Data Visualization Lab

Introduction to Tableau

Nov. 14, 2022

Tableau Public

➔ *"Tableau Public is a **free platform** to **explore**, **create** and **publicly share** data visualizations online"*

🤑 It is free;

👀 Everything you do in TP <u>must</u> be publicly accessible (can't save locally).

➔ **What does this imply?**

Tableau Public

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➔ **What does this imply?**

TP can only be used in a <u>non-professional way</u> (as you know, businesses must keep data private)

Tableau Public

➔ *"Tableau Public is a **free platform** to **explore**, **create** and **publicly share** data visualizations online"*
  - 🤑 It is free;
  - 👀 Everything you do in TP <u>must</u> be publicly accessible (can't save locally).

➔ **What does this imply?**
  TP can only be used in a <u>non-professional way</u> (as you know, businesses must keep data private)

➔ **Does this mean that we are about to use *yet another useless platform* that you will not give a d🤬n about for the rest of your lives?**

Tableau Desktop

➔   *"Tableau Desktop is data visualization software that lets you **see** and **understand data** in minutes."*

   💸   Not free, but free trial available;

   🔒   Data can be saved locally and kept private.

   It is designed to be used in <u>professional environments</u>.

➔   As a student you can access it by applying for an <u>annual free license</u> for the Desktop version.

   Know that it exists but **<u>do not use it</u>** for your exam project

Read more on Public vs Desktop features comparison: <u>https://www.edureka.co/blog/tableau-desktop-vs-tableau-public-vs-tableau-reader/</u>

What's next

What we will do

Create visualizations on Tableau

Learn to build dashboards and stories

Use Tableau Public

What we won't do

Preprocess data in Tableau

Work on private data

Use Tableau Desktop

Introduction to Tableau

Installation and setup

➜ Head over to **https://public.tableau.com/app/discover** and create a **new account** for Tableau Public;

➜ Download the Tableau Public Desktop application and sign in with your newly created account. 🔗 https://www.tableau.com/products/public/download

➜ If you are not using your computer:
   ◆ Create your account on the TP homepage;
   ◆ Click on *Create>Web Authoring* to access the tool
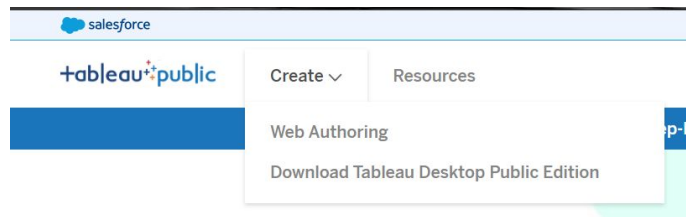
Connecting to data

File   Data   Help

Connect

To a File

Microsoft Excel

Text file

JSON file

Microsoft Access

PDF file

Spatial file

Statistical file

To a Server

OData

More...

Save locally. Work with big data.
Connect to more data sources.

Upgrade Now

Open

Open from Tableau Public

Discover

How-to Videos

Overview

Intro to the Interface

Chart Types

More how-to videos...

VIZ
OF THE
DAY

See trending vizzes
→

Viz of the Day

Explore viz of the day

Blog - Read latest post

Sample Data Sets

Current Status

Download data here

File Data Window Help

Connections   Add

Global Superstore Orders 2016
Microsoft Excel

Sheets

☐ Use Data Interpreter

Data Interpreter might be able to
clean your Microsoft Excel
workbook.

⊞ Orders

⊞ People

⊟ New Union

⊡ New Table Extension

Global Superstore Orders 2016

Drag tables here

Data Source   Sheet 1

Jessica

Connections   Add

Global Superstore Orders 2016
Microsoft Excel

Sheets

Use Data Interpreter

Data Interpreter might be able to clean your Microsoft Excel workbook.

Orders
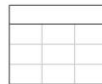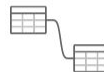
People

New Union

New Table Extension

Orders (Global Superstore Orders 2016)

Filters
0 | Add

Orders

Need more data?

Drag tables here to relate them. Learn more

| Orders | | 24 fields 51290 rows | | | | | 100 → rows |

Name

Orders

Fields

Type	Field Name	Physical Table	Remote Fie...
#	Row ID	Orders	Row ID
Abc	Order ID	Orders	Order ID
📅	Order Date	Orders	Order Date

# Orders Row ID	Abc Orders Order ID	📅 Orders Order Date	📅 Orders Ship Date	Abc Orders Ship Mode	Abc Orders Customer ID	Abc Orders Customer N
40098	CA-2014-AB10015140-41954	11/11/2014	13/11/2014	First Class	AB-100151402	Aaron Berg
26341	IN-2014-JR162107-41675	05/02/2014	07/02/2014	Second Class	JR-162107	Justin Ritte
25330	IN-2014-CR127307-41929	17/10/2014	18/10/2014	First Class	CR-127307	Craig Reiter
13524	ES-2014-KM1637548-41667	28/01/2014	30/01/2014	First Class	KM-1637548	Katherine N
47221	SG-2014-RH9495111-41948	05/11/2014	06/11/2014	Same Day	RH-9495111	Rick Hanse
22732	IN-2014-JM156557-41818	28/06/2014	01/07/2014	Second Class	JM-156557	Jim Mitchu

Go to Worksheet

Data Source   Sheet 1

Jessica

Joining multi-source data

Connecting tables from the same file (Global Superstore Orders 2016)

➜   Have a look at the file we just imported at the bottom of the page. We can see that for each transaction, a region is reported. Suppose we have a list of **vendors' names** so that we know the name of the vendor based on the region where the transaction has taken place.

➜   It could be useful to integrate data from the two tables. To do so, we simply drag the **People** table onto the canvas.

Connections   Add

Global Superstore Orders 2016
Microsoft Excel

Sheets   🔍

☐ Use Data Interpreter

Data Interpreter might be able to
clean your Microsoft Excel
workbook.

⊞ Orders
⊞ People

⊟ New Union

⬡ New Table Extension

🗄 Orders+ (Global Superstore Orders 2016)

Filters
0 | Add

| Orders | ——————— | People |

Orders — People ▼   24 → rows ⚙ ⌄

< | Abc | Abc |
How do relationships differ from joins? Learn more | People | People |
                                           | Person | Region (People) |

Orders	Operator	People		Marilène Rousseau	Caribbean
				Andile Ihejirika	Central Africa
Abc Region ▼	= ▼	Abc Region (People) ▼		Nicodemo Bautista	Central America
				Cansu Peynirci	Central Asia
⊕ Add more fields	Lon Bonher	Central US
Wasswa Ahmed	Eastern Africa
› Performance Options | Hadia Bousaid | Eastern Asia |

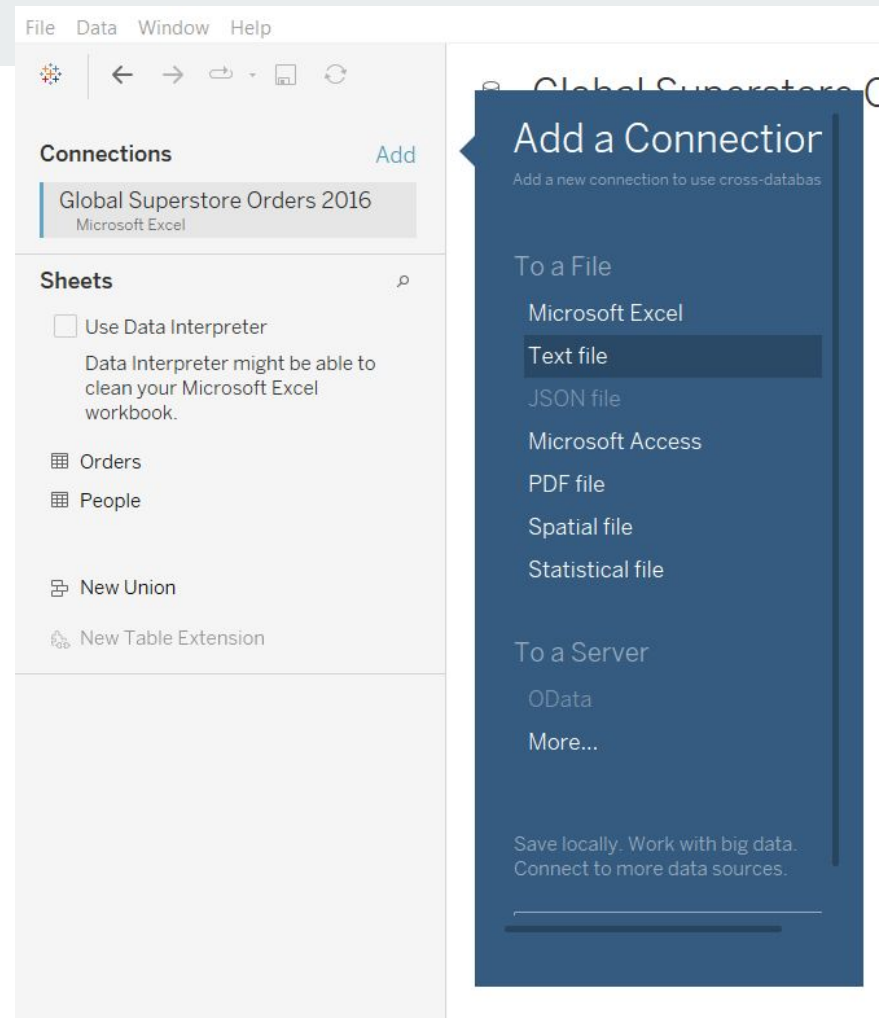⛁ Data Source   Sheet 1   👤 Jessica ▼

Joining tables from different files (Global Superstore Returns 2016)

➔ Otherwise, we can create an integrated data source by adding a connection;

➔ In our scenario, we might need to find out which orders, if any, were returned, but we have no returns listed in here. We need to resort to a different file.

➔ Click on *Add > Text File* (or whatever type of file you might need). In this case we will add the **Global Superstore Returns 2016**.

File Data Window Help

Connections Add

Global Superstore Orders 2016
Microsoft Excel

Sheets

☐ Use Data Interpreter

Data Interpreter might be able to clean your Microsoft Excel workbook.

▦ Orders

▦ People

⊟ New Union

⚙ New Table Extension

Add a Connection
Add a new connection to use cross-databas

To a File
Microsoft Excel
Text file
JSON file
Microsoft Access
PDF file
Spatial file
Statistical file

To a Server
OData
More...

Save locally. Work with big data.
Connect to more data sources.

Joining data from different files

Once the other data source is imported we can do two different things:

1. Drag and drop the **Global Superstore Returns 2016.csv** table from the **Files** (once was Sheets) pane onto the canvas;

   What happens? Why?

Add

al Superstore Orders 2016
rosoft Excel

al Supers... Returns 2016
t file

se Data Interpreter

ata Interpreter might be able to
ean your Text file workbook.

obal Superst...turns 2016.csv

w Union

w Table Extension

| Orders | ⚠ | Global Superstore Returns... |

⚠ Orders — Global Su...

How do relationships differ from joins? Learn more

Orders	Operator	Global Superstore R...
Select a field	=	Select a field

⚠ Select matching fields to create this relationship.

⊕ Add more fields

Data preview unavailable

→ ro

Source   Sheet 1

Joining data from different files

Once the other data source is imported we can do two different things:

1. Drag and drop the **Global Superstore Returns 2016.csv** table from the **Files** (once was Sheets) pane onto the canvas;

    What happens? The relationship between tables is not created automatically
    Why? Column names in the two data sources did not match

Connections   Add

Global Superstore Orders 2016
Microsoft Excel

Global Supers... Returns 2016
Text file

Files

☐ Use Data Interpreter

Data Interpreter might be able to
clean your Text file workbook.

⊞ Global Superst...turns 2016.csv

⊟ New Union

⚙ New Table Extension

Orders ———— Global Superstore Returns...

Orders — Global Su...   100

How do relationships differ from joins? Learn more

Orders	Operator	Global Superstore R...
Abc Region ▼	= ▼	Abc ID,Region ▼

⊕ Add more fields

> Performance Options

Abc Global Superstore Returns 2016.csv Returned,Order	Abc Global Superstore Returns 2016.csv ID,Region
Yes,CA-2012-SA20830140-4...	US
Yes,IN-2012-PB19210127-412...	Asia
Yes,CA-2012-SC20095140-4...	US
Yes,IN-2015-JH158207-42140...	null
Yes,IN-2014-LC168857-41747,...	null
Yes,ID-2013-AB1001527-4143...	Asia
Yes,ES-2015-RA1994545-42	Europe

⊟ Data Source   Sheet 1

Joining data from different files

Once the other data source is imported we can do two different things:

1. Drag and drop the **Global Superstore Returns 2016.csv** table from the **Files** (once was Sheets) pane onto the canvas;

2. We can merge the two data sources by right-clicking on the **Orders** table on the canvas and then **Open** it. Once opened, drag and drop the **Global Superstore Returns 2016.csv** file onto the canvas, select **Join (Inner)** and again join by **Region** and **ID, Region** respectively.

   What happens?

This second method will actually join the two data sources, meaning that you will be able to find information about returned orders in the Orders table. This might actually cause some loss of information, but we'll see this better in future lessons.

| Orders ▼ | 26 fields 2304 rows | | | | | 100 → rows ⚙ ⌄ |

		# Orders	# Orders	# Orders	Abc Orders	Abc Global Superstore Returns 2016.csv	Abc Global Superstore Returns 2016.csv
	...ders	scount	Profit	Shipping Cost	Order Priority	Returned,Order	ID,Region
		0,00	54,9000	11,1300	High	Yes,CA-2012-RA988523-4116...	Canada
		0,00	54,9000	11,1300	High	Yes,CA-2015-JS594023-423...	Canada
		0,00	54,9000	11,1300	High	Yes,CA-2014-TZ1144523-419...	Canada
		0,00	54,9000	11,1300	High	Yes,CA-2013-NF847523-4154...	Canada
		0,00	54,9000	11,1300	High	Yes,CA-2012-CC247523-4103...	Canada
		0,00	54,9000	11,1300	High	Yes,CA-2014-SS1041023-419...	Canada

Name

Orders

Fields

Type	Field Name	Physical Table	Remote Fie...
#	Row ID	Orders	Row ID
Abc	Order ID	Orders	Order ID
📅	Order Date	Orders	Order Date

Data formatting

We will do a bit of data preparation by:

1. Changing the **Row ID** type from Number (#) to String (Abc) – you can do this by simply clicking on the # icon in the column header;
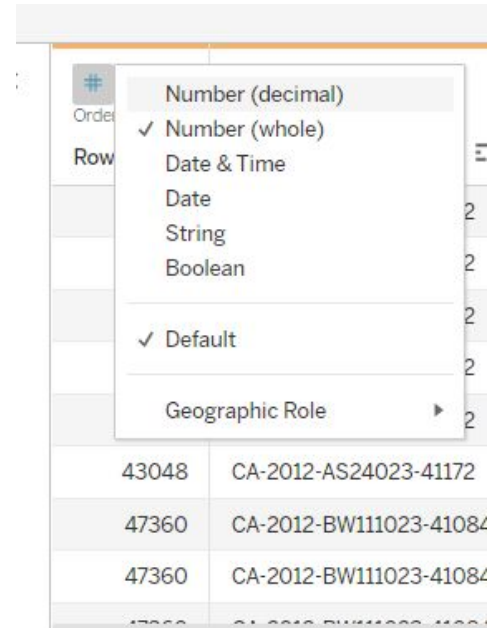
Data formatting

We will do a bit of data preparation by:

1. Changing the **Row ID** type from Number (#) to String (Abc) – you can do this by simply clicking on the # icon in the column header;

2. Splitting the **Order ID** to isolate the **Distribution Center** code – you can do this by clicking on the dropdown menu caret on the column header and select
    a. **Split**: selects on which character to split automatically;
    b. **Custom split:** to customize the operation).

    To rename the column, simply double click on the title and name it Distribution Center

Abc Calculation Distribution c...
CA
CA
CA
CA
CA
CA
CA
CA

Abc Calculation Order ID - Split 1	# Calculation Order ID - Split 2	Abc Calculation Order ID - Split 3	# Calculation Order ID - Split 4
CA	2012	AS24023	41172
CA	2012	AS24023	41172
CA	2012	AS24023	41172
CA	2012	AS24023	41172
CA	2012	AS24023	41172
CA	2012	AS24023	41172
CA	2012	BM165023	41216
CA	2012	BM165023	41216

Custom split with - character, split only once at the first character. Column renamed as **Distribution Center**

Split with no customization

Abc Calculation Distribution c...
CA
CA
CA
CA
CA
CA
CA
CA

Abc Calculation Order ID - Split 1	# Calculation Order ID - Split 2	Abc Calculation Order ID - Split 3	# Calculation Order ID - Split 4
CA	2012	AS24023	41172
CA	2012	AS24023	41172
CA	2012	AS24023	41172
CA	2012	AS24023	41172
CA	2012	AS24023	41172
CA	2012	AS24023	41172
CA	2012	BM165023	41216
CA	2012	BM165023	41216

🔴 Note that the newly created columns are put at the **end of the table** (if you think the Split operation has done nothing to your data, go look for the results there)

Try it yourself

➔   Import the **Global Superstore Orders 2016** Excel file;

➔   Join the **Orders** table from **Global Superstore Orders 2016** to the **Global Superstore Returns 2016** file;

➔   Use a **left Join** on the **Order ID** column;

➔   Change the **Row ID** type to String and isolate the **Distribution Center** from the **Order ID** column.

💡 **A little trick:** sometimes TP is not capable of importing your files correctly; in these cases, you might need to correct the import (check the next slide for more information)

Try it yourself

Right click on the **Global Superstore Returns 2016** dropdown menu and open the **Text File Properties** menu. Update the **Field separator**.

Which separator do we need?
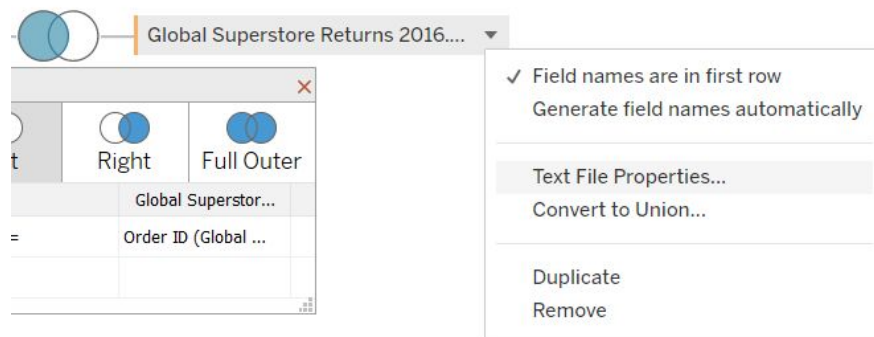
View Data: Global Superstore Returns 2016.csv ✕

Global Superstore Returns 2016.csv   1.079 rows   2 fields

⊞ Global Superstore ...

Abc Global Superstore Returns 2016.c... **ID,Region**	Abc Global Superstore Returns 2016.csv **Returned,Order**
US	Yes,CA-2012-SA20830140-41210,Central
Asia	Yes,IN-2012-PB19210127-41259,Eastern
US	Yes,CA-2012-SC20095140-41174,Central
Null	Yes,IN-2015-JH158207-42140,Oceania
Null	Yes,IN-2014-LC168857-41747,Oceania
Asia	Yes,ID-2013-AB1001527-41439,Eastern
Europe	Yes,ES-2015-RA1994545-42218,Western
US	Yes,CA-2014-TB21280140-41724,Central
Europe	Yes,ES-2014-JF15295120-41924,Southern
Asia	Yes,IN-2014-NM1844527-41800,Eastern
Null	Yes,IN-2015-GB145307-42260,Oceania

10.000   →   rows

The Tableau Workspace
Tableau Sheets

Creating your first viz

All you have to do is dragging the fields out from the pane on the left, called **Data Pane**.

The Data Pane is divided into **Dimensions** and **Measures** that represent the column headers in the Excel sheet:

➔ **Dimensions** are categorical fields, often discrete and color coded blue in the data pane and in the view;
➔ **Measures** are metrics, often continuous and color coded green in the data pane and in the view.

To add dimensions and measures to the view to create charts, simply drag and drop them from the Data Pane onto the **Rows** and **Columns** shelves.

Look at the Data Pane, which fields are categorical (and which are metrics instead)?

Creating your first viz

To create the viz, let's bring:

➔   **Category** and **Segment** to Rows;
➔   **Quantity** and **Market** to Columns.

To make the view clearer drag and drop the **Market** field onto the **Color** tab in the Marks pane.

What are we seeing here? What can we conclude about our data from this visualization?

Creating your first viz

To create the viz, let's bring:

➔ **Category** and **Segment** to Rows;
➔ **Quantity** and **Market** to Columns.

To make the view clearer drag and drop the **Market** field onto the **Color** tab in the Marks pane.

What are we seeing here? What can we conclude about our data from this visualization?

We are visualizing how sales are looking per category, customer segment and market, in terms of number of items sold. Africa seems to be an emerging market.

Creating your first viz

**What happened to the Quantity field on the Columns shelf?**

Creating your first viz

What happened to the Quantity field on the Columns shelf?

It displays the SUM of items sold per category, customer segment and market. TP automatically aggregates data with the supposed best measure.

Of course, you can change it as you need, either by selecting a predefined measure or by editing the formula "on shelf" (**Edit on shelf**).
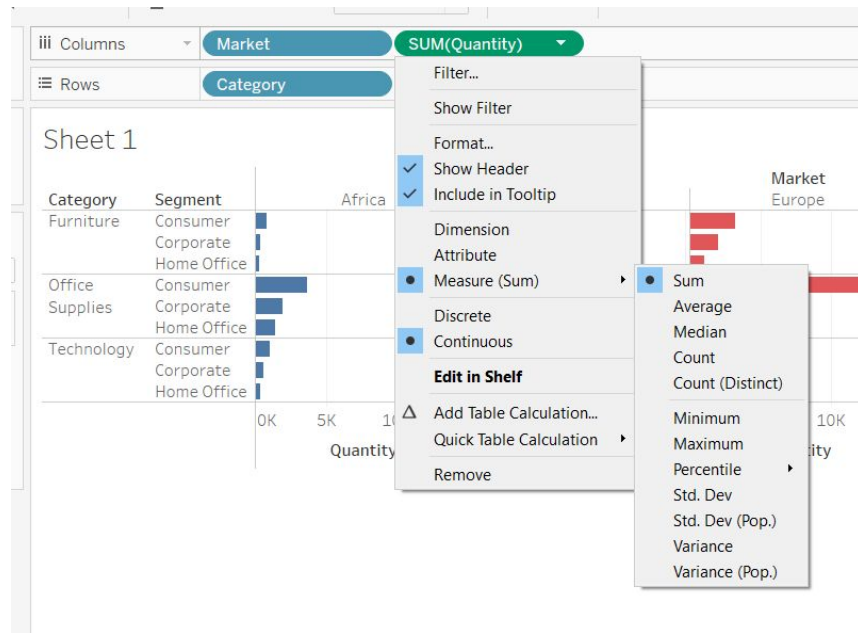
Building views

Now suppose we want to analyze sales over time in our **Global Superstore Orders 2016** dataset.

**Which measures and dimensions do we need?**

Building views

Now suppose we want to analyze <u>sales over time</u> in our **Global Superstore Orders 2016** dataset.

Which measures and dimensions do we need?

- **Sales** in Rows;
- **Order date** in Columns.

💡 **A little trick:** you can drag and drop measures and dimensions directly onto the columns/rows areas in the view instead of onto the shelves. You can drop fields onto any areas surrounded with an orange border
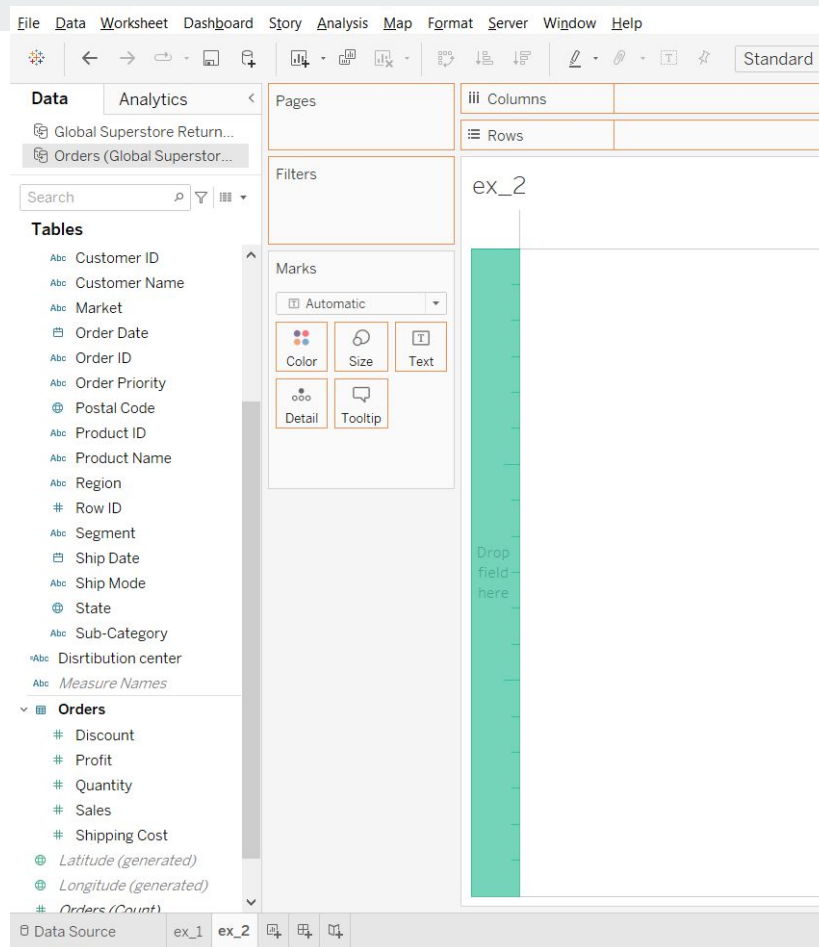
Building views

TP automatically aggregates sales by YEAR (Order date), but as with measures we can change that.
But before doing so ...

Do you notice anything about the Order date pill on the Columns shelf?
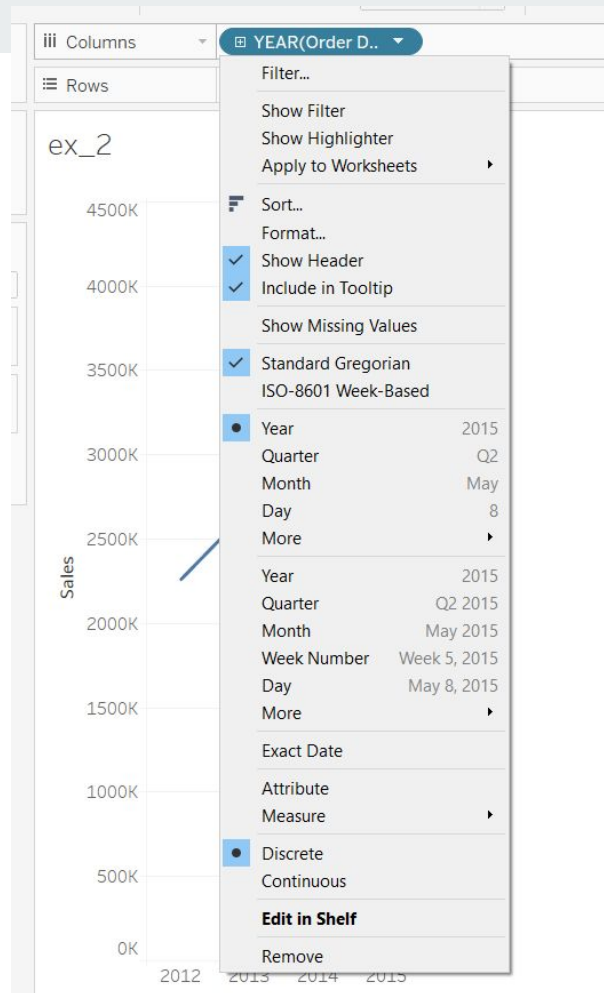
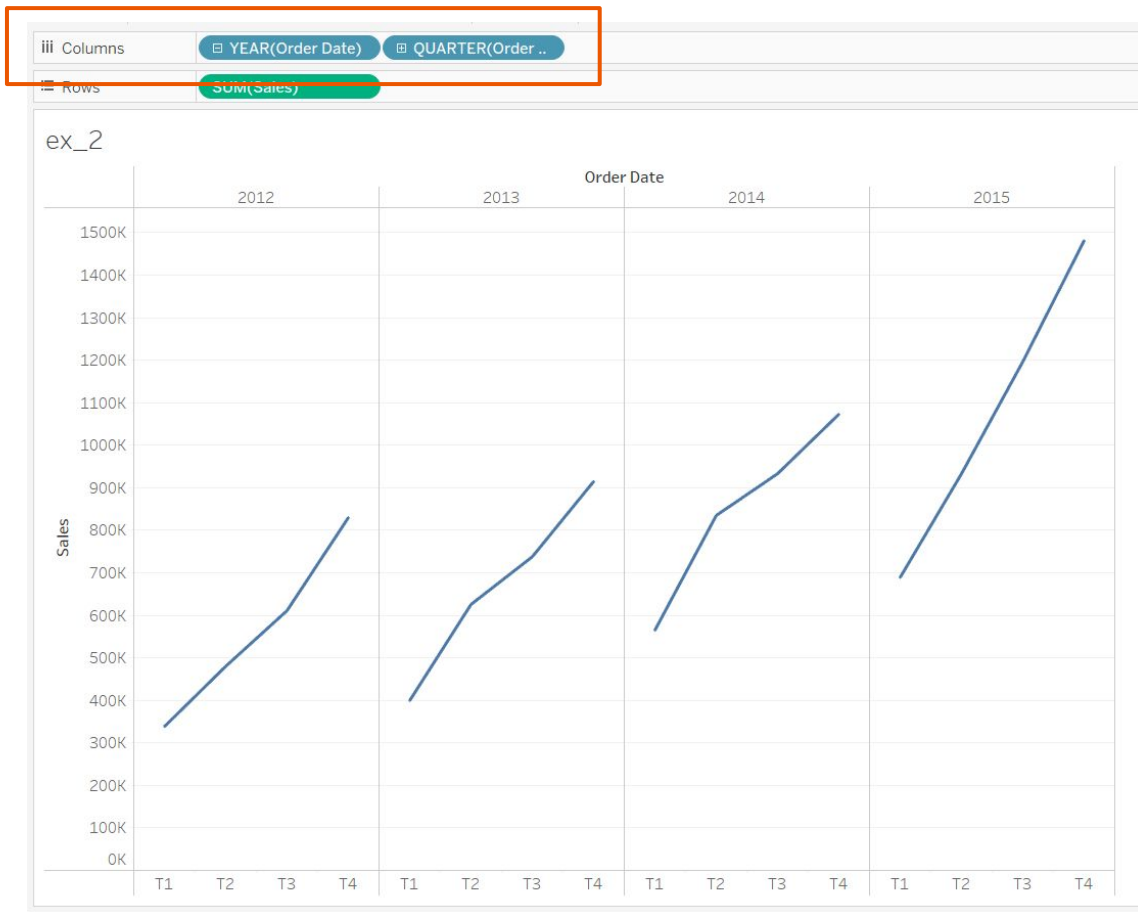# Building views

Suppose we want to visualize sales per quarters instead of years.

We can expand the YEAR (Order date) pill with the plus (+) symbol.

What if we wanted to compare sales in the same quarter over different years?

Building views

What if we wanted to compare sales in the same quarter over different years?

Simply swap the QUARTER (Order date) and YEAR (Order date) pills.
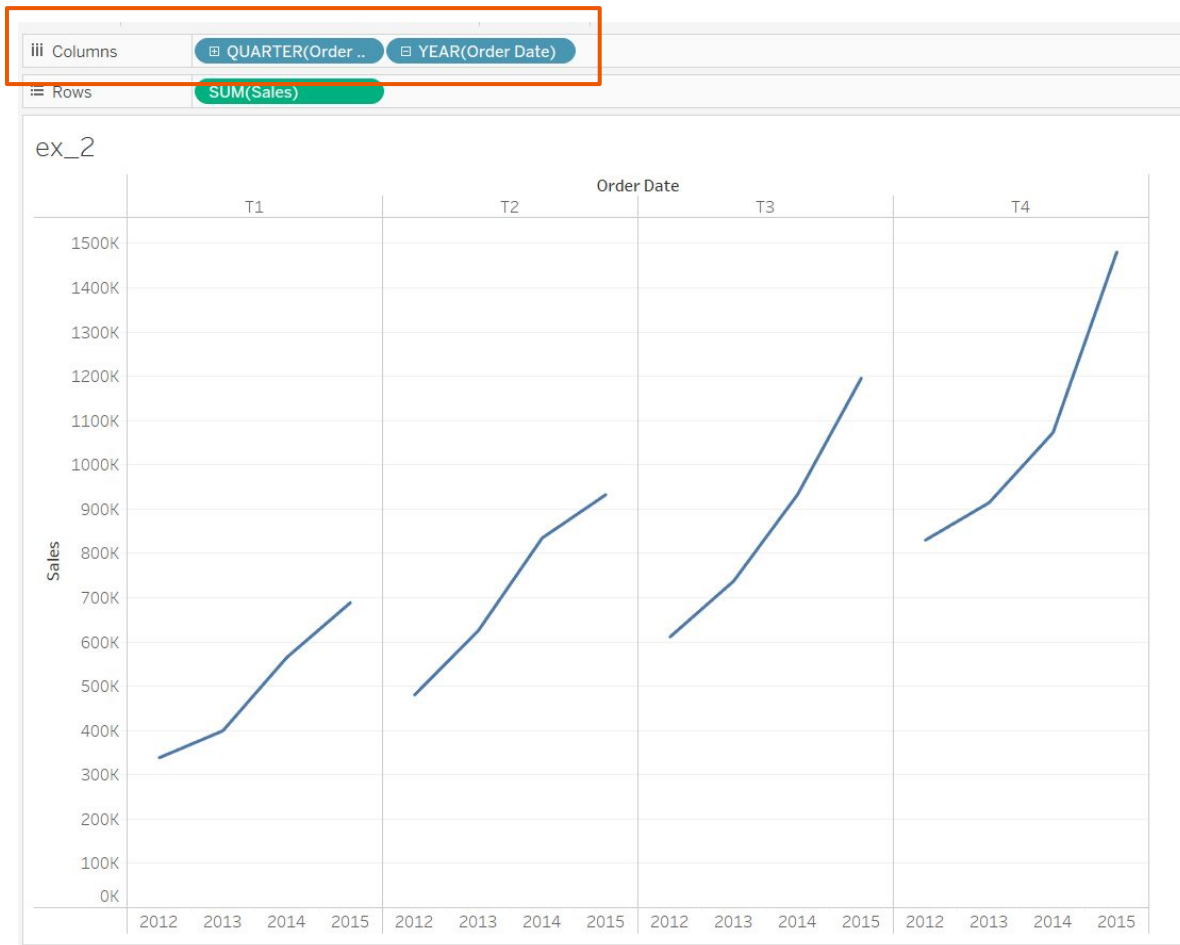
Building views

Now we want to analyze <u>sales over MONTHS</u> and compare YEARS in the same chart.

How can we do that? (Spoiler: 🎨)

Building views

How can we do that?

First, change the aggregation level to MONTH and then we can drag and drop the **Order date** field from the Data pane onto the **Color** tab in the Marks pane.
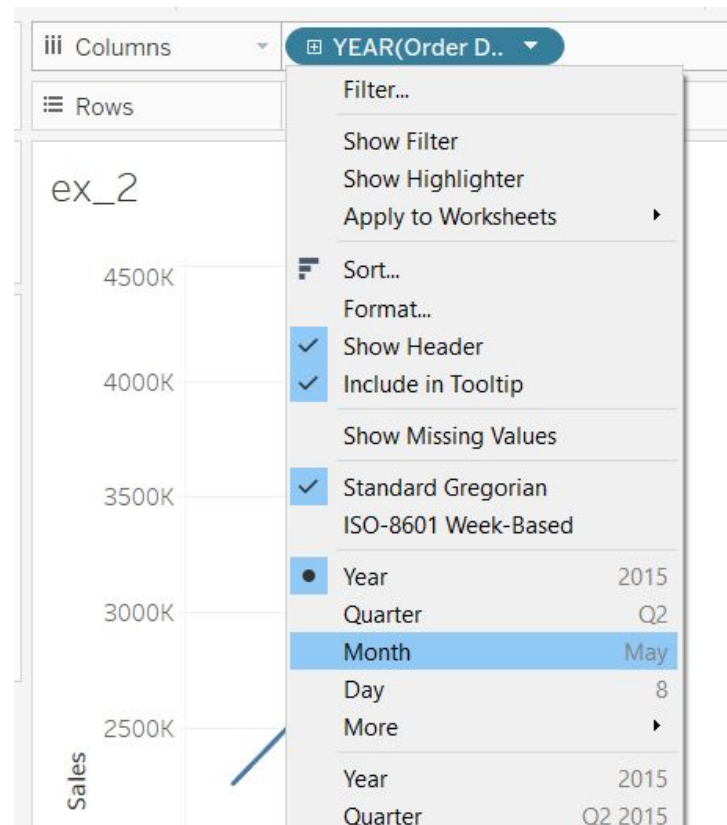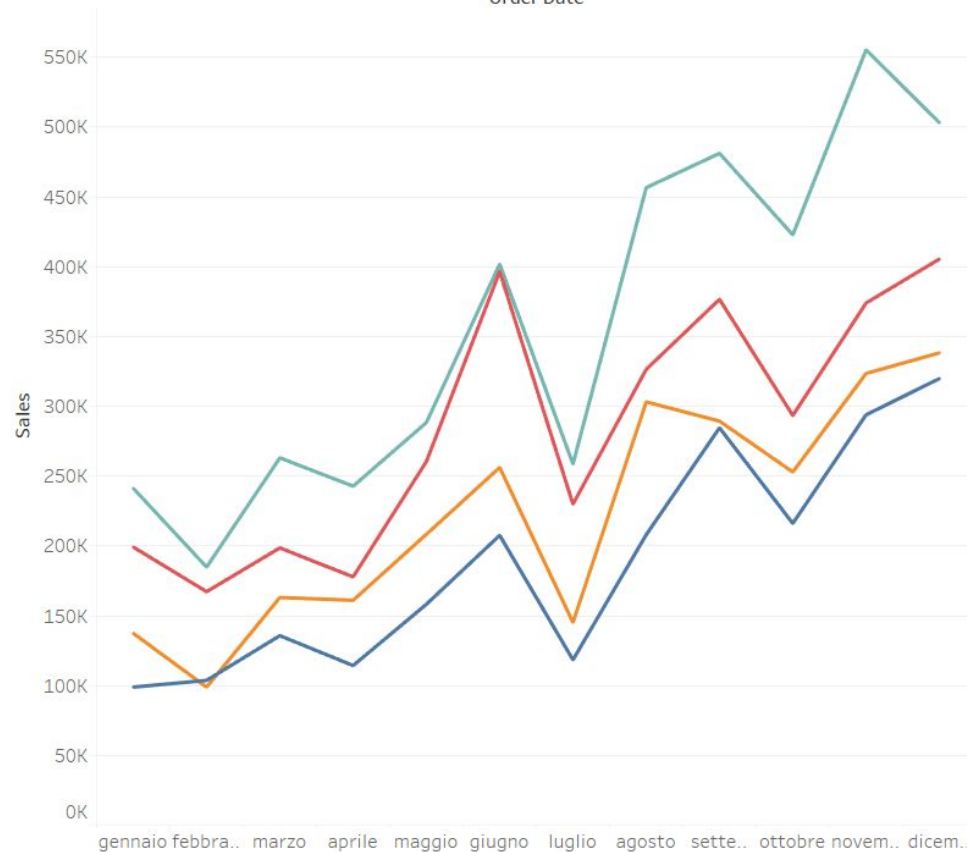
Quick table calculations

Up until now, we have only displayed measures and dimensions that were <u>already present</u> as column headers in the imported dataset. Suppose we want to visualize <u>year over year growth</u> in sales.

How can we compute that? 🤔

Quick table calculations

The **Quick table calculation** option allows you to add automatically computed measures to your visualization.

You won't need to work your way out of weird formulas, TP will do the hard work for you 🥳

Now, to compare total sales and year over year growth, simply add the **Sales** field to the Rows shelf again.

Fit Width

Show Me

Data | Analytics

Pages

Columns ⊞ MONTH(Order Da..

Rows SUM(Sales) SUM(Sales) △

Global Superstore Return...
Orders (Global Superstor...

Filters

ex_3

Search

YEAR(Order Date)
2012
2013
2014
2015

Tables

Abc Market
⊞ Order Date
Abc Order ID
Abc Order Priority
⊕ Postal Code
Abc Product ID
Abc Product Name
Abc Region
Row ID
Abc Segment
⊞ Ship Date
Abc Ship Mode
⊕ State
Abc Sub-Category
Abc Disrtibution center
Abc Measure Names

Marks

All

Automatic

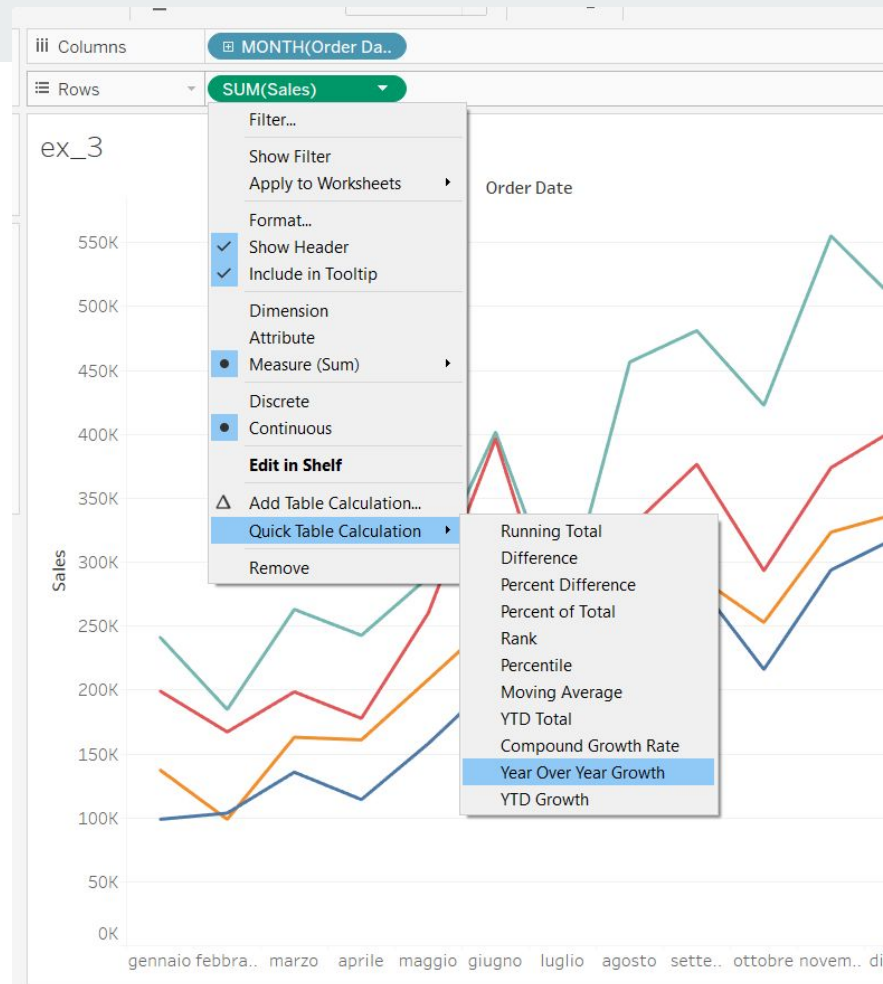Color Size Label

Detail Tooltip Path

⊞ YEAR(Order ..

SUM(Sales)

SUM(Sales) △

Orders
Discount
Profit
Quantity
Sales
Shipping Cost
⊕ Latitude (generated)
⊕ Longitude (generated)
⊕ Orders (Count)
Measure Values

500K
400K
300K
200K
100K
0K
70%
60%
50%
40%
30%
20%
10%
0%

Sales

% Differenza in Sales

Order Date

>12 nulls

gennaio febbraio marzo aprile maggio giugno luglio agosto settembre ottobre novembre dicembre

Data Source ex_1 ex_2 ex_3

84 marks   2 rows by 12 columns   % Difference in SUM(Sales): 936.48%

Marks

~ **All**

~ Automatic ▼

Color	Size	Label
Detail	Tooltip	Path

⊞ YEAR(Order ..

~ SUM(Sales)

~ SUM(Sales) Δ

Marks

~ **All**

~ **SUM(Sales)**

~ Automatic ▼

Color	Size	Label
Detail	Tooltip	Path

⊞ YEAR(Order ..

~ SUM(Sales) Δ

Marks

~ **All**

~ **SUM(Sales)**

~ **SUM(Sales) Δ**

~ Automatic ▼

Color	Size	Label
Detail	Tooltip	Path

⊞ YEAR(Order ..

💡 **A little trick:** you can customize each measure (hence chart) independently in the **Marks** pane; in this case, you could adopt different color palettes for the lines depicting total sales and for those depicting year over year growth (SUM (Sales) Δ)

The Mark Pane

The **Mark Pane** allows you to customize your view with tooltips, colors and so on.

What if we want to display year over year growth in tooltips instead of having a separate chart? How can we do that?

Fit Width

Show Me

Data | **Analytics**

Pages

Columns ⊞ MONTH(Order Da..

Rows ☰ SUM(Sales)

⬡ Global Superstore Return...
⬡ Orders (Global Superstor...

Filters

ex_3

Order Date

Search

Tables

Abc Market
⬡ Order Date
Abc Order ID
Abc Order Priority
⬡ Postal Code
Abc Product ID
Abc Product Name
Abc Region
Row ID
Abc Segment
⬡ Ship Date
Abc Ship Mode
⬡ State
Abc Sub-Category
Abc Disrtibution center
Abc Measure Names

⌄ ⬡ **Orders**
Discount
Profit
Quantity
Sales
Shipping Cost
⬡ Latitude (generated)
⬡ Longitude (generated)
⬡ Orders (Count)
Measure Values

Marks

∿ Automatic ▾

Color Size Label

Detail Tooltip Path

⬚ YEAR(Order ..
▢ SUM(Sales) △

YEAR(Order Date)
■ 2012
■ 2013
■ 2014
■ 2015

Month of Order Date: giugno
Year of Order Date: 2015
% Difference in Sales from the Previous Year of Order Date: 1,34%
Sales: 401.814

gennaio febbraio marzo aprile maggio giugno luglio agosto settembre ottobre novembre dicembre
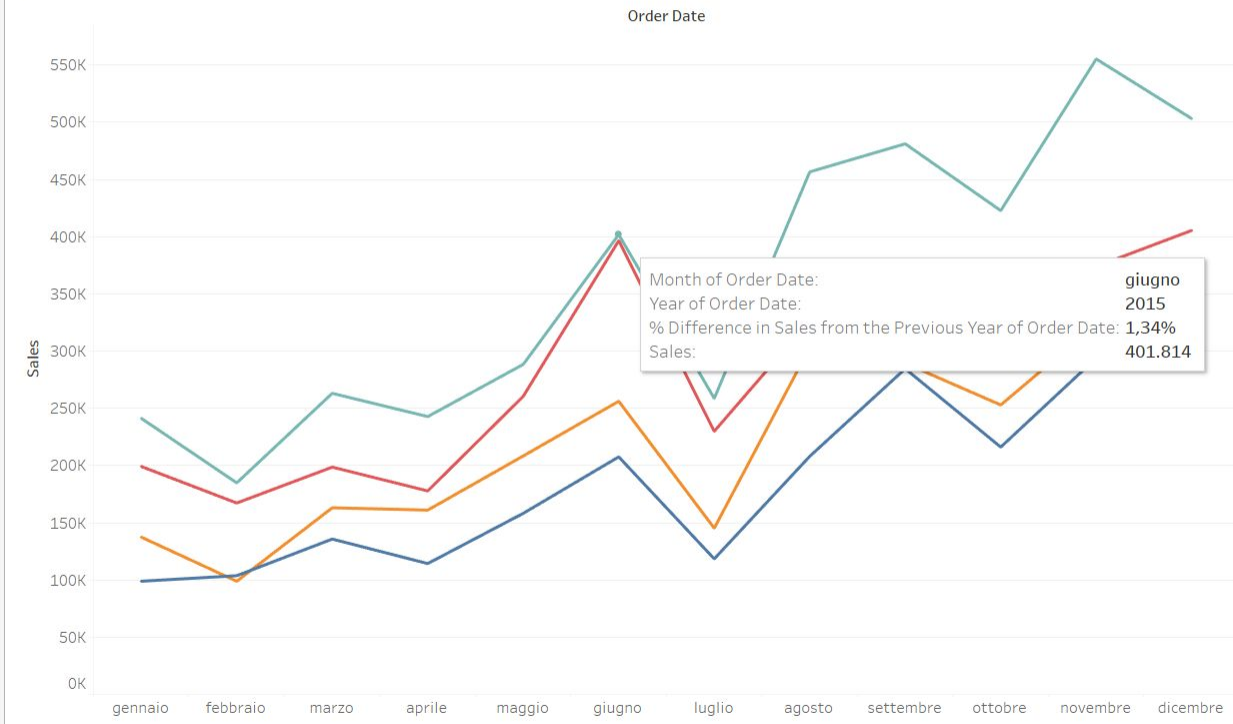
Annotating data

If you see something you want to point out on your view, simply right click on that point and add an annotation (*Annotate > Point*).
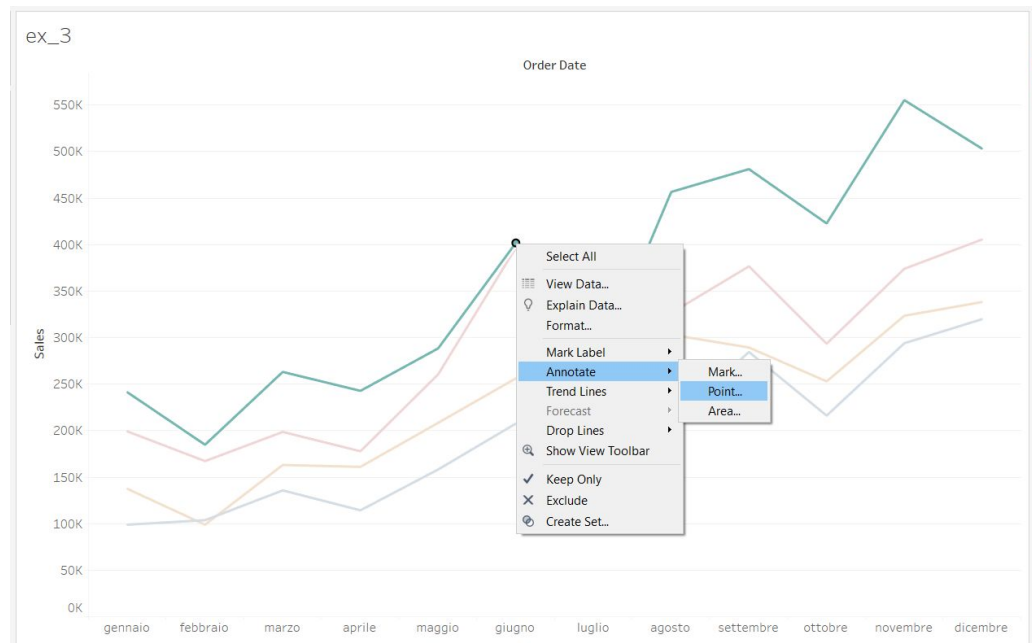
Visualizing Quick Table Calculation data

Suppose you want to visualize how <u>sales in each category changed over the course of each year</u>.

Right now our chart has:

1. **Lines** displaying the sum of sales over all categories (aggregated) by month;
2. **Colors** representing the years in which the sales occurred;
3. Year over year growth displayed in **tooltips**.

Where do we need to add the Category dimension?

Visualizing Quick Table Calculation data

Suppose you want to visualize how <u>sales in each category changed over the course of each year</u>.

Right now our chart has:

1. **Lines** displaying the sum of sales over all categories (aggregated) by month;
2. **Colors** representing the years in which the sales occurred;
3. Year over year growth displayed in **tooltips**.

Where do we need to add the Category dimension?

Add **Category** to the Rows shelf.

💡 Note that you can't swap **Category** and **SUM (Sales)** as we've done before
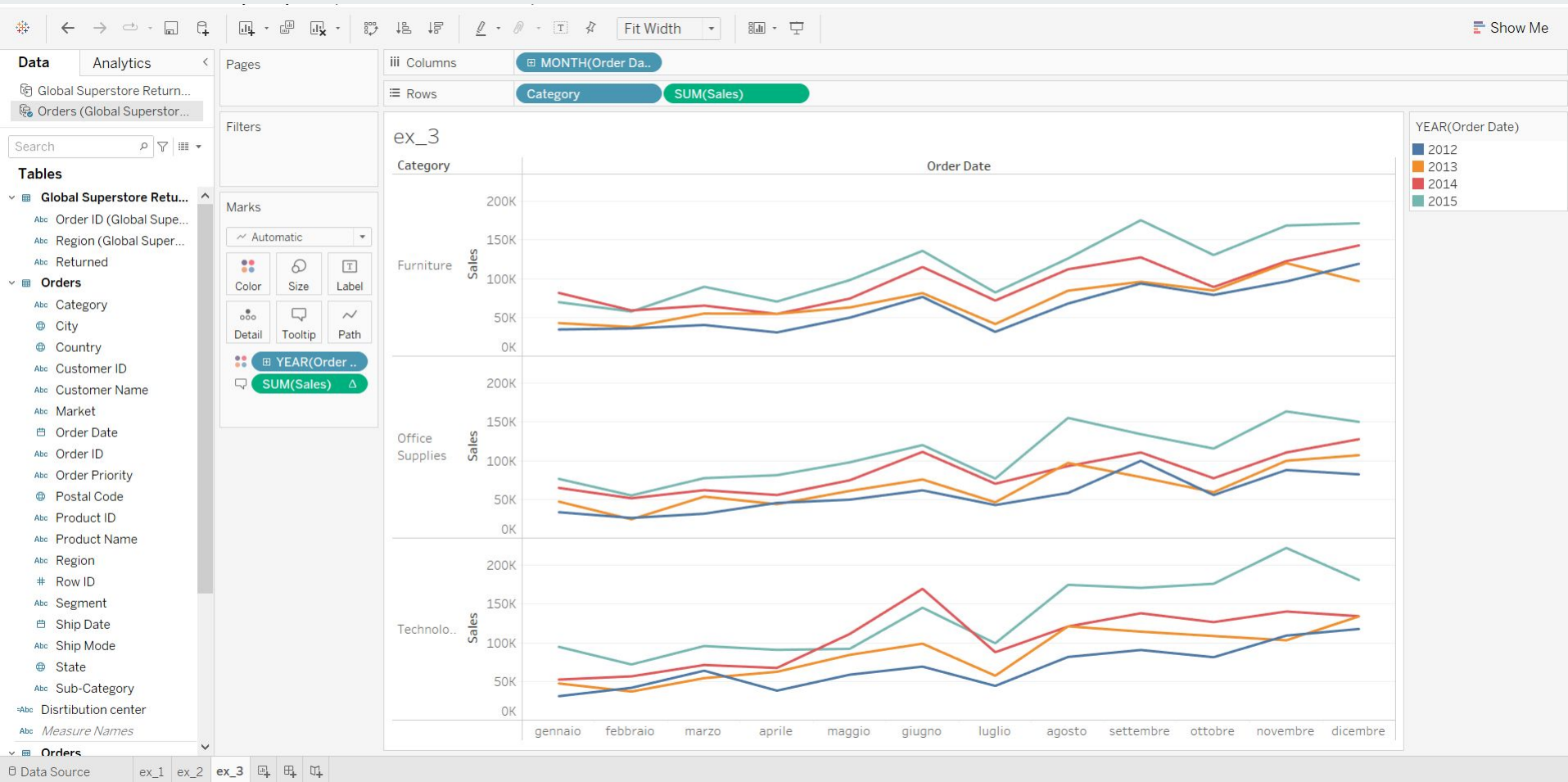
Visualizing Quick Table Calculation data

In TP you <u>cannot export data</u>, but you can visualize processed data (aka year over year growth) on a separate sheet.

To do that, simply right click on the **Sheet** tab and **Duplicate as Crosstab**.

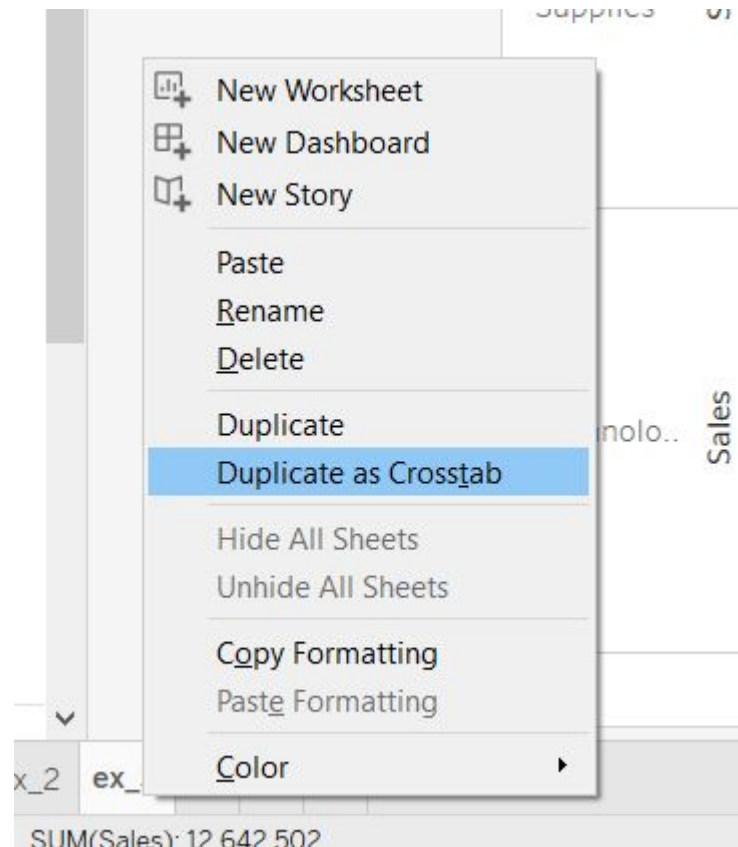| Category	Year of O..		gennaio	febbraio	marzo	aprile	maggio	giugno	luglio	agosto	settemb..	ottobre	novembre	dicembre
								Order Date						
Furniture	2012	% Difference in Sale..												
		Sales	34.464	35.799	40.277	30.690	49.769	76.585	31.383	68.000	93.934	79.094	96.558	119.531
	2013	% Difference in Sale..	24,08%	5,13%	36,76%	78,24%	26,46%	6,39%	32,21%	24,48%	2,38%	7,24%	24,57%	-19,00%
		Sales	42.761	37.635	55.082	54.702	62.939	81.481	41.491	84.644	96.166	84.824	120.279	96.817
	2014	% Difference in Sale..	91,31%	57,08%	18,59%	-0,21%	18,16%	41,45%	73,18%	32,67%	32,79%	5,30%	2,10%	47,91%
		Sales	81.805	59.118	65.323	54.587	74.371	115.251	71.854	112.296	127.701	89.319	122.803	143.203
	2015	% Difference in Sale..	-14,68%	-2,39%	37,33%	29,24%	32,19%	18,11%	14,60%	12,46%	37,65%	46,33%	37,50%	19,95%
		Sales	69.799	57.703	89.705	70.551	98.312	136.123	82.344	126.284	175.777	130.701	168.849	171.768
Office Supplies	2012	% Difference in Sale..												
		Sales	33.527	26.135	31.579	45.563	49.731	61.793	42.807	58.390	99.987	55.700	88.080	82.424
	2013	% Difference in Sale..	40,97%	-7,03%	70,12%	-3,68%	22,79%	22,74%	8,27%	66,57%	-21,15%	6,61%	13,56%	30,11%
		Sales	47.264	24.297	53.721	43.886	61.063	75.846	46.346	97.260	78.844	59.383	100.020	107.244
	2014	% Difference in Sale..	37,49%	112,17%	15,43%	27,07%	22,42%	46,99%	51,66%	-4,23%	40,48%	30,33%	10,71%	19,28%
		Sales	64.984	51.553	62.008	55.766	74.756	111.489	70.291	93.150	110.762	77.393	110.736	127.926
	2015	% Difference in Sale..	17,96%	7,04%	25,11%	45,92%	31,06%	7,94%	9,50%	66,86%	21,33%	49,59%	47,97%	17,47%
		Sales	76.654	55.184	77.576	81.372	97.975	120.340	76.971	155.431	134.387	115.771	163.851	150.279
Technology	2012	% Difference in Sale..												
		Sales	30.908	41.784	63.891	38.081	58.728	69.194	44.245	81.673	90.667	81.320	109.309	117.852
	2013	% Difference in Sale..	53,39%	-11,63%	-15,05%	64,03%	43,65%	42,86%	29,73%	48,44%	26,15%	33,71%	-5,58%	13,87%
		Sales	47.411	36.922	54.273	62.464	84.363	98.849	57.399	121.239	114.379	108.733	103.214	134.196
	2014	% Difference in Sale..	10,52%	53,21%	31,30%	8,01%	32,02%	71,76%	52,94%	-0,16%	20,79%	16,52%	36,08%	0,10%
		Sales	52.398	56.569	71.263	67.469	111.372	169.780	87.784	121.043	138.157	126.695	140.451	134.325
	2015	% Difference in Sale..	80,95%	27,19%	34,46%	34,65%	-17,29%	-14,39%	13,22%	44,50%	23,77%	39,15%	58,47%	34,82%
		Sales	94.815	71.951	95.819	90.849	92.114	145.351	99.390	174.905	170.994	176.295	222.579	181.097

Columns: ⊞ MONTH(Order Da.. | Measure Names

Rows: Category | ⊞ YEAR(Order Date)

ex_3 (2)

																Order Date	
		gennaio		febbraio		marzo		aprile		maggio		giugno		luglio		agosto	
Category	Year of O..	% Differ..	Sales	% Differ..	Sales	% Differ..	Sales	% Differ..	Sales	% Differ..	Sales	% Differ..	Sales	% Differ..	Sales	% Differ..	Sales
Furniture	2012		34.464		35.799		40.277		30.690		49.769		76.585		31.383		68.00
	2013	24,08%	42.761	5,13%	37.635	36,76%	55.082	78,24%	54.702	26,46%	62.939	6,39%	81.481	32,21%	41.491	24,48%	84.64
	2014	91,31%	81.805	57,08%	59.118	18,59%	65.323	-0,21%	54.587	18,16%	74.371	41,45%	115.251	73,18%	71.854	32,67%	112.29
	2015	-14,68%	69.799	-2,39%	57.703	37,33%	89.705	29,24%	70.551	32,19%	98.312	18,11%	136.123	14,60%	82.344	12,46%	126.28
Office Supplies	2012		33.527		26.135		31.579		45.563		49.731		61.793		42.807		58.39
	2013	40,97%	47.264	-7,03%	24.297	70,12%	53.721	-3,68%	43.886	22,79%	61.063	22,74%	75.846	8,27%	46.346	66,57%	97.26
	2014	37,49%	64.984	112,17%	51.553	15,43%	62.008	27,07%	55.766	22,42%	74.756	46,99%	111.489	51,66%	70.291	-4,23%	93.15
	2015	17,96%	76.654	7,04%	55.184	25,11%	77.576	45,92%	81.372	31,06%	97.975	7,94%	120.340	9,50%	76.971	66,86%	155.43
Technolo..	2012		30.908		41.784		63.891		38.081		58.728		69.194		44.245		81.67
	2013	53,39%	47.411	-11,63%	36.922	-15,05%	54.273	64,03%	62.464	43,65%	84.363	42,86%	98.849	29,73%	57.399	48,44%	121.23
	2014	10,52%	52.398	53,21%	56.569	31,30%	71.263	8,01%	67.469	32,02%	111.372	71,76%	169.780	52,94%	87.784	-0,16%	121.04
	2015	80,95%	94.815	27,19%	71.951	34,46%	95.819	34,65%	90.849	-17,29%	92.114	-14,39%	145.351	13,22%	99.390	44,50%	174.90

💡 Swap dimensions to make the view a bit clearer

15 minute break

Answer the Wooclap when you come back:

👏 **Wooclap here!**

Up next:

- ➔ 10 minutes to answer the Wooclap
- ➔ Lessons learned and recap
- ➔ 15-minute Q&A at the end of the lesson

Play around with what we've seen today with different data sources (or start working on your projects)

Additional free data sources are available 🔗 here

Recap and lessons learned

Recap

➔ Data import:
   ◆ Relationships and joins;
   ◆ Data formatting.

➔ Data visualization:
   ◆ Measures and dimensions;
   ◆ Expanding/aggregating dimensions;
   ◆ Quick table calculations;
   ◆ Intro to the Mark Pane;
   ◆ Crosstab duplication.

Takeaway

➔ Always double check for the relations between sheets/tables that Tableau automatically creates;

➔ Relationships **do not merge** data, joins do;

➔ Measures and dimensions' order matter (but now always) in the Columns/Rows shelves;

Link to the solution workbook for the lesson: 🔗 TBD