1. Tableau environment

1.1 Automatic fields

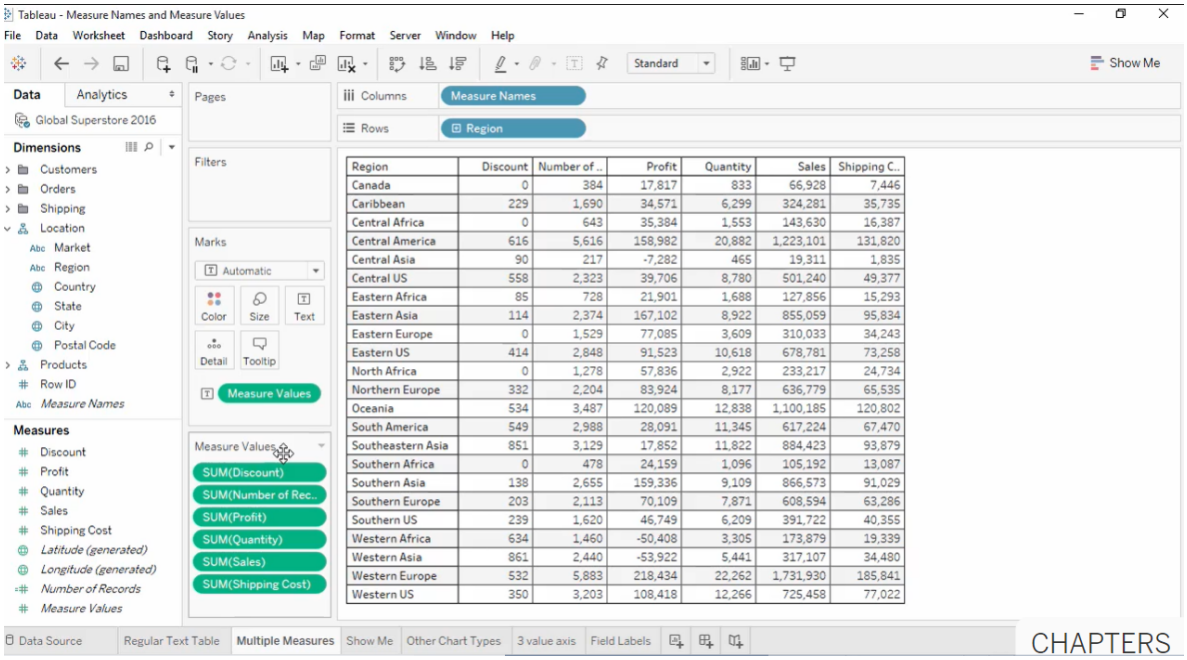
Measure name, measure value, count of table, lat, long

Measure name & measure values

Measure name is the name of measure

Measure value is the value of measure

Can be used to show measures in different dimension



1.2 Shelves and cards references

Page shelf: used as filter function

1.3 Tableau file types

- **Workbooks (.twb)** – Tableau workbook files have the .twb file extension. Workbooks hold one or more worksheets, plus zero or more dashboards and stories.
- **Bookmarks (.tbm)** – Tableau bookmark files have the .tbm file extension. Bookmarks contain a single worksheet and are an easy way to quickly share your work. For more information, see **Save a bookmark** on page 2956.
- **Packaged Workbooks (.twbx)** – Tableau packaged workbooks have the .twbx file extension. A packaged workbook is a single zip file that contains a workbook along with any supporting local file data and background images. This format is the best way to package your work for sharing with others who don't have access to the original data. For more information, see **Packaged Workbooks** on page 2959.
- **Extract (.hyper or .tde)** – Depending on the version the extract was created in, Tableau extract files can have either the .hyper or .tde file extension. Extract files are a local copy of a subset or entire data set that you can use to share data with others, when you need to work offline, and improve performance. For more information, see **Extract Your Data** on page 860.
- **Data Source (.tds)** – Tableau data source files have the .tds file extension. Data source files are shortcuts for quickly connecting to the original data that you use often. Data source files do not contain the actual data, but rather, the information necessary to connect to the actual data, as well as any modifications you've made on top of the actual data such as changing default properties, creating calculated fields, adding groups, and
- **Packaged Data Source (.tdsx)** – Tableau packaged data source files have the .tdsx file extension. A packaged data source is a zip file that contains the data source file (.tds) described above, as well as any local file data such as extract files (.hyper or .tde), text files, Excel files, Access files, and local cube files. Use this format to create a single file that you can then share with others who may not have access to the original data stored locally on your computer. For more information, see **Save Data Sources** on page 921.

if open .twbx, save as .twb, Tableau will also create a folder, including Data folder and a .hyper file

1.4 Visual cues and icons

Details of visual cues and icons

Some categories:

1. Data sources in the Data
2. Fields in the Data Pane
3. Fields on Shelves
4. Fields on the Marks card
5. Sheets in the Dashboards and Worksheets pane
6. Fields in the Calculation editor

2. Tableau concept

2.1 Data type

Some basic types are in the following figure. For more types could refer to Data sources in the Data in 1.4 Visual cues and icons.

Three ways to change the data :

1. From data source page
2. From data pane
3. From view

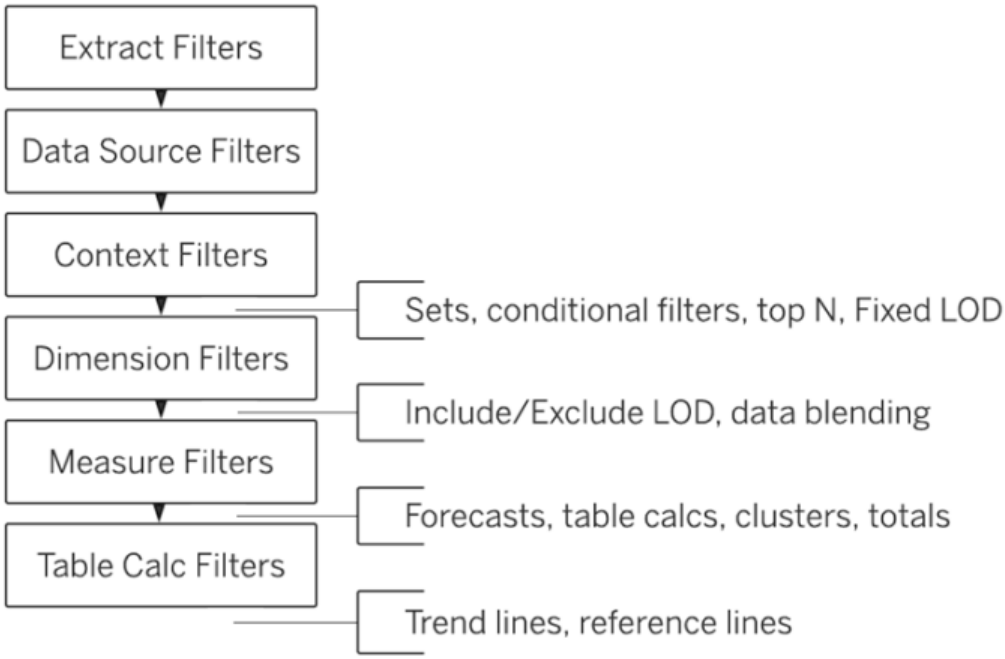
Icon	Data type
Abc	Text (string) values
	Date values
	Date & Time values
#	Numerical values
T|F	Boolean values (relational only)
	Geographic values (used with maps)
	Cluster Group (used with Find Clusters in Data)

2.2 Good dataset

1. Necessary elements
2. Both dimensions and measures(discrete and continuous)
3. Disaggregated

2.3 Order of operation

Very important



！！！ **Context filter**

Eg: when selecting top N in specific condition

Such as select top N sales in New York City.

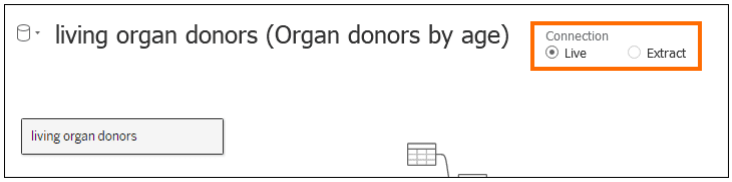
1. First step is to set [City] as context, then filter 'New York'
2. Then select top N on Customer Name

Domain 1: Connect to and Transform Data

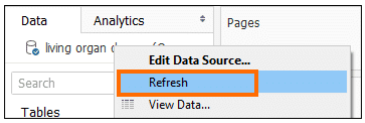
1.1. Connect to data sources

1.1.1. Choose an appropriate data source

1.1.2. Choose between live connection or extract



- **Live(default)**
  - Updated when: 1) opening a workbook or 2) manually refresh(right-click on data source)



  - Note: if change column name: will occur error. Do solve it, right-click on broken field in data pane, click [**Replace References**]
- **Extract**
  - Tableau makes a local copy of a subset of your data.

1.1.3. Connect to extracts

Benefits of using extract data(.hyper format): old version is using .tde format

1. Create extraction for billions of rows of data
2. .hyper is faster
3. Efficient even for large extract

1.1.4. Connect to spreadsheets

Eg: connect to excel

1.1.5. Connect to .hyper files (or .tde files)

If only share .hyper file: connection information and column name changes will missing

.tdsx or .twbx file" accessible to extract data source

1.1.6. Connect to relational databases

Knowing how to do is okay, haven't encountered in my exams.

1.1.7. Pull data from relational databases by using custom SQL queries

Need to know basic SQL syntax such as SELECT, FROM, WHERE, GROUP BY

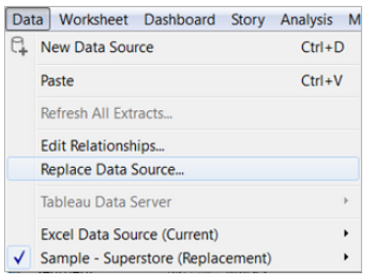
1.1.8. Connect to a data source on Tableau Server

Connect panel -> Search for Data -> connect and log in

Data on the server could be downloaded: **Data** menu -> select data source -> select **Create Local Copy**

1.1.9. Replace the connected data source with another data source for an existing chart or sheet

1. Open a workbook that connects to the *original* data source.
2. Select **Data** > **New Data Source** and then connect to the *new* data source.
3. On the Data Source page, drag a table to the canvas to set up the data source (if this is not automatically done for you).
4. Go to the sheet tab and select **Data** > **Replace Data Source**.



> **Note:** You must have at least one field in the view to make the **Replace Data Source** option available.

5. In the Replace Data Source dialog box, select the **Current** data source and the **Replacement** data source.

1.2. Prepare data for analysis

1.2.1. Assess data quality (completeness, consistency, accuracy)

What should exam:

- Unique values
- Data type(number, string, date)
- Data role(URL, email address, zip code)
- Null, outliers, unexpected values

Tableau cares more about boniness understandings

1.2.2. Perform cleaning operations

tTableau Prep

1.2.3. Organize data into folders

- Create a new folder: Select multiple fields and right click [**Folders** > **Create Folder**]
- Add to a folder: just drag

1.2.4.Use multiple data sources (establish relationships, create joins, union tables, blend data)

Relationships

Note: relationship(logical tables) in Tableau is different from Joins(physical tables)

Benefits over join

- No need join types(left, right, inner...)
- Automatic identify related fields
- Relationship will not merged into a single table
- Avoid duplications
- More refer to Relate Your Data

Requirements

- Fields mush have the same data type
- Geographic field can't define relationships
- Published data source can't define relationships

Performance options

Cardinality

Cardinality indicates whether or not the linking field records are unique. If multiple books can have the same author, but each author is listed only once in the author table, the cardinality for AuthID would be Many for Books and One for Author between those two tables. This setting impacts how Tableau handles aggregation before or after the join.

Referential integrity

Referential integrity indicates whether or not a record in one table is guaranteed to have a relationship in another table. If every book has an author, Book has referential integrity to Author. If not every author has a book, Author does not have referential integrity to Book. This setting impacts how Tableau chooses a join type and handles unmatched records.

Exercise

Difference between relationship and joins

RELATIONSHIPS	JOINS
Defined between logical tables in the Relationship canvas (logical layer)	Defined between physical tables in the Join/Union canvas (physical layer)
Don't require you to define a join type	Require join planning and join type
Act like containers for tables that are joined or unioned	Are merged into their logical table
Only data relevant to the viz is queried. Cardinality and referential integrity settings can be adjusted to optimize queries.	Run as part of every query
Level of detail is at the aggregate for the viz	Level of detail is at the row level for the single table
Join types are automatically formed by Tableau based on the context of analysis. Tableau determines the necessary joins based on the measures and dimensions in the viz.	Join types are static and fixed in the data source, regardless of analytical context. Joins and unions are established prior to analysis and don't change.
Rows are not duplicated	Merged table data can result in duplication
Unmatched records are included in aggregates, unless explicitly excluded	Unmatched records are omitted from the merged data
Create independent domains at multiple levels of detail	Support scenarios that require a single table of data, such as extract filters and aggregation

Difference between relationship and Blends

See more about blend, blend is used for data in different aggregation levels

RELATIONSHIPS	BLENDS
Defined in the data source	Defined in the worksheet between a primary and a secondary data source
Can be published	Can't be published
All tables are equal semantically	Depend on selection of primary and secondary data sources, and how those data sources are structured.
Support full outer joins	Only support left joins
Computed locally	Computed as part of the SQL query
Related fields are fixed	Related fields vary by sheet (can be customized on a sheet-by-sheet basis)

Relationships, joins, and blends

Relate

Use when combining data from different levels of detail.

- Requires matching fields between two logical tables. Multiple matching field pairs can define the relationship.
- Automatically uses correct aggregations and contextual joins based on how fields are related and used in the viz.
- Supports many-to-many and outer joins.
- Relationships are consistent for the entire workbook and can be published.
- Can be published, but you can't relate published data sources.
- Can't define relationships based on calculated fields or geographic fields.
- Using data source filters limits join culling benefits of relationships.

Join

Use when you want to add more columns of data across the same row structure.

- Requires common fields between two physical tables.
- Requires establishing a join clause and a join type.
- Can join on a calculation.
- Joined physical tables are merged into a single logical table with a fixed combination of data.
- May cause data loss if fields or values are not present in all tables (dependent on join types used).
- May cause data duplication if fields are at different levels of detail.
- Can use data source filters.

Union

Use when you want to add more rows of data with the same column structure.

- Based on matching columns between two tables.
- Unioned physical tables are merged into a single logical table with a fixed combination of data.

Blend

Use when combining data from different levels of detail.

- Can be used to combine published data sources, but can't be published.
- Can be used between a relational data source and a cube data source.
- Data sources can be blended on a per-sheet basis.
- Are always effectively left joins (may lose data from secondary data sources).

1.2.5. Prepare data by using Data Interpreter, pivot, and split

Interpreter

Pivot

- Automatic selection pivot
- Customise pivot by SQL: union

Split

Three ways

- On the Data Source page, check the menu for **Split** and **Custom Split**.
- From the Data pane on a sheet, check the menu for **Transform** > **Split** and **Custom Split**
- Split manually using the **SPLIT function**: Split, right, left

1.2.6.Create extract filters

Link

Good for data security: when published data, can specify query/modify rights for users and groups.

To create a data source filter

1. On the data source page, click **Add** in the Filters section in the upper-right corner of the page.

1.3. Perform data transformation in Tableau Prep

1.3.1. Choose which data transformation to perform based on a business scenario

Profile pane: summaries(type, distribution, unique counts)

- Outlier: using detail view
- Distribution: using summary view

Data grid(original data)

1.3.2. Combine data by using unions

Link

1.3.3. Combine data by using joins

Link

1.3.4. Shape data by using aggregations

Link

1.3.5. Perform filtering

When selecting a distribution bar or an individual value in the profile pane:

- The related values in the profile cards are highlighted in blue
- The data grid at the bottom is filtered

1.3.6.Shape data by using pivots

Link

1.4. Customize fields

1.4.0 .tds

Tableau preserves the customizations you make, but it does **not change the underlying source data.**

Benefits of Tableau data source(.tds)

1. Time-saving: you can reuse the .tds file in different workbooks.
2. Collaborative: you can share the .tds file with other users.

Tableau data source(.tds) includes:

- Folder structure(Folder, groups, sets)
- Measure and dimension conversions
- Attributes (e.g., field names, calculated fields)
- Field data types (e.g., strings, integers, dates)
- Field properties (e.g., how a field is displayed or aggregated)

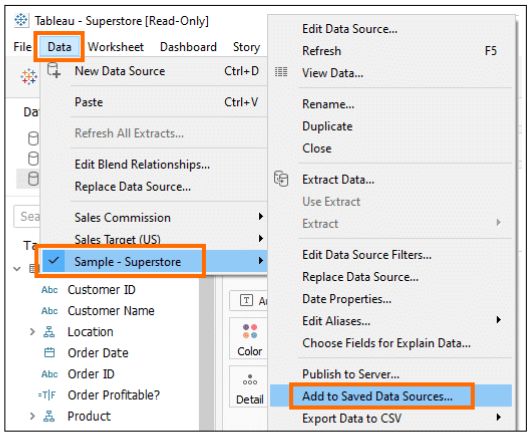
Tableau data source(.tds) not includes:

- Login information
- Vizzes created with the data

Save a Tableau data source (.tds) file locally

Remember that saving the .tds to the **Datasources** folder under **My Tableau Repository** makes the .tds available from the **Connect** page under **Saved Data Sources**

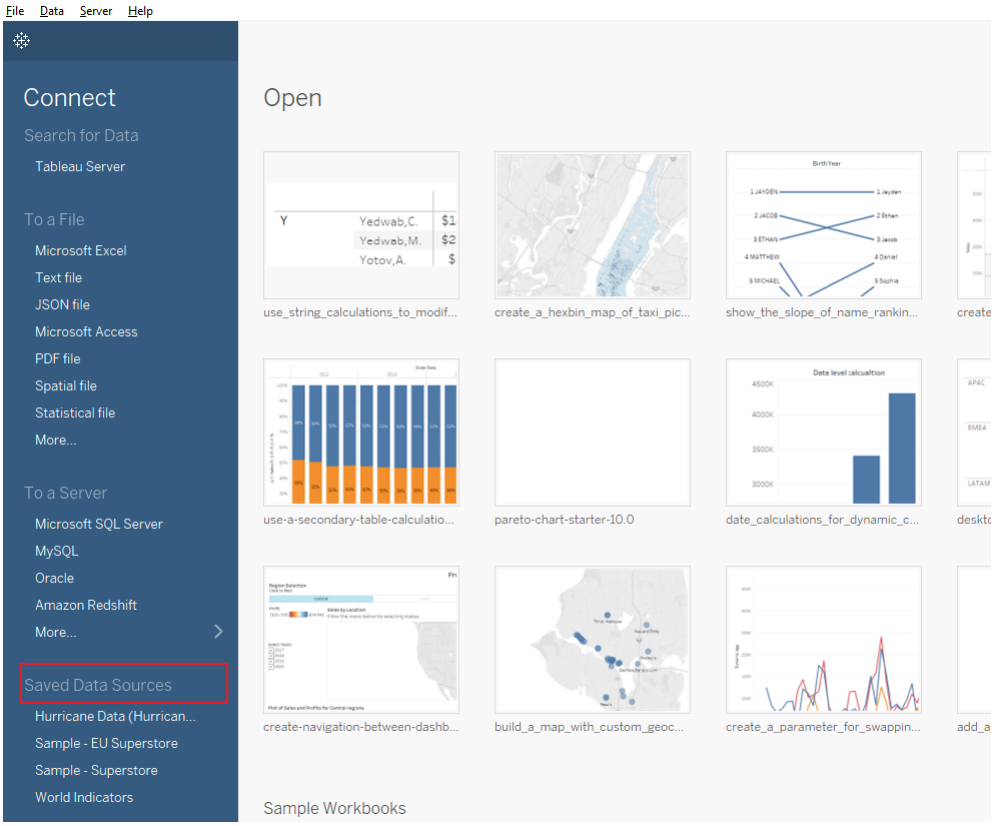
1. Open the **Data** menu.
2. Hover over the current data source.
3. Click **Add to Saved Data Sources**.



The **Add to Saved Data Sources** dialog box opens to the default location: the

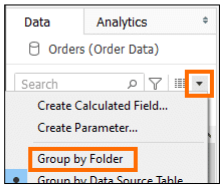
Open a locally saved Tableau data source (.tds) file

In connect page



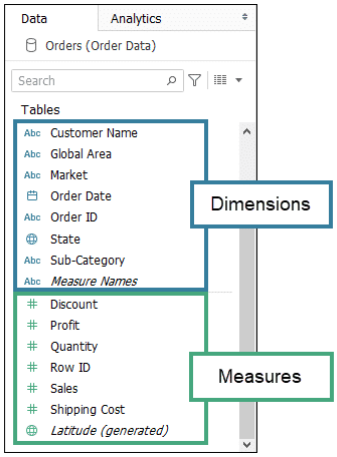
Folder structure

1. Click the **Data** pane menu and select **Group by Folder**.



2. Right-click one of the fields you wish to add to the folder, point to **Folders**, and select **Create Folder**.
3. In the **Create Folder** dialog box, give the new folder a relevant name.
4. Click **OK**.
5. Drag the desired fields into the folder.

Measure and dimension conversions



Attributes

1. Right-click to rename
2. Create an alias
    1. Only discrete dimension could create alias
    2. Right-click: Aliases...

Field properties

Dimensions: Comment, Colour, shape, sorted

Measures: Comment, Colour, Number Format, Aggregation, Total using

1.4.1. Change default field properties (types, sorting, etc.)

Right click on the field

1.4.2.Rename columns

Right click on the field

1.4.3.Choose when to convert between discrete and continuous

Right click on the field

1.4.4.Choose when to convert between dimension and measure

Right click on the field/drag

1.4.5.Create aliases

Right click on the field

Domain 2: Explore and Analyse Data

2.1. Create calculated fields

2.1.1. Write date calculations (DATEPARSE, DATENAME...)

Function	What return	Example
DATEADD(date_part, interval, date)	Date, adds an increment to the specified date	DATEADD('week', 1, [due date]); DATEADD('day', 280, #2/20/21#) = #November 27, 2021#
DATEDIFF(date_part, date1, date2, [start_of_week])	Integer, returns the difference between date1 and date2 expressed in units of date_part	DATEDIFF('day', #3/25/1986#, #2/20/2021#) = 12,751
DATENAME(date_part, date, [start_of_week])	**String**, returns date_part of date as a string.	DATENAME('year', #3/25/1986#) = "1986"; DATENAME('month', #1986-03-25#) = "March"
DATEPART(date_part, date, [start_of_week])	**Integer**, returns date_part of date as an integer.	DATEPART('year', #1986-03-25#) = 1986; DATEPART('month', #1986-03-25#) = 3
DATEPARSE(date_format, [date_string])	Date,	DATEPARSE('yyyy-MM-dd', "1986-03-25") = #March 25, 1986#
DATETRUNC(date_part, date, [start_of_week])	Date, the first [date_part] day of the [date]	DATETRUNC(month, #9/22/2018#) = #9/1/2018# I'm wondering Tableau made mistake on the last example of this function
DAY(date)	Integer, 1-31	Also WEEK, MONTH, QUARTER, YEAR, and the ISO equivalents
ISDATE(string)	Boolean	ISDATE(09/22/2018) = true
MAKEDATE(year, month, day)	Date	MAKEDATE(1986,3,25) = #1986-03-25#
MAKEDATETIME(date, time)	Datetime	MAKEDATETIME("1899-12-30", #07:59:00#) = #12/30/1899 7:59:00 AM#
MAKETIME(hour, minute, second)	Datetime	MAKETIME(14, 52, 40) = #1/1/1899 14:52:40#
NOW()	Datetime	
TODAY()	Date	

The date_part argument

DATE_PART	VALUES
'year'	Four-digit year
'quarter'	1-4
'month'	1-12 or "January", "February", and so on
'dayofyear'	Day of the year; Jan 1 is 1, Feb 1 is 32, and so on
'day'	1-31
'weekday'	1-7 or "Sunday", "Monday", and so on
'week'	1-52
'hour'	0-23
'minute'	0-59
'second'	0-60
'iso-year'	Four-digit ISO 8601 year
'iso-quarter'	1-4
'iso-week'	1-52, start of week is always Monday
'iso-weekday'	1-7, start of week is always Monday

2.1.2. Write string functions

Link

Function	Return	Definition
ASCII(string)/ CHAR(number)		ASCII('A') = 65/ CHAR(65) = 'A'
CONTAINS/ ENDSWITH/STARTSWITH(string, substring)	Boolean	CONTAINS(“Calculation”, “alcu”) = true; ENDSWITH(“Tableau”, “leau”) = true
FIND(string, substring, [start])	Index/ 0(if not found)	FIND("Calculation", "alcu") = 2; FIND("Calculation", "Computer") = 0
FINDNTH(string, substring, occurrence)	Returns the position of the nth occurrence of substring within the specified string	FINDNTH("Calculation", "a", 2) = 7
LEFT(string, number); RIGHT(string, number)	Returns the left/right-most number of characters in the string.	LEFT("Matador", 4) = "Mata"; RIGHT("Calculation", 4) = "tion"
(MID(string, start, [length])	Returns the string starting at index position `start`	MID("Calculation", 2) = "alculation"; MID("Calculation", 2, 5) ="alcul"
LTRIM/RTRIM/TRIM		
MAX/MIN(a, b)		
LOWER/UPPER		
SPLIT	Returns a substring from a string, using a delimiter character to divide the string into a sequence of tokens	SPLIT (‘a-b-c-d’, ‘-‘, 2) = ‘b’; `SPLIT (‘a|b|c|d’, ‘|‘, -2) = ‘c’

2.1.3. Write logical and Boolean expressions (If, case, nested, etc.)

Link

Function	Description	Example
IN	IN	SUM([Cost]) IN (1000, 15, 200
IF/ELSEIF/ELSE/ENDAND/OR	IF OR/AND THEN END	
CASE...END	CASE WHEN THEN WHEN THEN ... ELSE END	
IIF	IIF(test, then, else, [unknown])	
IFNULL	IIF(test, then, else, [unknown]), Returns if it is not null, otherwise returns	
ZN	ZN(expression), Returns if it is not null,	

Function	Description	Example
ZN	otherwise returns zero.	

2.1.4. Write number functions

Link, here only list function I'm not familiar

Function	Description	Example
DIV	DIV(integer1, integer2)	DIV(11,2) = 5
HEXBINX	HEXBINX(number, number); Maps an x, y coordinate to the x-coordinate of the nearest hexagonal bin.	HEXBINX([Longitude], [Latitude])
HEXBINY	HEXBINY(number, number); Maps an x, y coordinate to the y-coordinate of the nearest hexagonal bin.	HEXBINY([Longitude], [Latitude])
ZN	ZN(expression); Returns if it is not null, otherwise returns zero.	

2.1.5. Write type conversion functions

Link

Function used for	Functions	Example
Date	DATE/ DATETIME/ DATEPARSE	
Number	FLOAT/ INT	
String	STR	

2.1.6. Write aggregate functions

Link

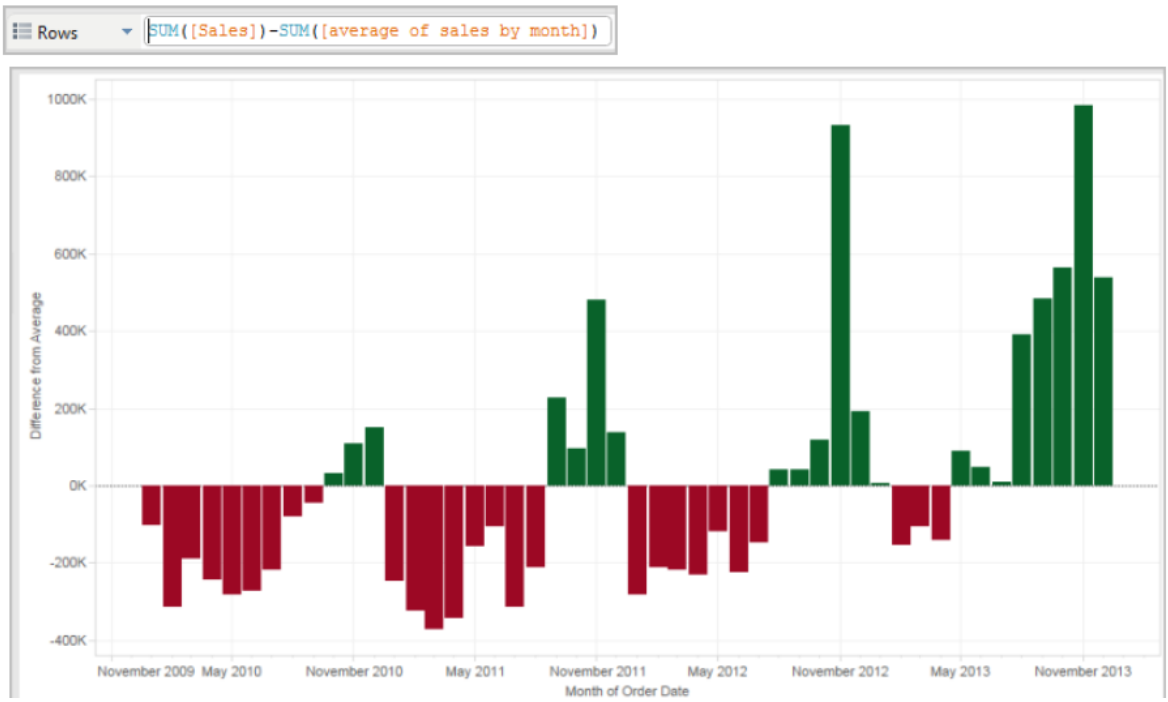
Function	Syntax	Definition
ATTR	ATTR(expression)	If expression has a single value for all rows: return the value of the expression; Else return *
AVG/ MEDIAN/STDDEV/VAR/COVAR...		
COUNT/ COUNTD		

2.1.7. Write FIXED LOD calculations

FIXED, INCLUDE, EXCLUDE

A mixed use of exclude and fixed

```
{EXCLUDE [Order Date (Month / Year)] : AVG({FIXED [Order Date (Month / Year)] : SUM([Sales])})}
```

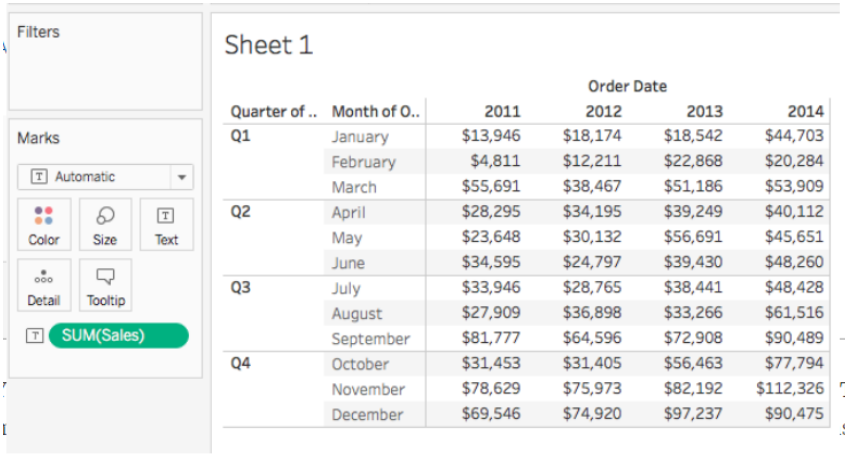


2.2. Create quick table calculations

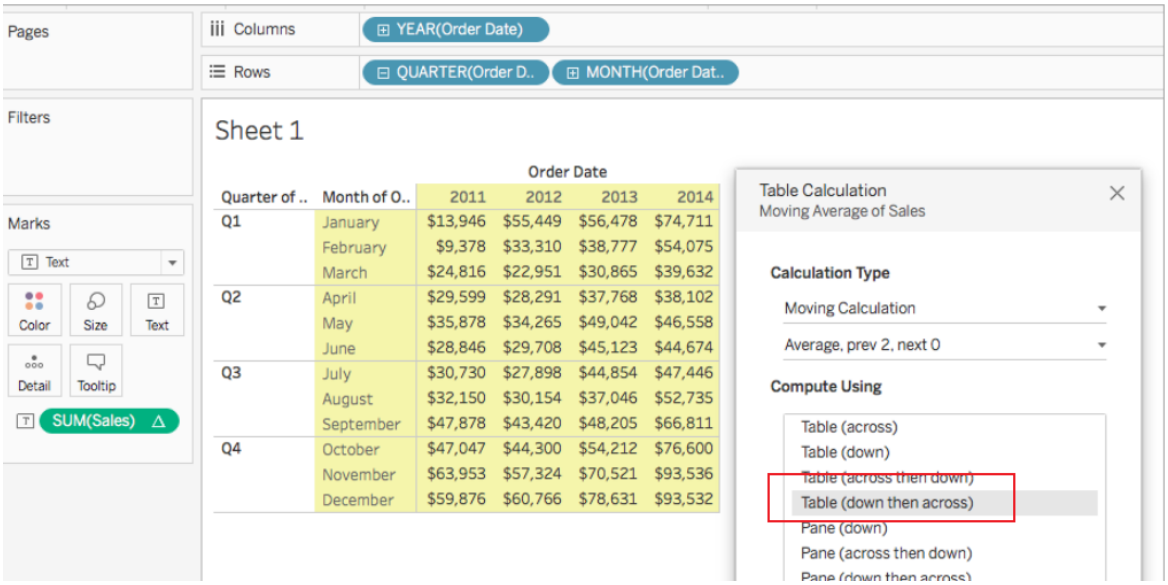
Table(across): row

Table(down: column)

2.2.1. Moving average



To do this, you can transform each
s over time.

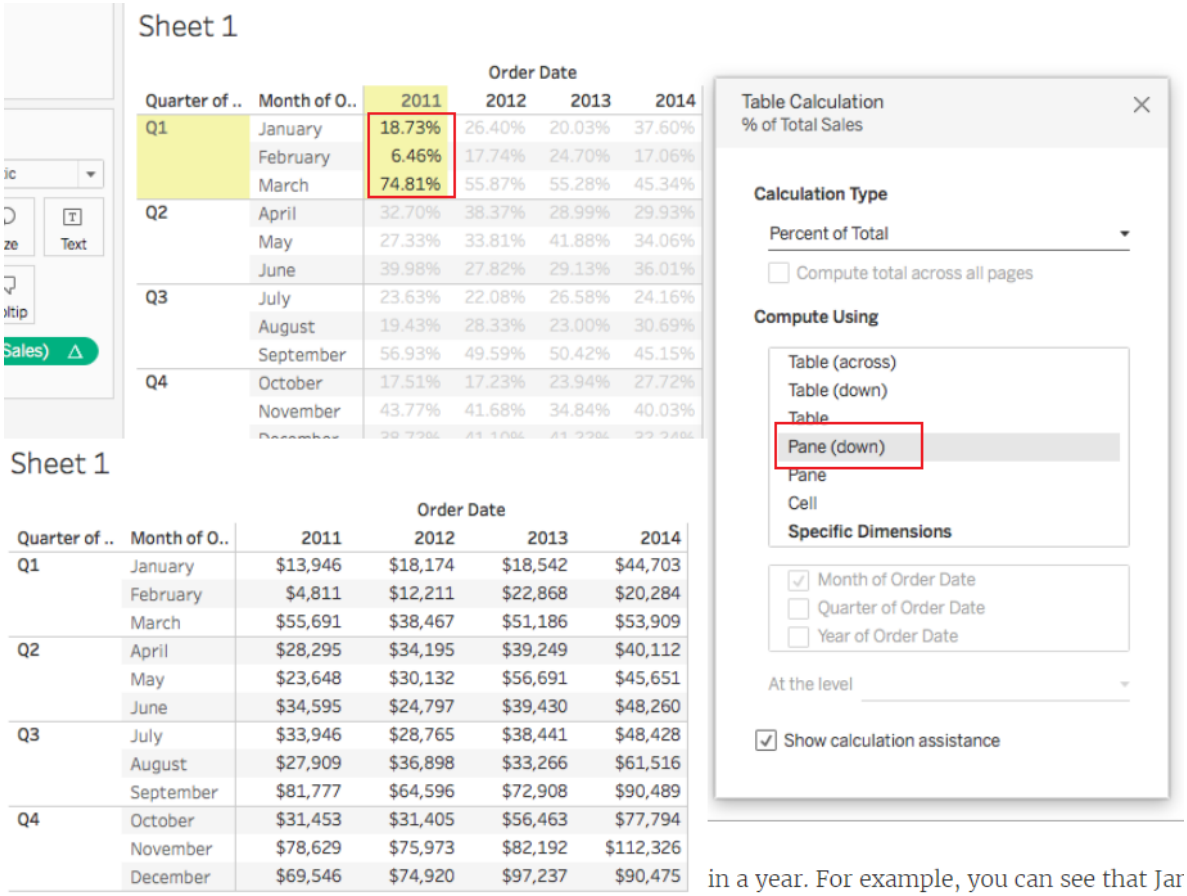


You can see the average sales over time. For example, the value listed for December 2011 is the average sales for October, November, and December, 2011. The value listed for January, 2012 is the average sales for November and December, 2011, and January, 2012

Or could using WINDOW_AVG() function

2.2.2. Percent of total

Pane

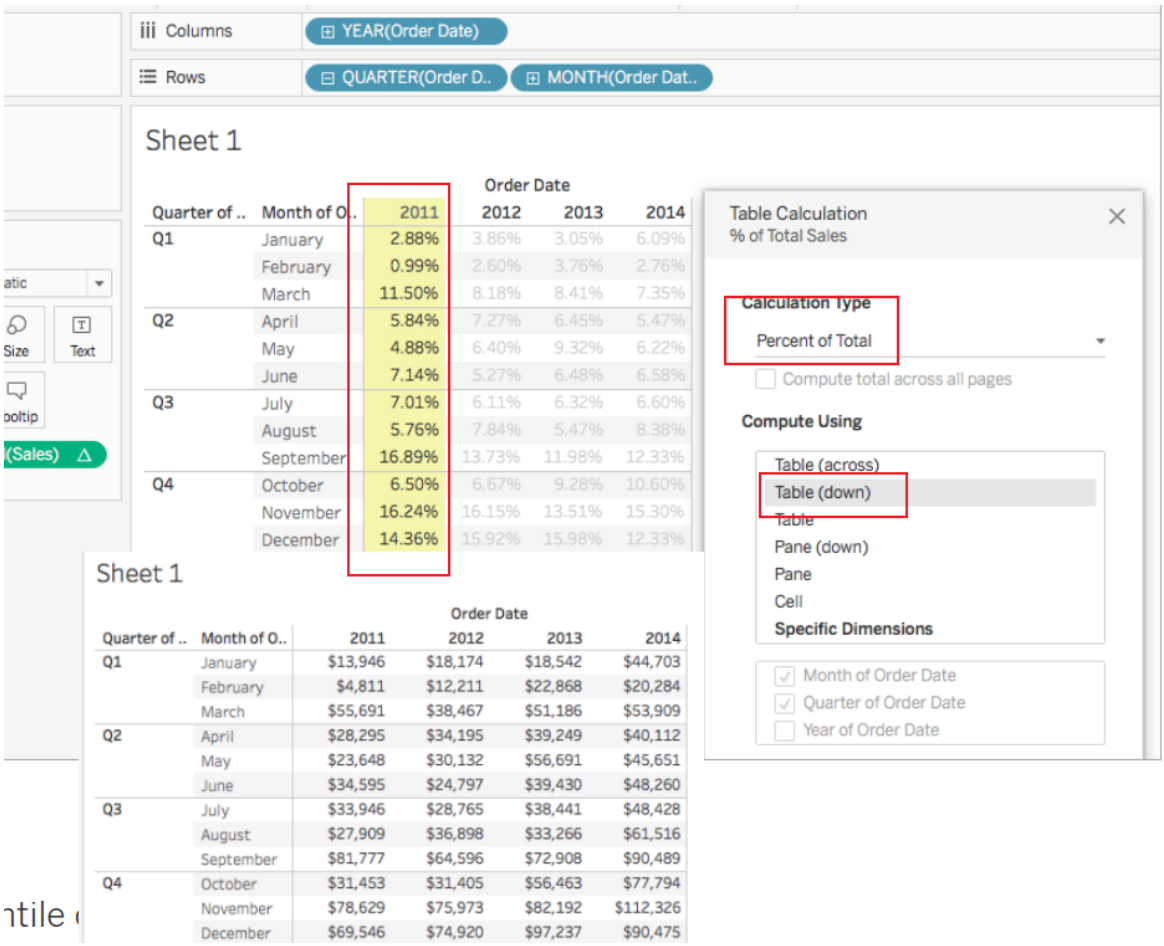


Sheet 1

Quarter of ..	Month of O..	Order Date 2011	2012	2013	2014
Q1	January	$13,946	$18,174	$18,542	$44,703
	February	$4,811	$12,211	$22,868	$20,284
	March	$55,691	$38,467	$51,186	$53,909
Q2	April	$28,295	$34,195	$39,249	$40,112
	May	$23,648	$30,132	$56,691	$45,651
	June	$34,595	$24,797	$39,430	$48,260
Q3	July	$33,946	$28,765	$38,441	$48,428
	August	$27,909	$36,898	$33,266	$61,516
	September	$81,777	$64,596	$72,908	$90,489
Q4	October	$31,453	$31,405	$56,463	$77,794
	November	$78,629	$75,973	$82,192	$112,326
	December	$69,546	$74,920	$97,237	$90,475

in a year. For example, you can see that Jar

Table



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	September	$81,777	$64,596	$72,908	$90,489
Q4	October	$31,453	$31,405	$56,463	$77,794
	November	$78,629	$75,973	$82,192	$112,326
	December	$69,546	$74,920	$97,237	$90,475

ıtile

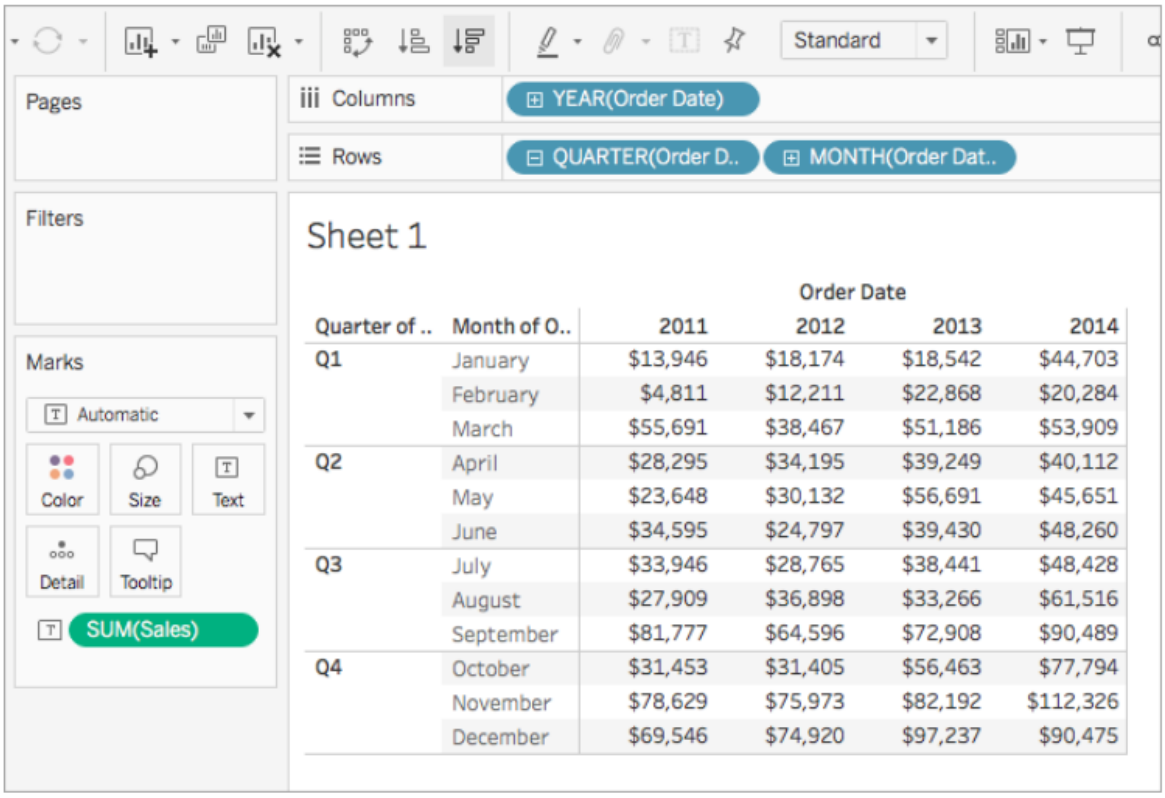
2.2.3. Running total

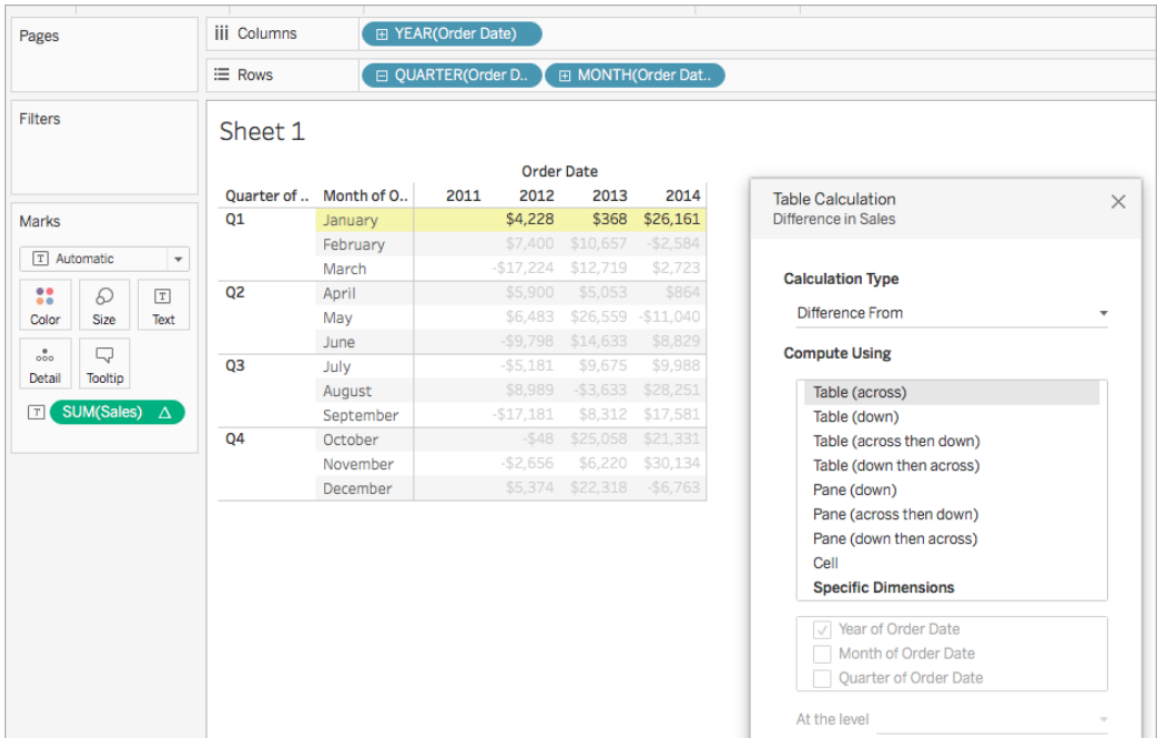
- Aggregates values cumulatively in a partition

- Could be

Option	Meaning
Sum	Cumulatively add
Average	Average of the current and all the previous
Minimum	All values are replace by the lowest value in the original partition before the current
Maximum	All values are replace by the lowest value in the original partition before the current

2.2.4. Difference and percent of difference





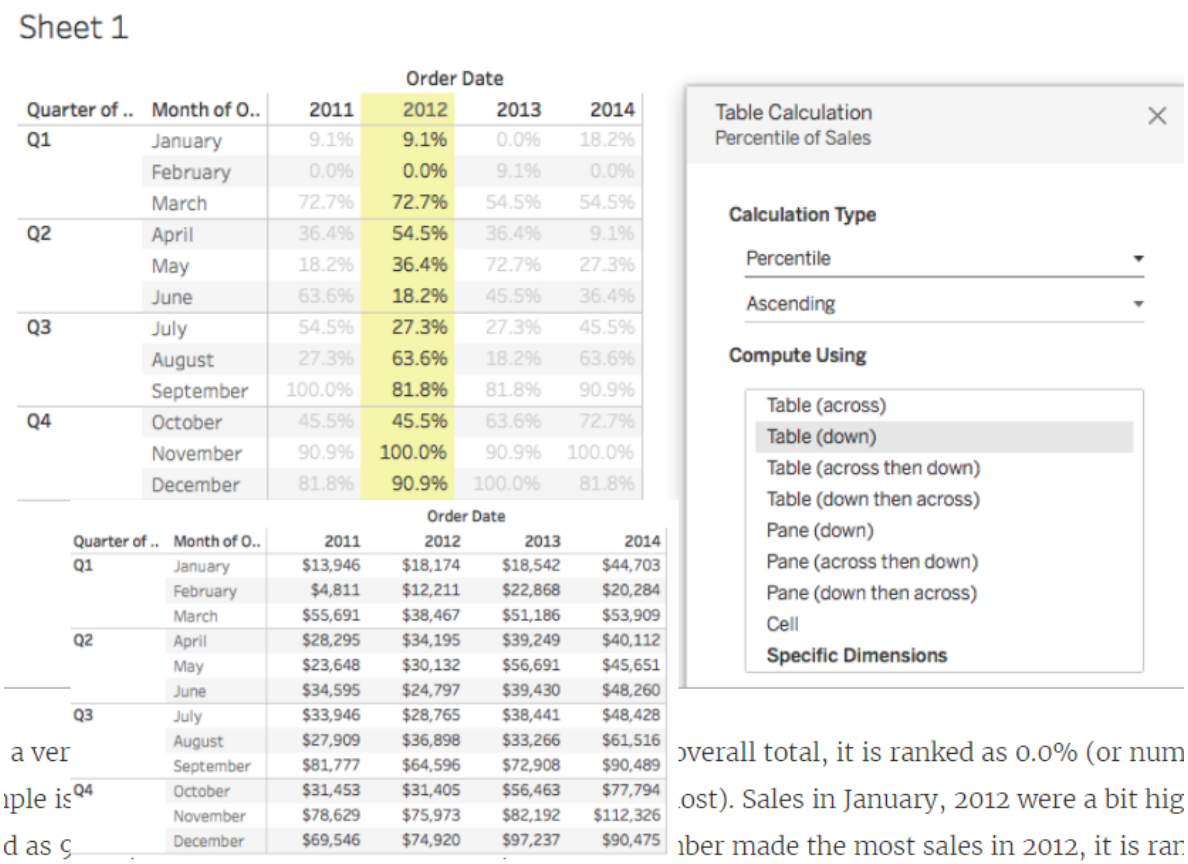
With a **Difference From**, **Percent Difference From**, or **Percent From**:

Check **relative to**

Previous	Calculates the difference between the current value and the previous value in the partition. This is the default value.
Next	Calculates the difference between the current value and the next value in the partition.
First	Calculates the difference between the current value and the first value in the partition.
Last	Calculates the difference between the current value and the last value in the partition.

2.2.5. Percentile

Percentile table calculation computes a **percentile rank** for each value in a partition.



Since February made a very small amount of sales in 2012 compared to the overall total, it is ranked as 0.0% (or number 1 out of 12, since this example is Ascending, and therefore ranked from least to most). Sales in January, 2012 were a bit higher and were therefore ranked as 9.1% (or number 2 out of 12 months). Since November made the most sales in 2012, it is ranked as 100% (or number 12 out of 12)

2.2.6. Compound growth rate

Could adjust "Relative to"

$$CAGR = \left(\frac{\text{Ending Value}}{\text{Beginning Value}}\right)^{\left(\frac{1}{\#\text{ of years}}\right)} - 1$$

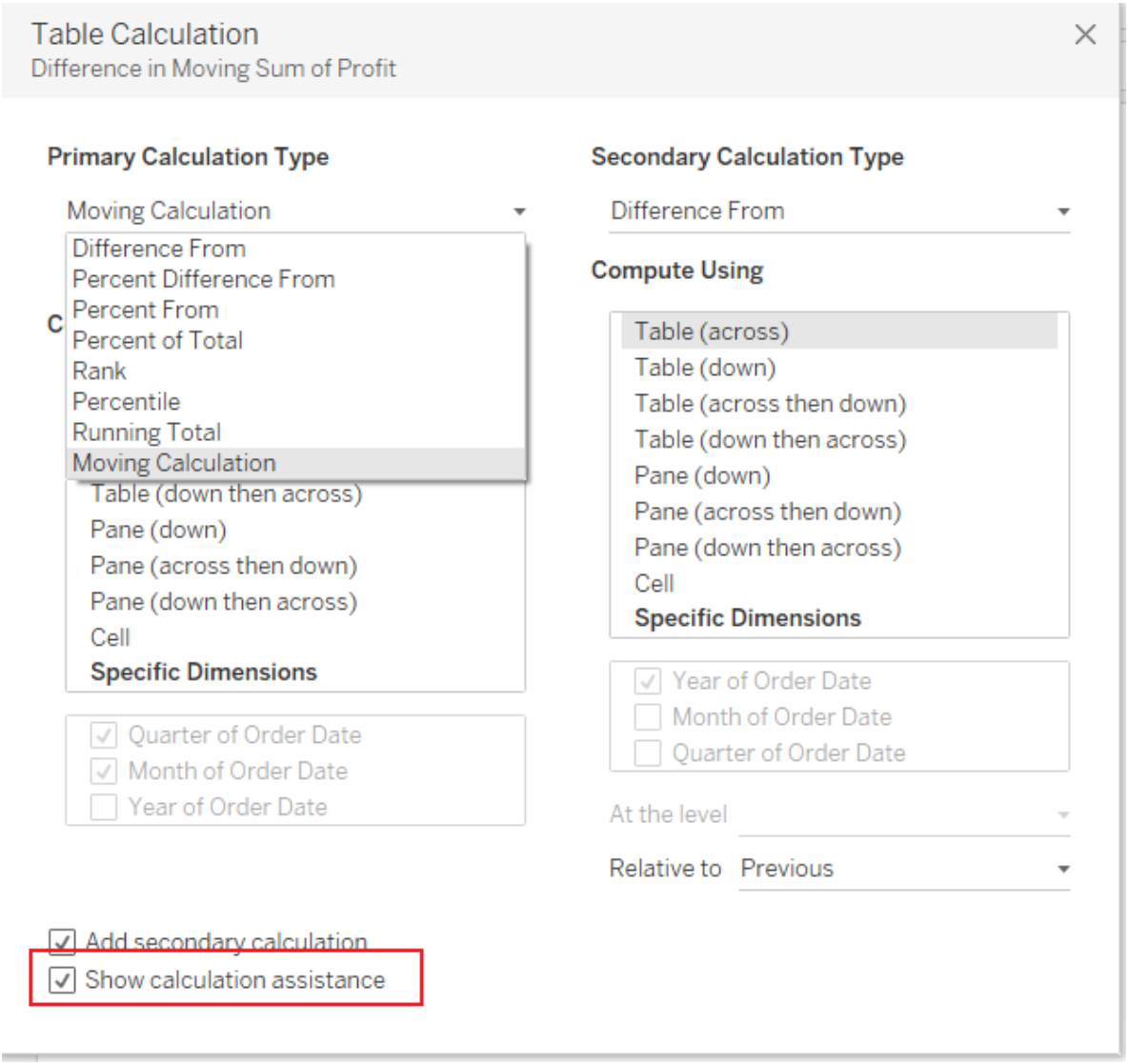
2.2.7 Add Second Calculation

Only with **Running Total** and **Moving Calculation**

2.3. Create custom table calculations

I prefer to understanding these concepts by creating a dashboard, one on the left is table calculation sheet; one on the right is the original sheet. In this way, any calculation can be compared between these two.

Also, [Show calculation assistance] is also helpful, highlighting the calculation areas.



2.3.1. Year to date

2.3.2. Month to date

2.3.3. Year over year

2.3.4. Index

- Need to know the difference between : Index, first, last

2.3.5. Ranking

If a series = (23, 45, 45, 67),

There are four types of ranking:

- Competition: results in (1, 2, 2, 4)
- Modified Competition: results in (1, 3, 3, 4)
- Dense: results in (1, 2, 2, 3)
- Unique: results in (1, 2, 3, 4)

2.3.6. First-last

Explained in 2.3.4

Need to note here is

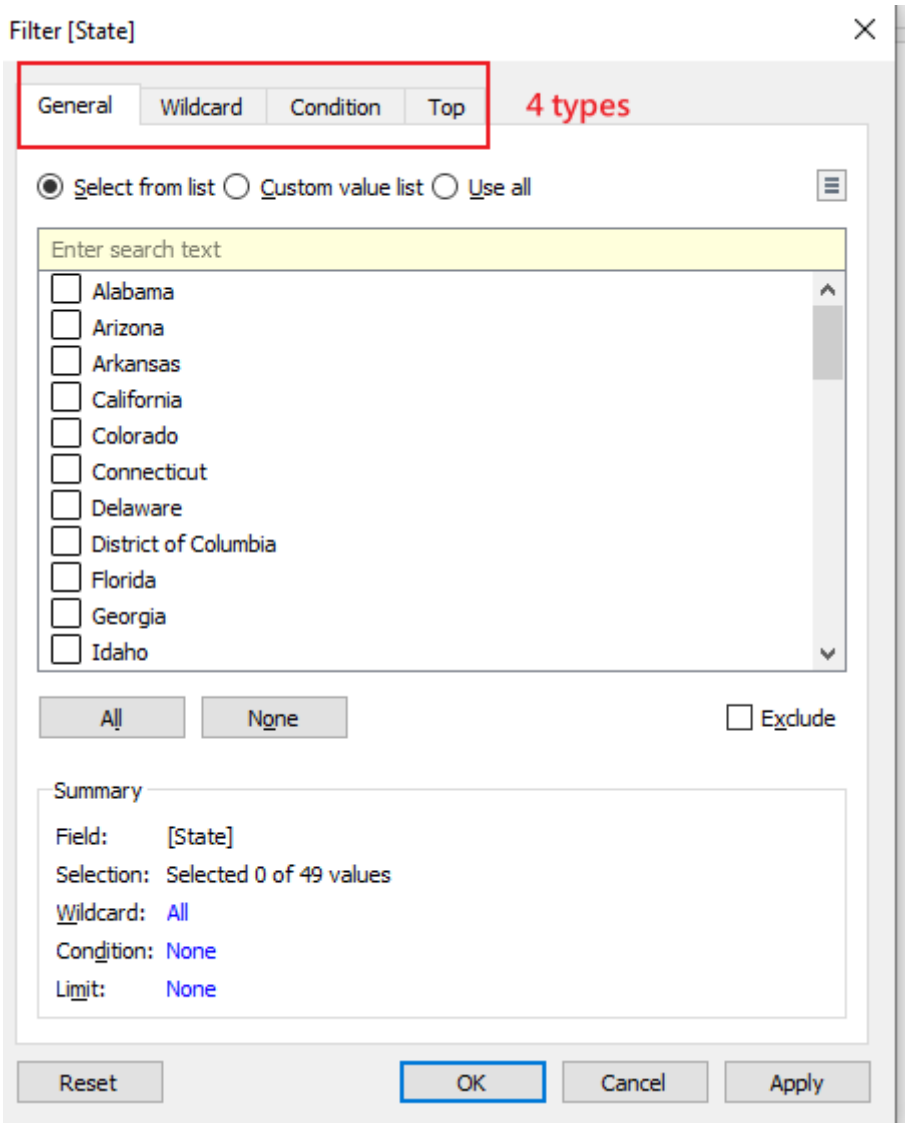
- The logic of using index, ranking, first, last in table calculation is the same of the functions used in filed calculation
- Need to know how these are combine used with LOOKUP function

2.4. Create and use filters

2.4.1. Apply filters to dimensions and measures

By dragging a dimension/measure in to filter shelf, the the following window will pop out.

Filter dimensions(categorical)

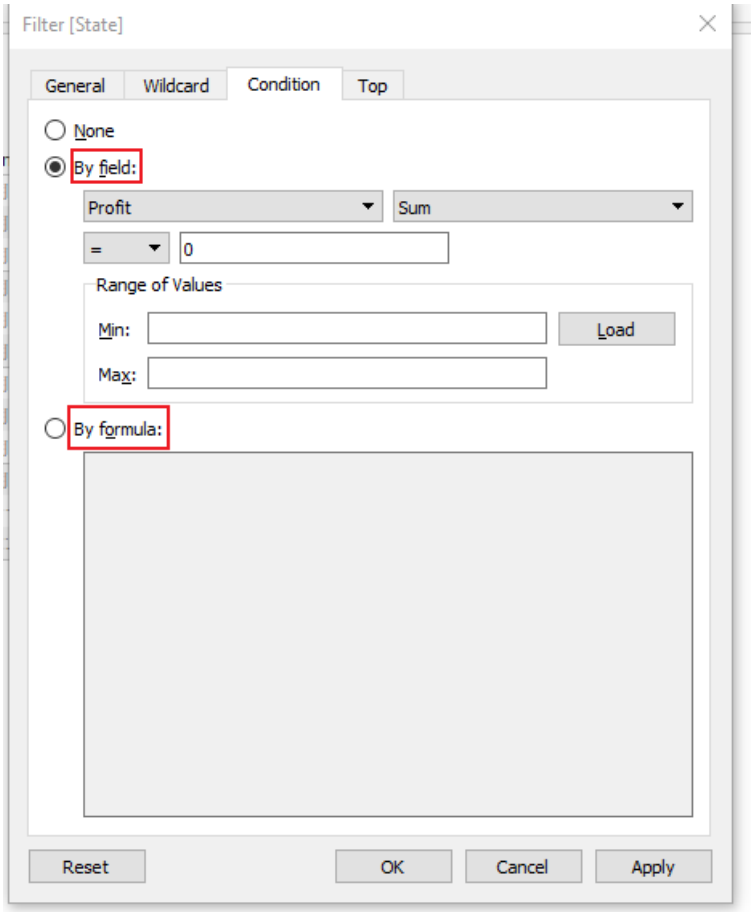


General: select/deselect from the list or search(Custom value list)

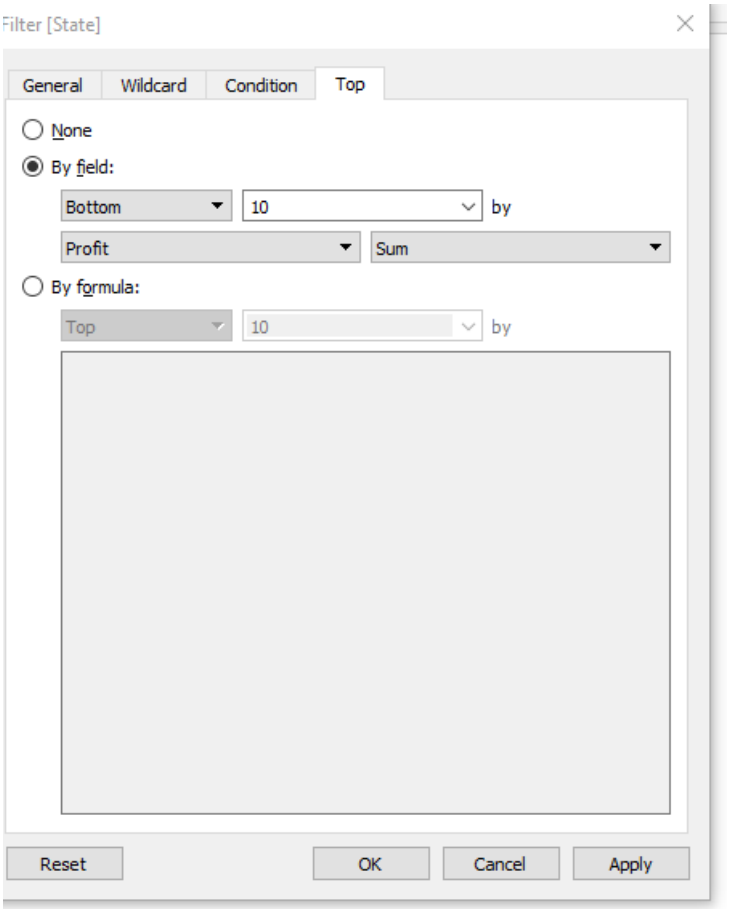
Wildcard: include XXX contains/starts with/ ends with/ exactly matches

exclude XXX NOT contains/starts with/ ends with/ exactly matches

Condition



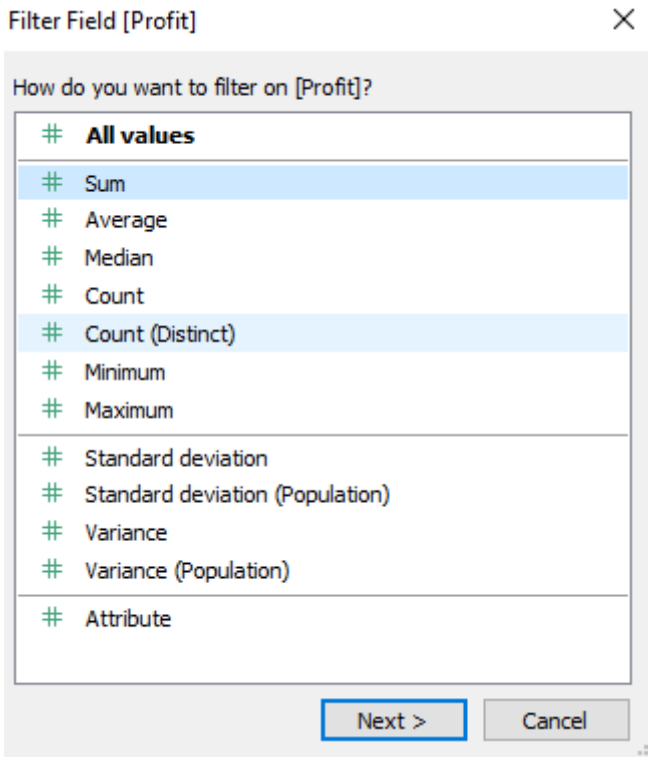
TOP(like condition, add top/bottom N)



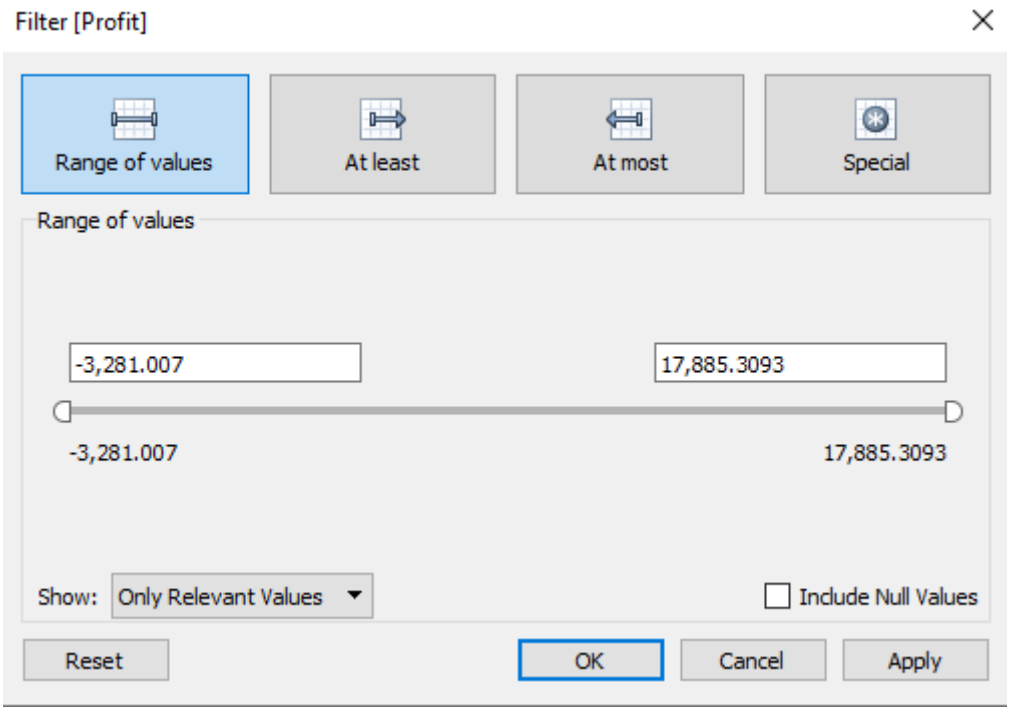
Filter measures(quantitative data)

For example, by dragging profit into filter shelf

Step 1: to choose a calculation method



Step 2: set range



Filter date: similar to measures

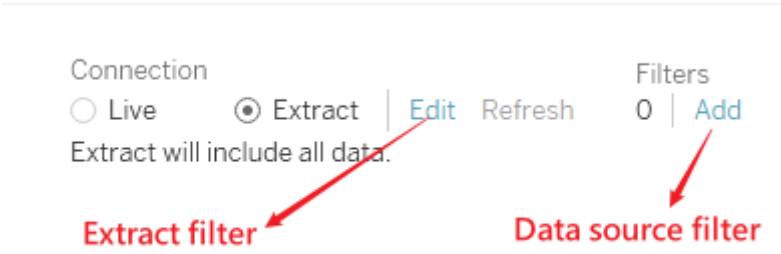
2.4.2. Configure filter settings including Top N, Bottom N, include, exclude, wildcard, and conditional

Mentioned in 2.4.1

2.4.3. Add filters to extract, data sources, context

Extract filter: In Data Source pane, click [Edit] after selecting [Extract], will be similar as dimension/measure

Data Source filter: Next to [Extract Filter], click [Add], will be similar as dimension/measure



Context filter

Select [Add to Context] in from the dimension/measure filter shelf

Some characteristics:

- Appear at the top pf the filter shelf
- Grey colour
- Can't be rearranged

2.4.4. Apply filters to multiple sheets and data sources

Official link

Could also refer to e-learning: Create Dashboards and Stories/ Filtering Across Data

Or Three methods step by step practical:

1. Edit data source relationship, filter apply to related data source
2. Create calculation field
3. Add dashboard actions

2.5. Create parameters to enable interactivity

Official link include why parameter and how to creat it

YouTube video

Parameters won't work by itself, need to combine with the following three ways

2.5.1. In calculations

Table table could insert parameter to dynamically change the name

In Edit filters, Edit Set(dynamically select top N)

2.5.2. With filters

In edit filter window

Condition: using by formula, could say this is parameter in calculation

Top N: by field or by formula

2.5.3. With reference lines

Analytics pane, drag and choose, direct

2.6. Structure the data

2.6.1. Sets

One example: parameter, top N sets, calulated field,

Sets are costumed field used to hold the subset of data based on a given condition

- Dynamic Sets
  - The members of a dynamic set change when the underlying data changes.
  - Dynamic sets can only be based on a single dimension.
  - **How**: Data pane, right-click a dimension and select **Create** > **Set**. Could use General, condition or Top
- Fixed Sets
  - The members of a dynamic set change when the underlying data changes.
  - Dynamic sets can only be based on a single dimension.
  - **How**: Right-click the mark(s) and select **Create Set**.
- Combine Sets

2.6.2. Bins

Can I say Bins is for measure, Sets is for dimensions? Bins can be more than 2, while sets only 2(in/out)

2.6.3. Hierarchies

By dragging to the top of another filed

2.6.4. Groups

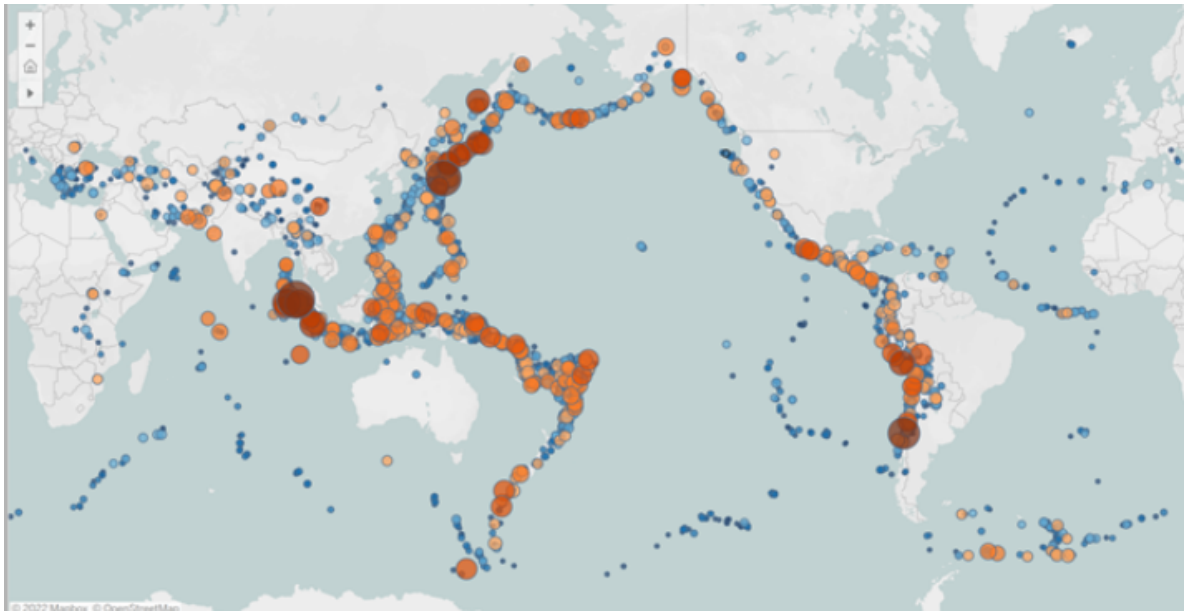
Right click on dimension/measure

2.7. Map data geographically

Mapping Concepts in Tableau(Some useful links are listed on the bottom within this hyper link)

2.7.1. Create symbol maps

Proportional symbol maps: **showing quantitative data for individual locations**. Eg: plot earthquakes around the world and size them by magnitude



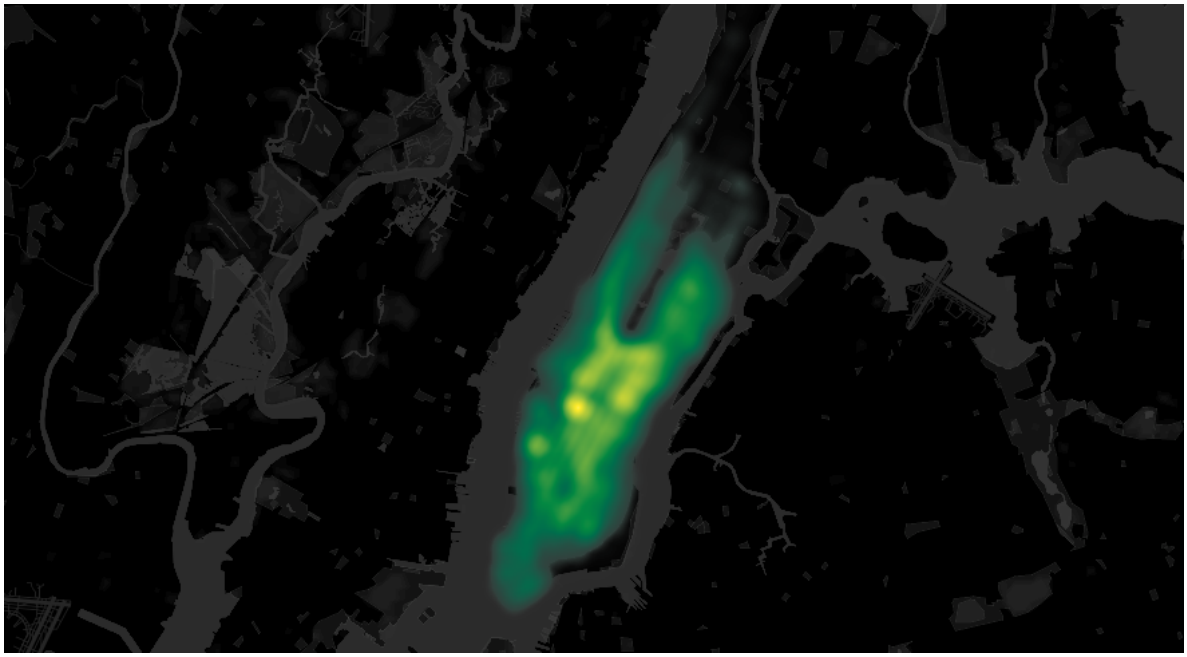
2.7.2. Create heat maps

Heatmaps, or density maps, can be used when you want to **show a trend for visual clusters of data**.

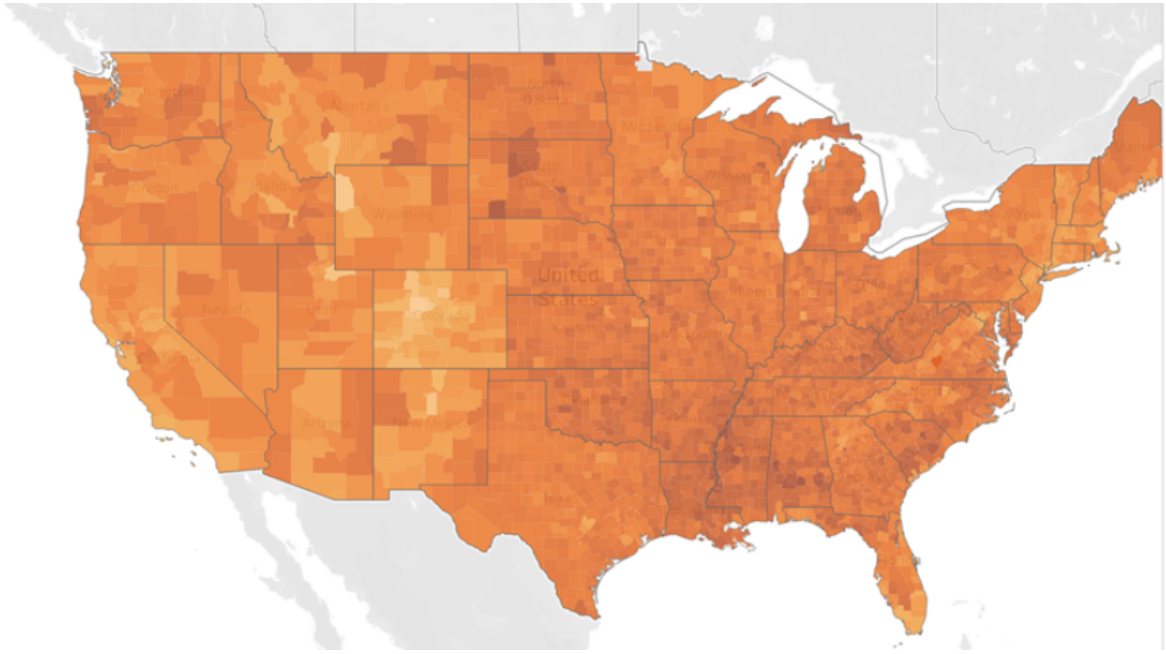
2.7.3. Create density maps

Tableau put Heatmaps and density maps together, don't know why distinct these two here in exam guideline.

- Could adjust colour, intensity, opacity, size



2.7.4. Create choropleth maps (filled maps)



Some other types of maps not required in exams:

- Flow maps(path maps)
- Spider maps (origin-destination maps)

2.8. Summarize, model, and customize data by using the Analytics feature

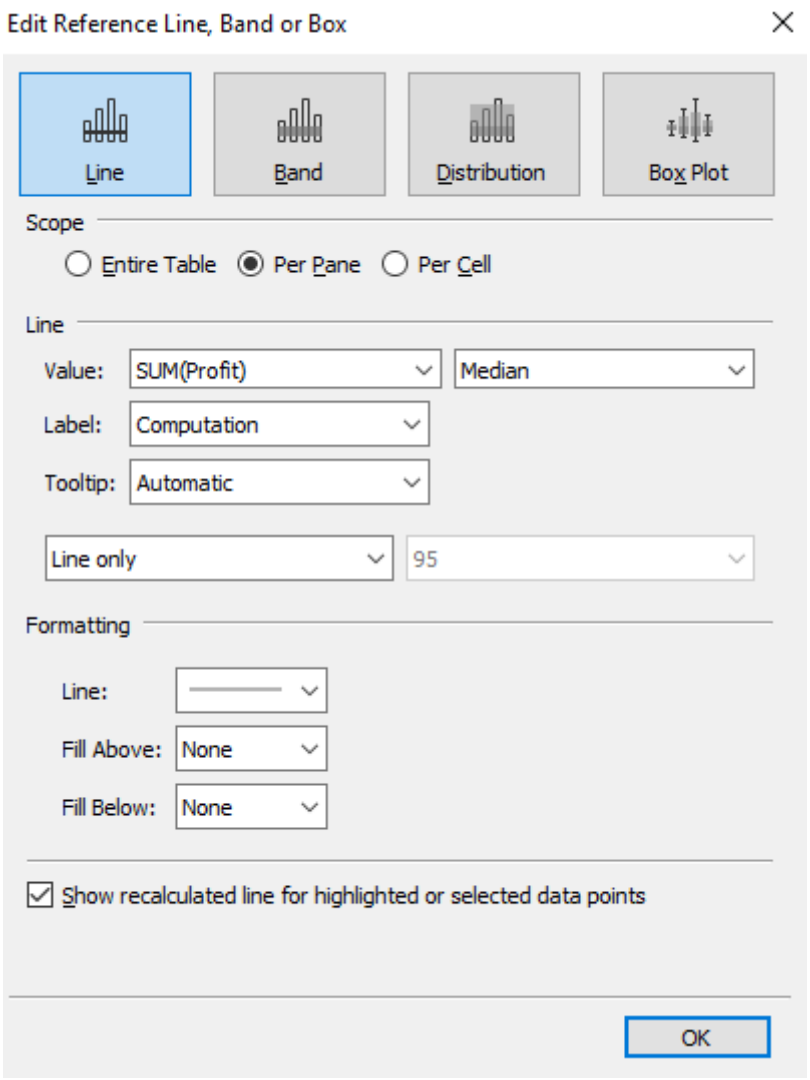
This part won't be difficult, some shares the sample pattern of operation.

2.8.1. Totals and subtotals

Official hellp

Could do both from **Analytic pane(Drag Total)** or **Analysis menu(Select total)**

Mostly use this window(even drag)



2.8.2. Reference lines

Same in the window

2.8.3. Reference bands

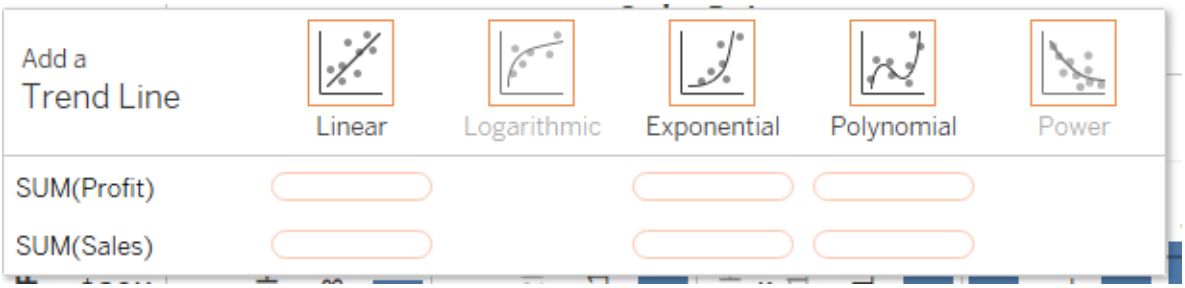
Same in the window

2.8.4. Average lines

Feels like the same as the reference line. Same in the window

2.8.5. Trend lines

Five types



2.8.6. Distribution bands

Same in the window

2.8.7. Forecast by using default settings

Only available in Tableau Desktop

To remove, edit, or read a description of the current forecast, go to the Analysis menu and choose **Forecast**. Other lines and bands can be removed by dragging

Forecasting is not supported for views based on multidimensional data sources. In addition, the view cannot contain any of the following:

- Table calculations
- Disaggregated measures
- Percent calculations
- Grand Totals or Subtotals
- Date values with aggregation set to Exact Date

2.8.8. Customize a data forecasting model

Enhance Forecast

1. Drag the same measure into detail
2. Right-click - Forecast Result: could see the forecast precision of the tooltip

2.8.9. Create a predictive model

MODEL_PERCENTILE

MODEL_QUANTILE

Domain 3: Create Content

3.1. Create charts

3.1.1. Create basic charts from scratch (bar, line, pie, highlight table, scatter plot, histogram, tree map, bubbles, data tables, Gantt, box plots, area, dual axis, combo)

Remind me: highlight table is using "Square"

Official Link

3.1.2. Sort data (including custom sort)

Ways of sorting

1. From header
2. From a field label
3. From toolbar

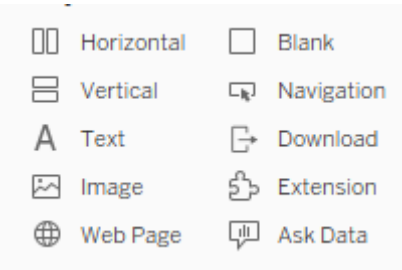
Could sort dimension filed based on Data source/ alphabetic, field(measure), manual, nested(independent sort within a pane)

3.2. Create dashboards and stories

3.2.1. Combine sheets into a dashboard by using containers and layout options

No need explore, all based on needs

3.2.2. Add objects



3.2.3. Create stories

Creating stories itself is not difficult, but I found interesting on [The seven types of data stories]

1. **Change over time**: Uses a chronology to illustrate a trend.
2. **Drill down**: Sets context so that your audience better understands what's going on in a particular category.
3. **Zoom out**: Describes how something your audience cares about relates to the bigger picture.
4. **Contrast**: Shows how two or more subjects differ.
5. **Intersections**: Highlights important shifts when one category overtakes another.
6. **Factors**: Explains a subject by dividing it into types or categories.
7. **Outliers**: Shows anomalies or where things are exceptionally different.

3.3. Add interactivity to dashboards

3.3.1. Apply a filter to a view

‼ In Exam

First select a sheet: use as filter

Right-click on the field to select **show Filter**

3.3.2. Add filter, URL, and highlight actions

Show Highlighter is below Show Filter

3.3.3. Swap sheets by using parameters or sheet selector

‼ In Exam

[Swap by using parameter] note: need to set as floating for the swap effect

Another way is two click swap button

3.3.4. Add navigation buttons

‼ In Exam: how to click on the navigation button and redirect to a sheet

3.3.5. Implement user guiding sentences (click..., hover..., menu options)

3.4. Format dashboards

More practice and play around would be helpful

3.4.1. Apply color, font, shapes, styling

3.4.2. Add custom shapes and color palettes

3.4.3. Add annotations

3.4.4. Add tooltips

3.4.5. Apply padding

3.4.6. Remove gridlines, row-level and column-level bands, and shading

3.4.7. Apply responsive design for specific device layouts

Domain 4: Publish and Manage Content on Tableau Server and Tableau Online

9% of the Exam, I didn't spend much time here

4.1. Publish Content

To understand a workbook's structure

1. Original data(credentials)
2. Tableau data source(how to access the original data, calculations, extraction period)
3. Selecting views

To decide how to connect data and keep it up-to-date

4.1.1. Publish a workbook

Need to know

1. The name of server
2. How to sign in

4.1.2. Publish a data source

- If wish refresh extracted data source: must select Embed password or Allow refresh access
- If workbook connects to Tableau data source: embedding password

4.1.3. Print content

4.1.4. Export content

4.2. Schedule data updates

4.2.1. Schedule data extract refreshes

!!! In exam

4.2.2. Schedule a Tableau Prep workflow

4.3. Manage Published workbooks

4.3.1. Create alerts

!!! In exam

4.3.2. Create subscriptions