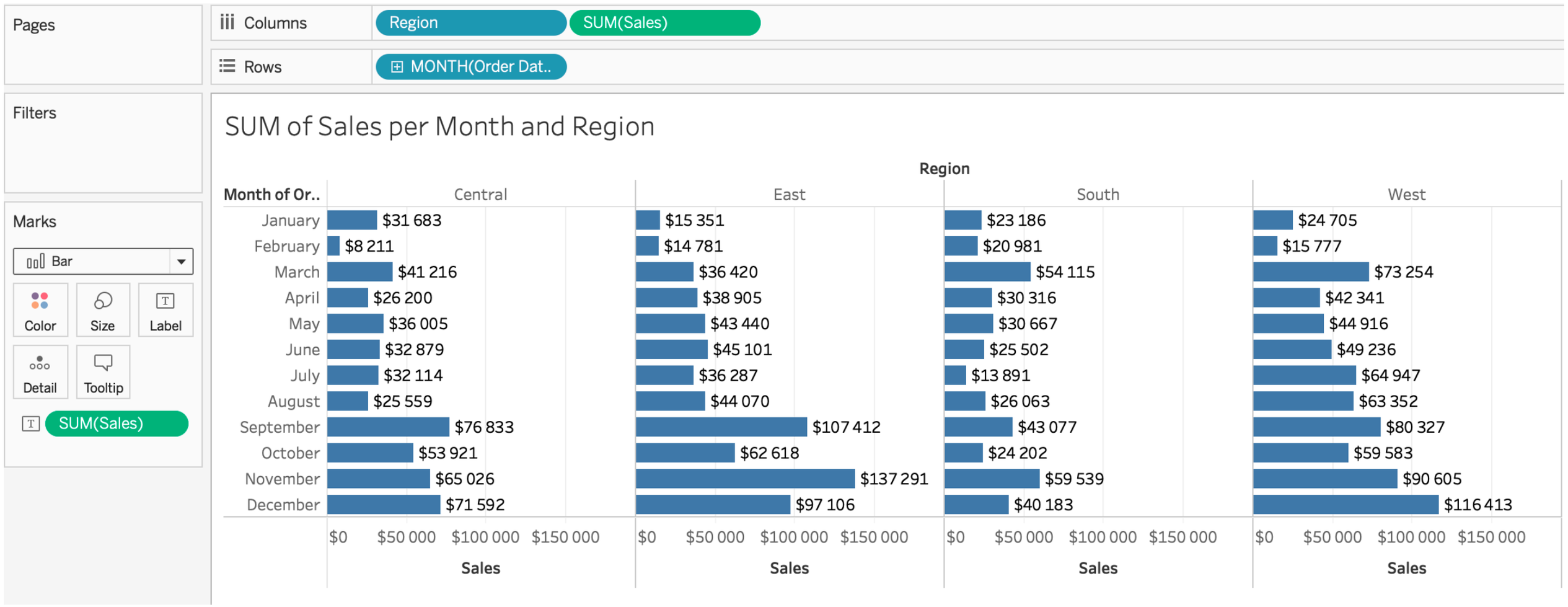
- ExcludeRegion calculation

```
{EXCLUDE [Region]: SUM([Sales])}
```



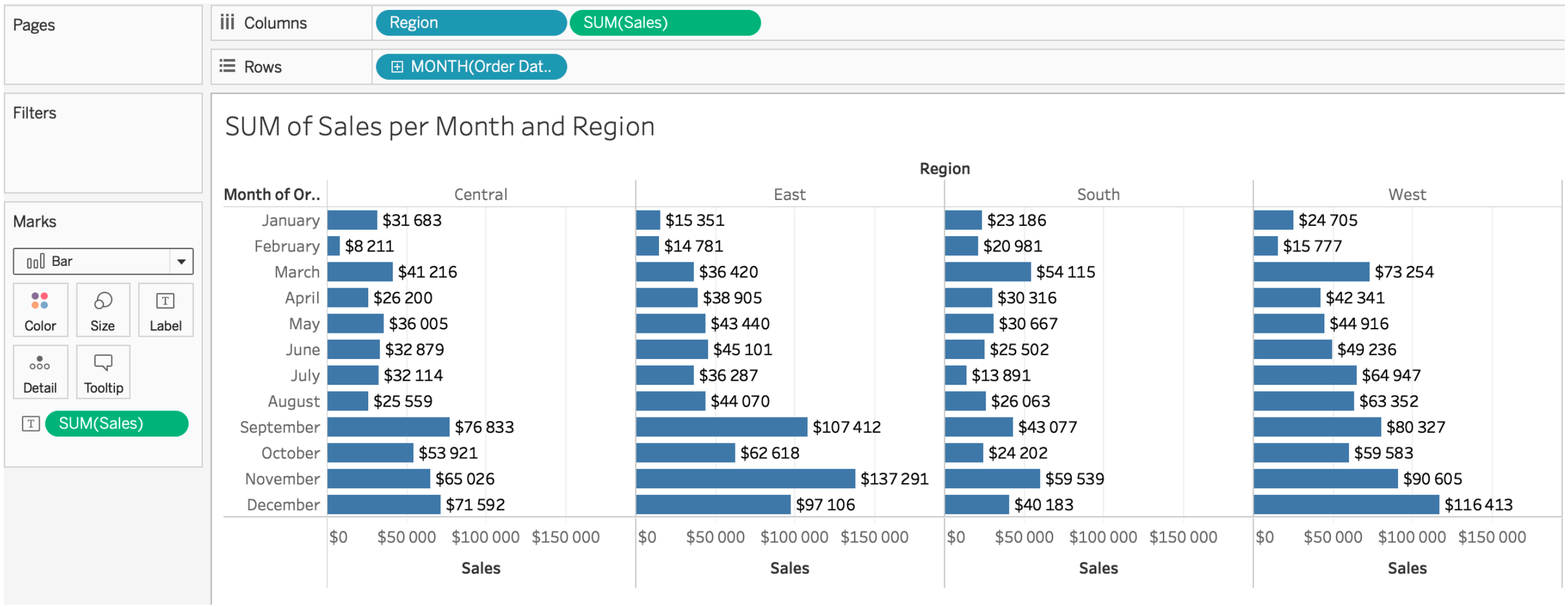
Level of Detail (LOD) expressions: **EXCLUDE**

- ExcludeRegion calculation
  - ```
    {EXCLUDE [Region]: SUM([Sales])}
    ```


    ```

Level of Detail (LOD) expressions: **EXCLUDE**

- ExcludeRegion calculation
  - ```
    {EXCLUDE [Region]: SUM([Sales])}
    ```
- A view that breaks out the sum of sales by region and by month:


    ```

Pages

Filters

Marks

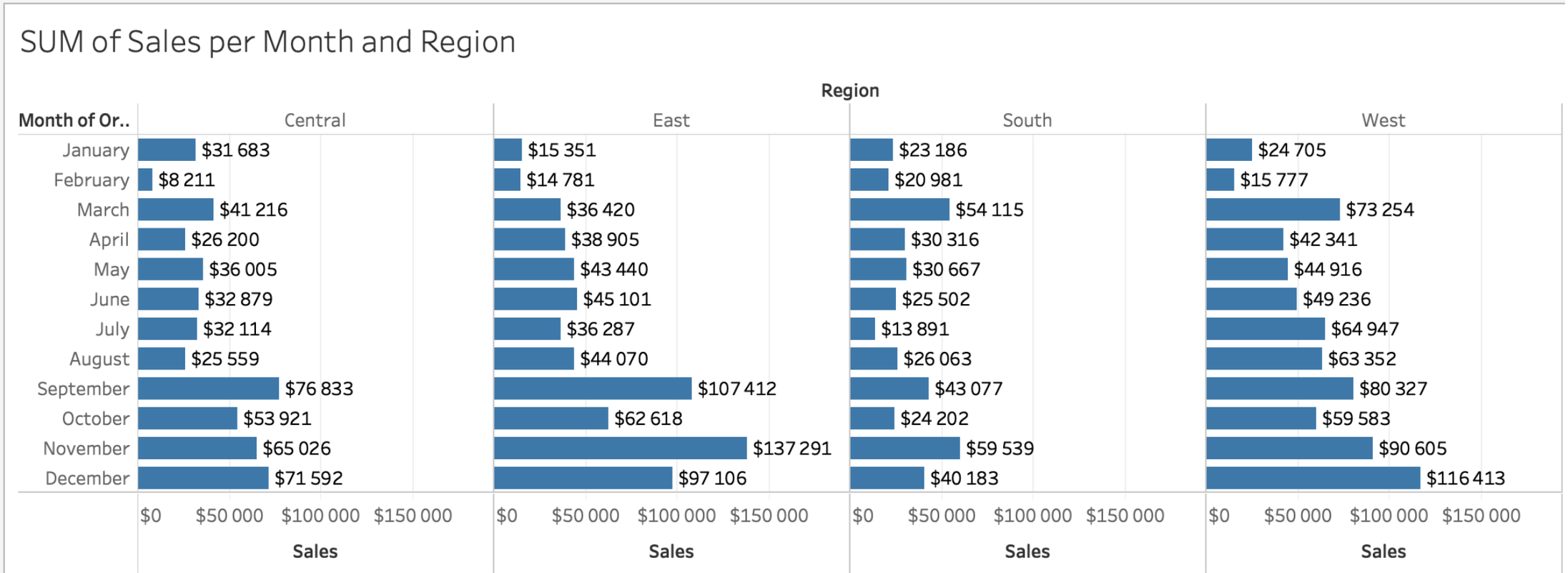
Bar

Color | Size | Label | Detail | Tooltip

SUM(Sales)

Columns: Region | SUM(Sales)

Rows: MONTH(Order Dat..



Pages

Columns: Region | SUM(Sales)

Rows: MONTH(Order Dat..

Filters

Marks

Bar

Color | Size | Label | Detail | Tooltip

SUM(Sales)

SUM of Sales per Month and Region

Month of Or..	Central	East	South	West
January	$31 683	$15 351	$23 186	$24 705
February	$8 211	$14 781	$20 981	$15 777
March	$41 216	$36 420	$54 115	$73 254
April	$26 200	$38 905	$30 316	$42 341
May	$36 005	$43 440	$30 667	$44 916
June	$32 879	$45 101	$25 502	$49 236
July	$32 114	$36 287	$13 891	$64 947
August	$25 559	$44 070	$26 063	$63 352
September	$76 833	$107 412	$43 077	$80 327
October	$53 921	$62 618	$24 202	$59 583
November	$65 026	$137 291	$59 539	$90 605
December	$71 592	$97 106	$40 183	$116 413

Region

$0 $50 000 $100 000 $150 000

Sales

Pages

Columns: Region | SUM(Sales)

Rows: MONTH(Order Dat..

Filters

Marks

Bar

Color | Size | Label | Detail | Tooltip

ATTR(! Exclude..

SUM(Sales)

SUM of Sales per Month and Region

Region

Month of Or.. | Central | East | South | West

January $31 683 | $15 351 | $23 186 | $24 705

February $8 211 | $14 781 | $20 981 | $15 777

March $41 216 | $36 420 | $54 115 | $73 254

April $26 200 | $38 905 | $30 316 | $42 341

May $36 005 | $43 440 | $30 667 | $44 916

June $32 879 | $45 101 | $25 502 | $49 236

July $32 114 | $36 287 | $13 891 | $64 947

August $25 559 | $44 070 | $26 063 | $63 352

September $76 833 | $107 412 | $43 077 | $80 327

October $53 921 | $62 618 | $24 202 | $59 583

November $65 026 | $137 291 | $59 539 | $90 605

December $71 592 | $97 106 | $40 183 | $116 413

Pages

Columns: Region | SUM(Sales)

Rows: MONTH(Order Dat..

Filters

Marks

Bar

Color | Size | Label | Detail | Tooltip

SUM(Sales)

SUM of Sales per Month and Region

Month of Or..	Central	East	South	West
January	$31 683	$15 351	$23 186	$24 705
February	$8 211	$14 781	$20 981	$15 777
March	$41 216	$36 420	$54 115	$73 254
April	$26 200	$38 905	$30 316	$42 341
May	$36 005	$43 440	$30 667	$44 916
June	$32 879	$45 101	$25 502	$49 236
July	$32 114	$36 287	$13 891	$64 947
August	$25 559	$44 070	$26 063	$63 352
September	$76 833	$107 412	$43 077	$80 327
October	$53 921	$62 618	$24 202	$59 583
November	$65 026	$137 291	$59 539	$90 605
December	$71 592	$97 106	$40 183	$116 413

Region

$0 $50 000 $100 000 $150 000

Sales

Pages

Columns: Region | SUM(Sales)

Rows: MONTH(Order Dat..

Filters

Marks

Bar

Color | Size | Label | Detail | Tooltip

ATTR(! Exclude..

SUM(Sales)

SUM of Sales per Month and Region

Region

Month of Or.. | Central | East | South | West

January $31 683 | $15 351 | $23 186 | $24 705

February $8 211 | $14 781 | $20 981 | $15 777

March $41 216 | $36 420 | $54 115 | $73 254

April $26 200 | $38 905 | $30 316 | $42 341

May $36 005 | $43 440 | $30 667 | $44 916

June $32 879 | $45 101 | $25 502 | $49 236

July $32 114 | $36 287 | $13 891 | $64 947

August $25 559 | $44 070 | $26 063 | $63 352

September $76 833 | $107 412 | $43 077 | $80 327

October $53 921 | $62 618 | $24 202 | $59 583

November $65 026 | $137 291 | $59 539 | $90 605

December $71 592 | $97 106 | $40 183 | $116 413

Pages

Columns: Region | SUM(Sales)

Rows: MONTH(Order Dat..

Filters

Marks

Bar

Color | Size | Label | Detail | Tooltip

SUM(Sales)

SUM of Sales per Month and Region

Month of Or..	Central	East	South	West
January	$31 683	$15 351	$23 186	$24 705
February	$8 211	$14 781	$20 981	$15 777
March	$41 216	$36 420	$54 115	$73 254
April	$26 200	$38 905	$30 316	$42 341
May	$36 005	$43 440	$30 667	$44 916
June	$32 879	$45 101	$25 502	$49 236
July	$32 114	$36 287	$13 891	$64 947
August	$25 559	$44 070	$26 063	$63 352
September	$76 833	$107 412	$43 077	$80 327
October	$53 921	$62 618	$24 202	$59 583
November	$65 026	$137 291	$59 539	$90 605
December	$71 592	$97 106	$40 183	$116 413

Region

$0 $50 000 $100 000 $150 000

Sales

Pages

Columns: Region | SUM(Sales)

Rows: MONTH(Order Dat..

Filters

Marks

Bar

Color | Size | Label | Detail | Tooltip

ATTR(! Exclude..

SUM(Sales)

! ExcludeRegion added to color shades the view to show total sales by month but without the regional component

Month of Or..	Central	East	South	West
January	$31 683	$15 351	$23 186	$24 705
February	$8 211	$14 781	$20 981	$15 777
March	$41 216	$36 420	$54 115	$73 254
April	$26 200	$38 905	$30 316	$42 341
May	$36 005	$43 440	$30 667	$44 916
June	$32 879	$45 101	$25 502	$49 236
July	$32 114	$36 287	$13 891	$64 947
August	$25 559	$44 070	$26 063	$63 352
September	$76 833	$107 412	$43 077	$80 327
October	$53 921	$62 618	$24 202	$59 583
November	$65 026	$137 291	$59 539	$90 605
December	$71 592	$97 106	$40 183	$116 413

Level of Detail (LOD) expressions: **TABLE SCOPED**

It is possible to define a level of detail expression at the table level without using any of the scoping keywords. For example, the following expression returns the minimum (earliest) order date for the entire table:

```
{MIN([Order Date])}
```

This is equivalent to a FIXED level of detail expression with no dimension declaration:

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

Notes on dimensions declarations in LoD expressions

- For level of detail expressions, you **can use any expression that evaluates as dimension in a dimensionality declaration**, including Date expressions.

> **Note**: It is strongly recommended that you drag fields into the calculation editor when creating dimension declarations, instead of typing them. For example, if you see **YEAR([Order Date])** on a shelf and then type that as the dimension declaration, it will not match the field on the shelf. But if you drag the field from the shelf into the expression, it will become **DATEPART('year', [Order Date])**, and that will match the field on the shelf.

Notes on dimensions declarations in LoD expressions

With named calculations (that is, calculations that you save to the Data pane, as opposed to ad-hoc calculations, which you do not name), Tableau cannot match the name of a calculation to its definition. So if you create a named calculation, MyCalculation, defined as follows:

```
MyCalculation = YEAR([Order Date])
```

And then you created the following EXCLUDE level of detail expression and used it in the view:

```
{EXCLUDE YEAR([Order Date]) : SUM(Sales)}
```

Then MyCalculation would not be excluded.

Similarly, if the EXCLUDE expression specified MyCalculation:

```
{EXCLUDE MyCalculation : SUM(Sales)}
```

Then YEAR([Order Date]) would not be excluded.

What next?

- **Top 15 LOD Expressions**
  - **https://www.tableau.com/about/blog/LOD-expressions**

Table Calculations

Table Calculation Types

- **Difference** From, **Percent Difference** From, **Percent** From
  - **Difference -** Current - Reference.
  - **Percent Difference** - (Current - Reference) / Current in percentage
  - **Percent** - Current / Reference in percentage

- Two values to consider: the **current value**, and the **value from which the difference should be calculated**
  - Previous, Next, First, Last
- **The reference values depend on the computation order over the table (down, across, etc.**

Table Calculation Types

- **Percent of Total**, **Percentile, Rank**
  - **Percent of Total -** computes a value as a percentage of all values in the current partition.
  - **Percentile** - computes a percentile rank for each value in a partition
  - **Rank** - computes a ranking for each value in a partition
- In the case of **Percentile** and **Rank** an order (ascending our descending) has to be defined
- In the case of **Rank** a *Rank Type* has to be defined: Competition (1, 2, 2, 4); Modified Competition (1, 3, 3, 4); Dense (1, 2, 2, 3); Unique (1, 2, 3, 4)

Table Calculation Types

- **Moving Calculation**

  - **Moving Calculation -** determines the value for a mark in the view by performing an aggregation (sum, average, minimum, or maximum) across a specified number of values before and/or after the current value

- **Aggregation**: sum, average, minimum, or maximum
- Values before and after.
  - Previous Values
  - Next Values
- **Add Secondary Calculation**

Table Calculation Types

- **Running Total calculation**

  - **Running Total** -aggregates values cumulatively in a partition. It can do this by summing values, averaging values, or replacing all values with either the lowest or highest actual value.

- **Aggregation:** sum, average, minimum, or maximum

- **Add Secondary Calculation**

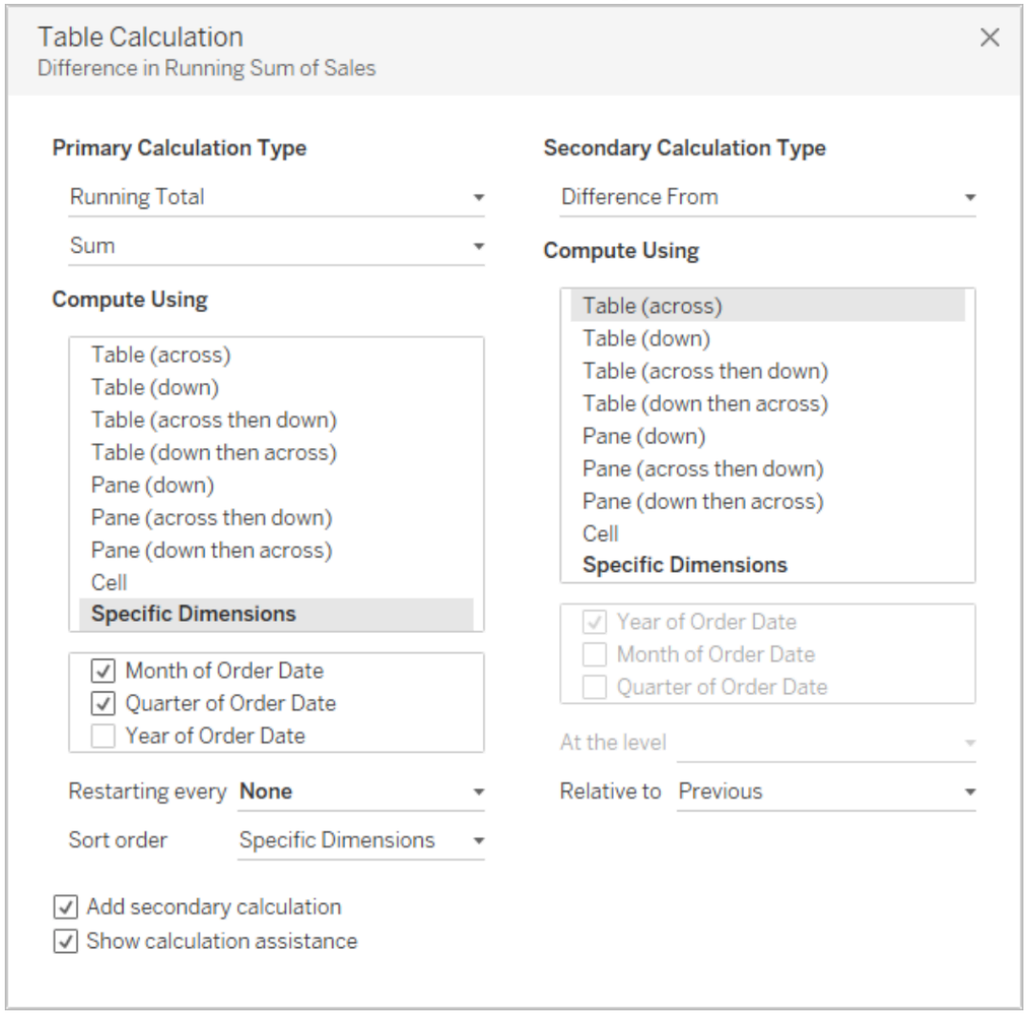


Table Calculations

- **Basics**
  - **https://onlinehelp.tableau.com/current/pro/desktop/en-us/calculations_tablecalculations.htm**

- **Table Calculation Types**
  - **https://onlinehelp.tableau.com/current/pro/desktop/en-us/calculations_tablecalculations_definebasic_runningtotal.htm**

THANK YOU!

jmp@fct.unl.pt

fpb@fct.unl.pt

FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

NOVALINCS
LABORATORY FOR COMPUTER SCIENCE AND INFORMATICS

Departamento de Informática, FCT/UNL
Quinta da Torre P-2829-516
CAPARICA, Portugal

di.secretariado(AT)fct.unl.pt

(+351) 212948536 (direct)
(+351) 212948300 (central)
(+351) 212948500 (central)