Mastering Data Manipulation and Visualization in Tableau

📄 Pre-requisites

Hope you have gone through the self-learning content for this session on the PRISM portal.

By the End of this Session, You Will:

- Use sorting, building hierarchies, groups, sets, filters and tooltip.

- Perform basic Tableau calculation.

- Be able to efficiently use slicing and dicing in Tableau.

- Make more efficient calculated field.

- Visualize data more efficiently.

Pop Quiz

Q. What is the purpose of filtering in Tableau?

a. Changing the visual appearance of the data

b. Rearranging the data points within a dimension or measure

c. Limiting the data displayed based on specific conditions or criteria

d. Sorting the data in ascending or descending order

Pop Quiz

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Sort

- Sorting the data is a very important feature in analyzing the data. Sorting helps us to arrange the data in ascending or descending order.

- There are multiple ways to sort a visualization with single-click sort buttons.

- In all cases, **one click** sorts ascending, **two** clicks sorts descending, and **three** clicks clear the sort.

There are multiple ways to perform sorting:

1. Sort from an axis

2. Sort from a header

3. Sort from a field label

4. Sort from a toolbar

5. Sort by drag and drop

Sort from an Axis

Steps:

1. Hover over a numerical axis to bring up the sort icon.
2. Click the icon to sort.

In this example, the sort is applied to Color based on Metric A. The sort is applied to the innermost dimension, which is Color in this case.
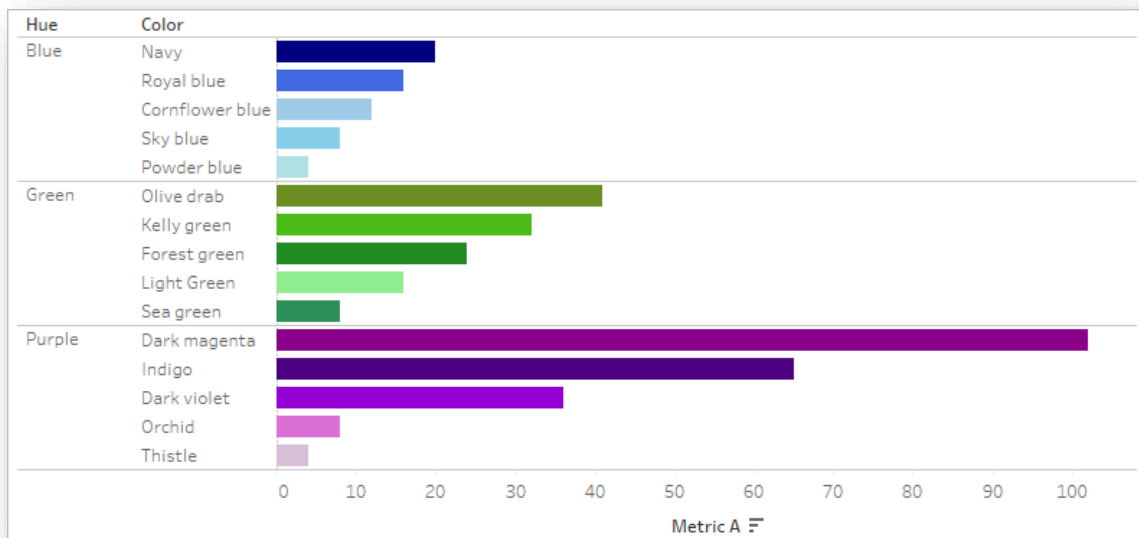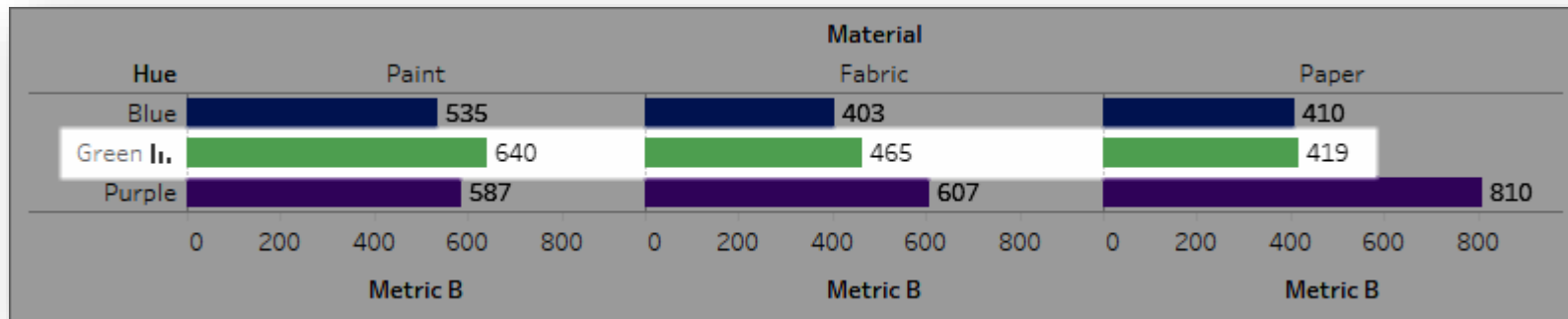
Sort from a Header

Steps:

1. Hover over a header to bring up the sort icon.
2. Click the icon to sort.

In this example, the sort is applied to **Material** (sorting the order of the columns Paint, Fabric, and Paper) based on the values for Green, since that header was used for the sort.
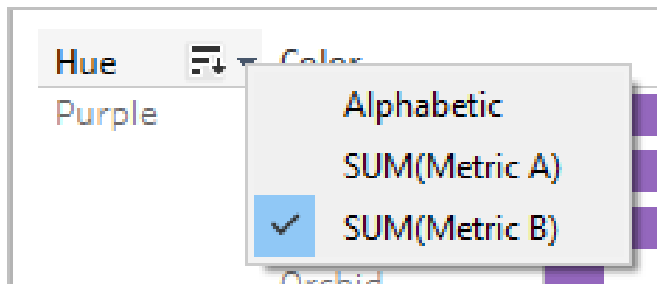
Sort from a Field Label

Steps:

1. Hover over a field label to bring up the sort icon.
2. The sort icon for a field label is slightly different from a header or axis.
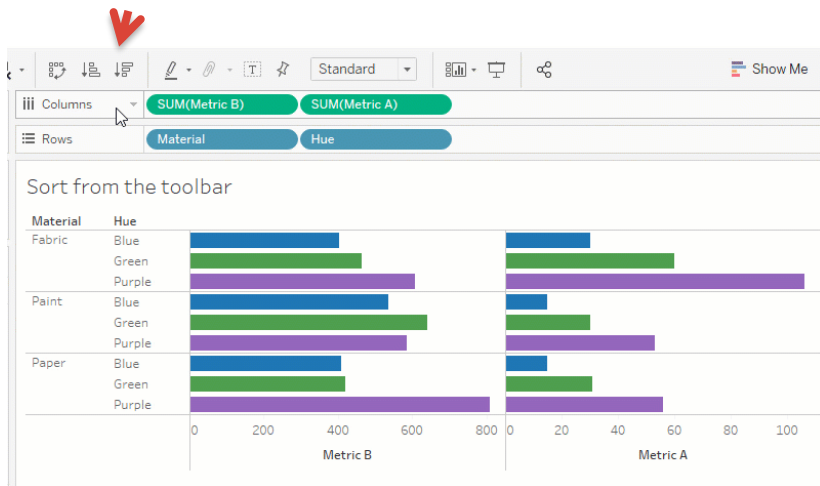
The default option is alphabetical sorting, but there is also a menu where we can choose to sort by a field in the view.

Sort from Tool Bar

Steps:

1. Select the dimension you wish to sort.

2. If you do not select a field before sorting, the default behavior is to sort the deepest dimension.

3. Choose the appropriate sort button (ascending or descending) in the toolbar.

Nested and Non-nested Sort

NESTED	NON-NESTED
A nested sort considers each pane independently and sorts the rows per pane.	A non-nested sort considers the value across panes and will have the same order of values per pane.
Purple is sorted above Green for Fabric and Paper, but below Green for Paint.	Purple is above Green for all materials because, in aggregate, Purple is higher than Green.
Nested sorts look correct within the context of the pane, but don't convey the aggregated information about how the values compare overall.	Non-nested sorts may look incorrect in a single pane, but consistently convey how the aggregated values compare overall.
Sorting from an axis gives a nested sort by default.	Sorting from a field label gives a non-nested sort by default.

Poll Time

Q. What does sorting in Tableau allow you to do?

a. Reorder the columns in a table visualization

b. Filter the data based on specific conditions

c. Rearrange the data points within a dimension or measure

d. Group the data into predefined categories

Poll Time

Q. What does sorting in Tableau allow you to do?

a. Reorder the columns in a table visualization

b. Filter the data based on specific conditions

c. **Rearrange the data points within a dimension or measure**

d. Group the data into predefined categories
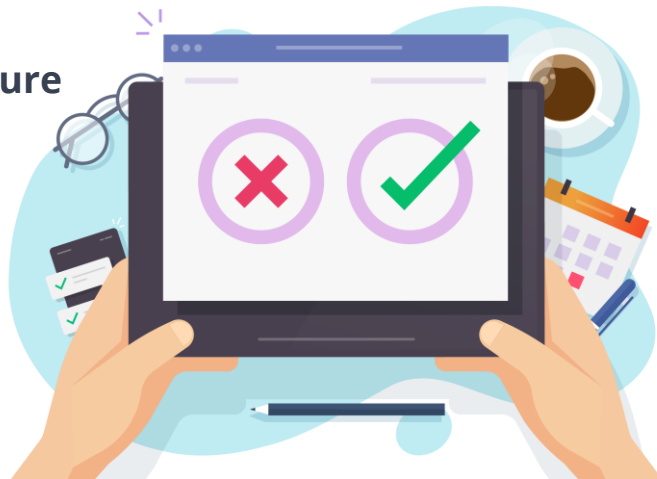
Filter

Filtering is an essential part of analyzing data.

There are various ways to perform filtering like:

1. **Using the Filters shelf:** The Filters shelf is located on the left side of the Tableau window. It is a convenient way to add and manage filters for your view.

2. **Using filter cards:** Filter cards are a more interactive way to filter data. They can be displayed in the view itself, or in a separate pane.

3. **Formatting filters:** You can format filters to make them more visually appealing and easier to use. For example, you can change the font, size, and color of the filter text.
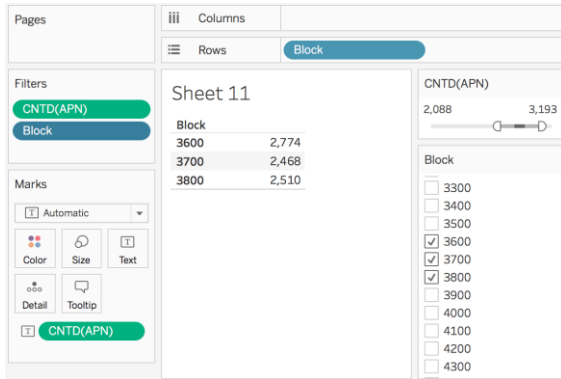
Hierarchies

- Hierarchies are fundamental in Tableau for organizing and analyzing data effectively.

- Tableau automatically generates hierarchies for date fields when connected to a data source.

- Users can create custom hierarchies by combining relevant fields, allowing for personalized data analysis.

Hierarchies

- Custom hierarchies enable users to drill down and analyze data at various levels for more in-depth insights.

- Hierarchies enhance the depth and granularity of data analysis, improving the quality of insights in Tableau.

- Creating hierarchies involves dragging and dropping fields in the Data pane, and additional fields can be added or re-ordered within the hierarchy.

Hierarchies

To drill up or down in a hierarchy in Tableau Desktop or in web authoring:
•In the visualization, click the **+** or **-** icon on the hierarchy field.

Pop Quiz

Q. In a sales dashboard, a parameter is created to allow users to select a specific sales region. What is the primary purpose of this parameter?

a. Changing the color scheme of the dashboard

b. Sorting the sales data in ascending or descending order

c. Filtering the sales data to display only the selected region

d. Grouping the sales data into predefined categories based on region

Pop Quiz

Q. In a sales dashboard, a parameter is created to allow users to select a specific sales region. What is the primary purpose of this parameter?

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b.   Sorting the sales data in ascending or descending order

c.   **Filtering the sales data to display only the selected region**

d.   Grouping the sales data into predefined categories based on region

Group

- Groups in Tableau combine related dimension members into higher-level categories.

- They simplify complex data by creating logical clusters or segments.

- Groups can be created based on single or multiple dimensions.

- Grouped members appear as a single item, aiding analysis and comparison.

- Groups can be used in calculations, filters, and sorting operations, and can be edited or deleted as needed.
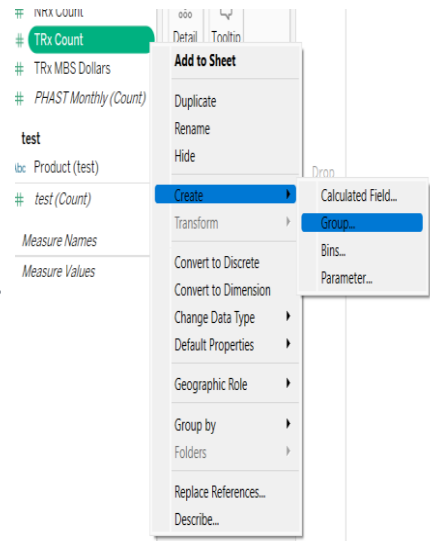
Group

Grouping Visually in Tableau:

- When you group visually in Tableau, you can manually select and group multiple marks or data points directly in the visualization.

- Visual grouping allows you to quickly create ad-hoc groups without modifying the underlying data structure.

- By selecting and grouping marks, Tableau automatically creates a new group with a distinct color and visual representation.

- Grouping visually is useful for exploring data patterns, identifying outliers, or comparing specific subsets of data
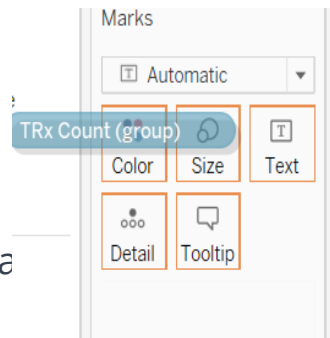
Group

Group Labels in Tableau:

- Group labels in Tableau provide a way to assign custom names to groups created within the data.

- Group labels help improve the clarity and understanding of the data by providing meaningful names for grouped categories.

- You can rename groups to reflect the characteristics or attributes shared by the grouped members.

- Group labels are especially helpful when presenting or sharing visualizations, as they provide context and insights to the audience.

- With group labels, you can create more descriptive and informative legends or tooltips, enhancing the overall interpretation of the data.
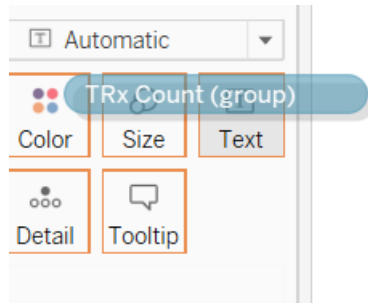
Poll Time

Q. In a sales analysis dashboard, groups are used in Tableau to combine individual products into a category called "Electronics." What is the primary purpose of creating this group?

a.   Changing the font style and size of the sales data

b.   Sorting the products based on their sales performance

c.   Grouping related products together for easier analysis

d.   Filtering the products based on specific criteria

Poll Time

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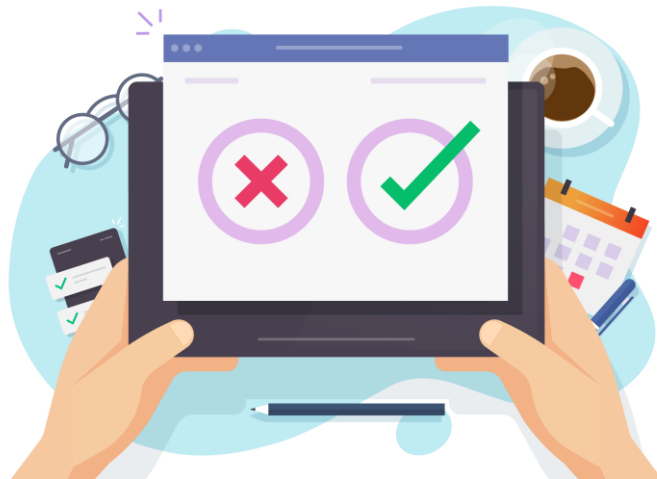
a. Changing the font style and size of the sales data

b. Sorting the products based on their sales performance

c. Grouping related products together for easier analysis

d. Filtering the products based on specific criteria

Sets

- Sets in Tableau are custom subsets of data based on specific conditions or criteria.

- Sets can be created manually by selecting data points or dynamically based on conditions defined by calculations.

- Sets allow for flexible data grouping and analysis, focusing on a specific subset of data for deeper insights.

- They can be used to compare and analyze data within and across different dimensions.

- Sets can be combined with other sets, dimensions, or measures to create more complex analysis.
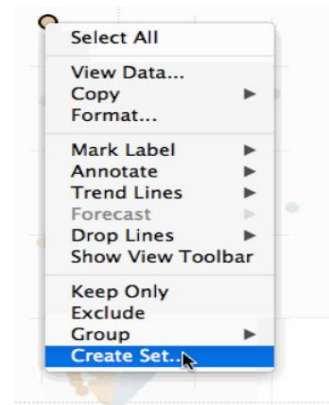
Sets

- Tableau offers different types of sets: fixed sets, dynamic sets, and combined sets.

- Fixed sets are defined by specific conditions and remain unchanged with filters or user interactions.

- Dynamic sets adapt to changing conditions through user interactions, while combined sets are created by combining multiple sets using logical operators.

- Sets are versatile tools used in calculations, filters, and visualizations for focused data exploration and analysis, enabling pattern identification, outlier detection, and data-driven decision-making.
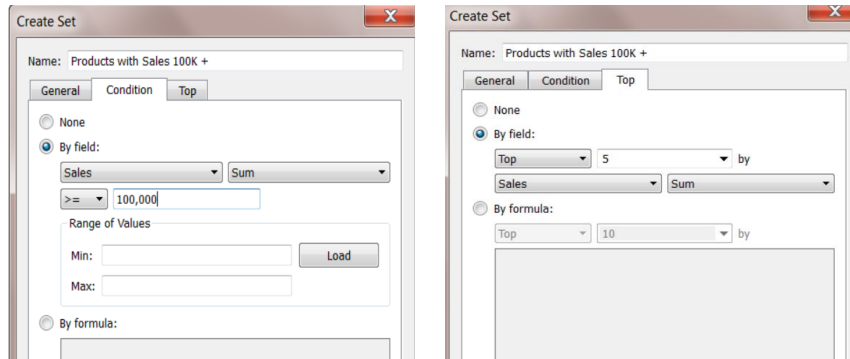
Tooltip

- **Tooltip command buttons** in Tableau enable interactive actions within tooltips.

- They provide clickable options for users to perform actions or navigate within the dashboard or workbook.

- Tooltip command buttons enhance interactivity and functionality in visualizations.

- To add a tooltip command button, edit the tooltip for a specific mark or data point in the visualization.

- Configure button actions, such as navigating to a specific sheet or dashboard, opening a URL, running JavaScript, applying filters, or clearing selections.

Tooltip

- What are Tooltips?

- Tooltips in Tableau are interactive elements that enhance the understanding of data by providing additional details and insights.

- Tooltips are interactive elements in Tableau that appear when hovering over or clicking on data points.

- Tooltips prevent clutter by displaying information that may not fit directly into the main visualization.

- They can include specific data values, calculated fields, descriptive text, and visual elements like images or charts.
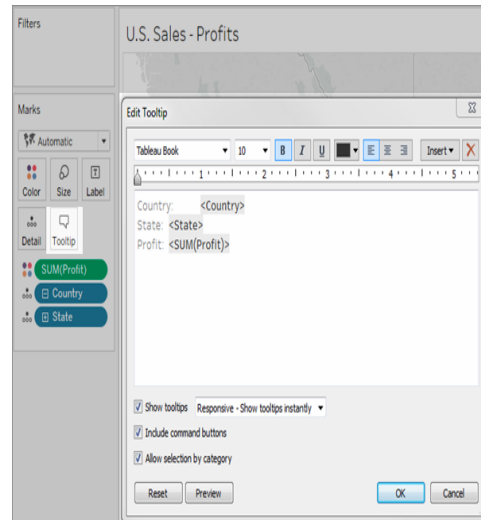
Pop Quiz

Q. In a dashboard displaying monthly sales data, tooltips are added to show additional information about each data point, such as the product name and sales amount. What is the purpose of tooltips in this scenario?

a.   Changing the color scheme of the dashboard

b.   Sorting the sales data in ascending or descending order

c.   Filtering the sales data based on specific criteria

d.   Providing additional details and context for each data point on hover

Pop Quiz

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c. Filtering the sales data based on specific criteria

d. **Providing additional details and context for each data point on hover**

Calculated field

- Calculations in Tableau enable complex data transformations and custom metrics.

- They provide flexibility to manipulate data and create calculated fields not present in the original dataset.

- Tableau offers two calculation types: Aggregate and Non-Aggregate.

- To create a basic calculation in Tableau:

  - Select the field(s) for the calculation.
  - Right-click, choose "Create," and select the calculation type.
  - Define the calculation expression using Tableau's formula syntax and functions.
  - Assign a name to the calculated field for reference in visualizations.

String Function

Tableau offers a range of string functions to work with text data.

- String functions help with tasks like extracting substrings, converting case, finding patterns, replacing text, and more.

Commonly Used String Functions:

Function	Description
LEFT(str, n)	Returns the leftmost n characters from a string.
RIGHT(str, n)	Returns the rightmost n characters from a string.
MID(str, start, length)	Returns a substring from a string, starting at a specified position and with a specified length.
LEN(str)	Returns the length of a string.
UPPER(str)	Converts all characters in a string to uppercase.

String Function

Function	Description
SPLIT(str, delimiter)	Splits a string into an array of substrings based on a specified delimiter.
JOIN(arr, delimiter)	Joins an array of strings into a single string with a specified delimiter.
REGEXP_REPLACE(str, pattern, replace)	Replaces substrings within a string based on a regular expression pattern.
REGEXP_EXTRACT(str, pattern)	Extracts substrings from a string based on a regular expression pattern.
REGEXP_MATCH(str, pattern)	Checks if a string matches a regular expression pattern and returns true or false.
FORMAT(str, format)	Formats a string using a specified format pattern.

String Function

Function	Description
LOWER(str)	Converts all characters in a string to lowercase.
PROPER(str)	Converts the first character of each word in a string to uppercase and the remaining characters to lowercase.
TRIM(str)	Removes leading and trailing spaces from a string.
REPLACE(str, find, replace)	Replaces all occurrences of a substring within a string with another substring.
FIND(str, find)	Returns the starting position of a substring within a string.
CONTAINS(str, find)	Checks if a string contains a specified substring and returns true or false.
CONCAT(str1, str2, ...)	Concatenates multiple strings into a single string.

Poll Time

Q. In a data cleaning process, a string function query is used in Tableau to remove leading and trailing spaces from a text field. What is the primary purpose of this string function query?

a.   Changing the font style and size of the text

b.   Sorting the text data in alphabetical order

c.   Filtering the data based on specific text patterns

d.   Removing unnecessary spaces for data consistency and accuracy

Poll Time

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a. Changing the font style and size of the text

b. Sorting the text data in alphabetical order

c. Filtering the data based on specific text patterns

d. **Removing unnecessary spaces for data consistency and accuracy**

Date Function

- Tableau offers a variety of date functions to analyze and manipulate date and time data.

- Date functions help with tasks like extracting components, performing date calculations, formatting, and aggregating data based on dates.

Function	Description
DATE(date_part, value)	Constructs a date using the specified date part values.
DATEADD(date_part, value, date)	Adds or subtracts a specified interval to a date and returns the resulting date.
DATEDIFF(date_part, start_date, end_date)	Calculates the difference between two dates in the specified date part units.
DATEPART(date_part, date)	Extracts a specified part (such as year, month, day, hour, etc.) from a date and returns the extracted value.
DATENAME(date_part, date)	Returns the name of a specified part (such as year, month, day, hour, etc.) from a date.
DAY(date)	Extracts the day of the month from a date.
MONTH(date)	Extracts the month from a date.

Date Function

Function	Description
YEAR(date)	Extracts the year from a date.
TODAY()	Returns the current date.
NOW()	Returns the current date and time.
DATEPARSE(format, string)	Converts a string to a date using the specified format.
DATESTR(date)	Converts a date to a string.
ISDATE(date)	Checks if a value is a valid date.
DATE_TRUNC(date_part, date)	Truncates a date to the specified date part, such as truncating a date to the start of the month or year.
MAKEDATE(year, month, day)	Constructs a date using the specified year, month, and day values.

Date Function

Function	Description
TIME(date)	Extracts the time portion from a date.
HOUR(datetime)	Extracts the hour from a datetime value.
MINUTE(datetime)	Extracts the minute from a datetime value.
SECOND(datetime)	Extracts the second from a datetime value.
DAYNAME(date)	Returns the name of the day of the week for a date.
WEEKDAY(date)	Returns the weekday index for a date, where Sunday is 0 and Saturday is 6.
QUARTER(date)	Extracts the quarter from a date.
EOMONTH(date, n)	Returns the last day of the month for a date, optionally adding or subtracting a specified number of months.

Pop Quiz

Q. In a project management dashboard, a DateDiff function query is used in Tableau to calculate the duration between the start date and end date of each project. What is the primary purpose of this DateDiff function query?

a. Changing the date format for visual presentation

b. Sorting the projects based on specific dates

c. Filtering the projects based on a specific duration

d. Calculating the duration of each project for analysis and tracking

Pop Quiz

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a. Changing the date format for visual presentation

b. Sorting the projects based on specific dates

c. Filtering the projects based on a specific duration

d. **Calculating the duration of each project for analysis and tracking**

Summary

- Delved into sorting, hierarchies, and groups to slice and dice data effectively.

- Learned the power of sets and filters to focus on specific data subsets.

- Created dynamic experiences with dependent filters and tooltip commands.

- Developed calculated fields with string, logical, and type conversion functions.

- Understood IF_ELSE and CASE_WHEN functions for conditional analysis.

- Acquired skills to manipulate, analyze, and visualize data for informed decision-making.

Activity

Pre-requisites: Familiarity with basic data manipulation in Tableau, understanding of calculated fields.

Scenario: You work for a retail company and want to analyze the sales performance of different product categories in specific regions. Additionally, you want to calculate a new metric that assesses profitability based on discounts and costs.

Expected Outcome:
A Tableau workbook with two worksheets:
- A visualization showing the sales performance of product categories in different regions.
- A visualization displaying the calculated profitability metric for each sale.

Activity

Steps:

1. Data Preparation: Load your sales data into Tableau, ensuring it includes columns for product categories, regions, sales amounts, discounts, and costs.

2. Worksheet 1 - Sales Performance:
   - Create a bar chart that displays sales amounts for product categories, with regions as columns.
   - Apply filters to focus on a specific time period or region.
   - Add sorting and color coding for clarity.

3. Worksheet 2 - Profitability Metric:
   - Create a calculated field that calculates profitability using the formula: (Sales Amount - (Discount + Cost)).
   - Build a scatter plot with profitability on the y-axis and sales amount on the x-axis.
   - Customize tooltips to display additional information.
   - Apply color shading to represent different product categories.

4. Dashboard Creation: Combine both worksheets into a dashboard, allowing for easy comparison and insights.

Next Session:
Advanced Calculations in Tableau

THANK YOU!

Please complete your assessments and review the self-learning content
for this session on the **PRISM** portal.

knowledgehut
upGrad

Advanced Calculations in Tableau

📄 Pre-requisites

Hope you have gone through the self-learning content for this session on the PRISM portal.

By the End of this Session, You Will:

- Demonstrate proficiency in executing quick table calculations for rapid insights.

- Utilize Level of Detail (LOD) expressions to perform precise analysis beyond standard aggregations.

- Apply fixed LOD expressions to isolate specific dimensions while maintaining context.

- Implement include LOD expressions to incorporate dimensions in calculations without affecting the view.

- Leverage exclude LOD expressions to exclude dimensions from calculations while preserving context.

- Harness parameters to empower interactive exploration and user-driven insights.

📄 Recap

Pop Quiz

Q. Groups in Tableau are used for _____.

a. Sorting data within a dimension

b. Combining multiple dimensions into a single dimension

c. Applying aggregate calculations to a dimension

d. Filtering data based on a dimension

Pop Quiz

Q. Groups in Tableau are used for _____.

a. Sorting data within a dimension

b. Combining multiple dimensions into a single dimension

c. Applying aggregate calculations to a dimension

d. Filtering data based on a dimension

Quick Table Calculation

Quick table calculations allow us to quickly apply a common table calculation to your visualization using the most typical settings for that.

 calculation type. This slide illustrates how to apply a quick table calculation to a visualization using an example.

The following quick table calculations are available in Tableau for you to use:

Function	Description
Running Total	Calculates a cumulative total or running sum.
Difference	Computes the difference between consecutive values in a field or table calculation.
Percent Difference	Calculates the percentage difference between consecutive values in a field or calculation.
Percent of Total	Computes the percentage of a value relative to the total value in a field or calculation.
Percentile	Calculates the percentile rank of a value in a field or calculation.
Rank	Assigns a rank to values in a field or calculation.
Percentile Rank	Computes the percentile rank of a value in a field or calculation.

Quick table Calculation

Function	Description
Running Total	Calculates a cumulative total or running sum.
Difference	Computes the difference between consecutive values in a field or table calculation.
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Rank	Assigns a rank to values in a field or calculation.
Percentile Rank	Computes the percentile rank of a value in a field or calculation.

Quick table Calculation

On the Marks card, right-click **SUM(Profit)** and select **Quick Table Calculation** > **Moving Average**

Poll Time

Q. In a sales dashboard, a quick table calculation is applied in Tableau to calculate the percent of total sales for each product category. Which quick table calculation function should be used for this calculation?

a. Percent Difference From

b. Running Total

c. Percent of Total

d. Moving Average

Poll Time

Q. In a sales dashboard, a quick table calculation is applied in Tableau to calculate the percent of total sales for each product category. Which quick table calculation function should be used for this calculation?
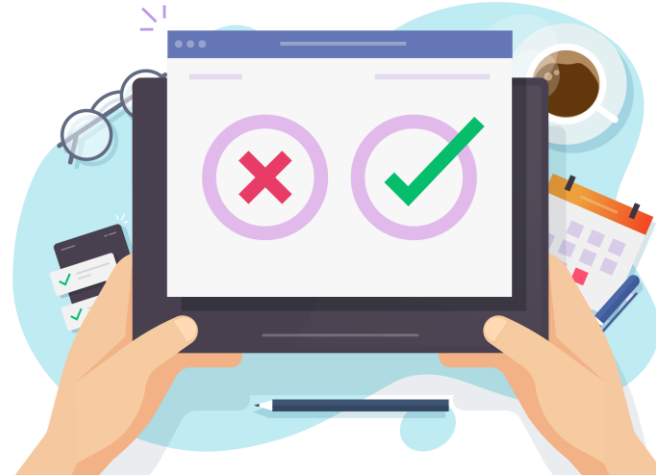
a.   Percent Difference From

b.   Running Total

c.   Percent of Total

d.   Moving Average

Level of Details (LOD)

Level of Detail (LOD) is a powerful concept in Tableau that allows you to control the granularity of data analysis and calculations independently of the visualization's level of detail. It enables you to perform calculations and aggregations at different levels within the same visualization, providing flexibility and precision in data analysis.

LOD expressions are used to create calculated fields that define the scope of data you want to consider in calculations. They provide three main types of expressions:

- **INCLUDE**: Focuses on specific dimensions while retaining context from other dimensions. It allows you to perform calculations for selected dimensions while considering all others.

- **EXCLUDE**: Ignores specific dimensions while retaining context from other dimensions. It enables you to calculate values for a specific dimension while disregarding others.

- **FIXED**: Locks the dimensions you want to analyze, ignoring the current view's filters. It's useful for creating context-independent calculations.

Include Level of Details (LOD)

- **Include Level of Detail (LOD)** expressions in Tableau enable calculations that include additional dimensions while preserving the current level of detail.

- They are denoted by the keyword "INCLUDE" followed by the dimensions within square brackets [ ].

- Include LOD expressions that are useful when you want to perform calculations at a higher level of detail while still considering specific dimensions.

- They allow for aggregating data from additional dimensions without affecting the current level of detail in the visualization.

- Include LOD expressions provide flexibility in calculations by incorporating additional dimensions while maintaining the desired level of detail.

Exclude Level of Details (LOD)

- **Exclude Level of Detail (LOD)** expressions in Tableau enable calculations that exclude specific dimensions while preserving the current level of detail.

- They are denoted by the keyword "EXCLUDE" followed by the dimensions within square brackets [ ].

- Exclude LOD expressions are useful when you want to perform calculations while excluding certain dimensions from the analysis.

- They allow for filtering out specific dimensions without affecting the current level of detail in the visualization.

- Exclude LOD expressions provide flexibility in calculations by excluding dimensions from the analysis while maintaining the desired level of detail.

Fixed Level of Details (LOD)

- **Fixed Level of Detail** (LOD) is a type of calculation in Tableau that allows you to create a context-independent measure by "fixing" the dimensions you want to analyze.

- Unlike other LOD expressions like INCLUDE and EXCLUDE, which respond to filters and dimensions in the visualization, the FIXED LOD calculation maintains a consistent reference point regardless of the view's context.

- A FIXED LOD calculation freezes the dimensions you specify, ensuring that the calculation remains constant and unaffected by changes in filters, dimensions, or other contextual factors.

- Fixed LOD calculations are valuable when you need to analyze data in isolation from the current view's dimensions or filters.

- They are particularly useful for creating reference lines, benchmark values, or consistent measures that remain constant across different perspectives.

Level of Details (LOD)
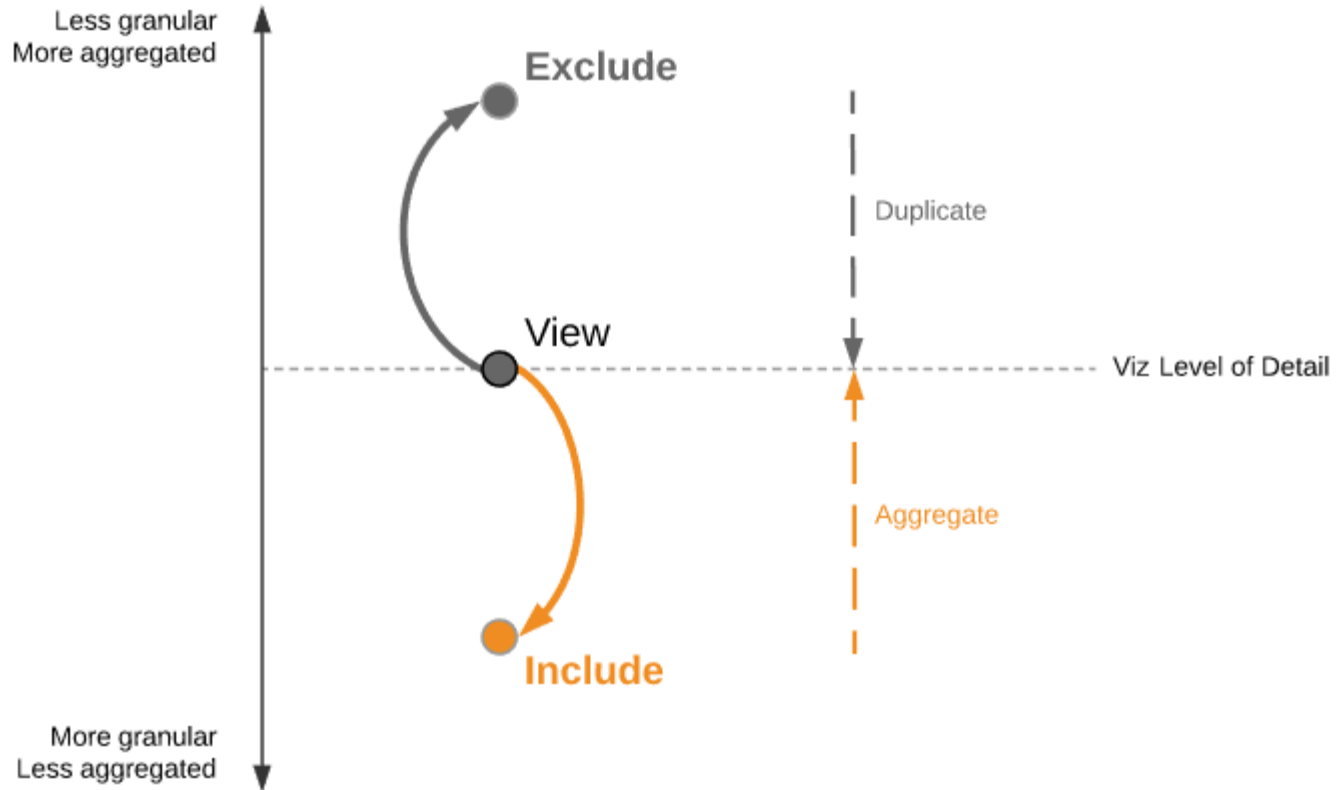
Pop Quiz

Q. Which LOD expression in Tableau would you use to calculate the average sales for each product category, regardless of any applied filters or dimensions?

a.   FIXED LOD expression

b.   INCLUDE LOD expression

c.   EXCLUDE LOD expression

d.   All of the listed

Pop Quiz

Q. Which LOD expression in Tableau would you use to calculate the average sales for each product category, regardless of any applied filters or dimensions?

a. **FIXED LOD expression**

b. INCLUDE LOD expression

c. EXCLUDE LOD expression

d. All of the listed

Parameters

- Parameters in Tableau are user-defined inputs for dynamic control.

- They act as placeholders for values that users can change.

- Parameters allow for interactive modification of values.

- They can be used in calculations, filters, and various parts of the workbook.

- Parameters enable the exploration of different scenarios and comparisons.

Parameters

- They work well with calculated fields for complex calculations.

- Parameters enhance interactivity in dashboards and reports.

- Tableau offers different parameter types for various data types.

- Parameters can be combined with actions and dynamic sets.

- Overall, parameters enhance flexibility and customization in Tableau visualizations.
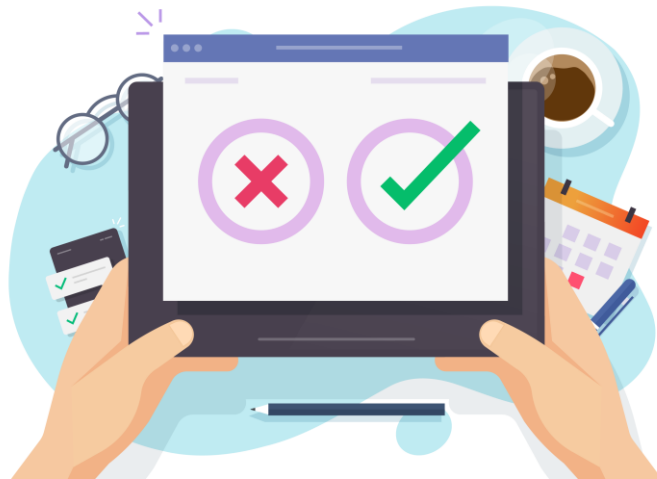
Parameters

Parameter Type	Description
Numeric parameters	User-defined inputs for numeric values.
String parameters	User-defined inputs for text values.
Date parameters	User-defined inputs for dates or date ranges.
Boolean parameters	User-defined inputs for toggling true/false options.
List parameters	User-defined inputs from predefined value lists.
Hierarchical parameters	User-defined inputs from hierarchical structures.
Bins parameters	User-defined inputs for data binning operations.
Aggregation parameters	User-defined inputs for adjusting aggregation levels.
Calculated parameters	User-defined inputs derived from calculations.
Tableau Server parameters	Parameters managed in Tableau Server for centralized control.

Poll Time

Q. Which type of Tableau parameter allows users to select a specific date range for analysis and filtering?

a. Numeric parameter

b. String parameter

c. Date parameter

d. Boolean parameter

Poll Time

Q. Which type of Tableau parameter allows users to select a specific date range for analysis and filtering?

a.   Numeric parameter

b.   String parameter

c.   **Date parameter**

d.   Boolean parameter

📄 Demo – Advanced Calculations in Tableau

Pop Quiz

Which type of IF statement in Tableau is used to handle null values and return an alternate value if the condition evaluates to null?

a. IF-THEN

b. IF-THEN-ELSE

c. IFNULL

d. ISNULL

Pop Quiz

Q. Which type of IF statement in Tableau is used to handle null values and return an alternate value if the condition evaluates to null?

a. IF-THEN

b. IF-THEN-ELSE

c. **IFNULL**

d. ISNULL

Summary

- Dived deep into advanced calculations and parameters in Tableau to elevate our data analysis skills.

- Applied calculations to visualizations for instant insights without complex formulas.

- Commanded Level of Detail (LOD) expressions, isolating dimensions for precise calculations.

- Discovered Fixed LOD calculations for consistent, context-independent measures.

- Harnessed Include and Exclude LOD calculations for targeted analysis, answering complex questions.

- Empowered users to customize visualizations dynamically using interactive parameters.

- Acquired advanced techniques to transform data into actionable insights, enhancing our visualization prowess.

Activity

Pre-requisites: Understanding of Fixed Level of Detail (LOD) calculations.

Scenario: You're analyzing employee performance data across different departments and regions. Your goal is to create a reference line that indicates the average performance score across all departments, unaffected by any filters or selections.

Expected Outcome: Users will create a visualization with a fixed reference line representing the overall average performance score.

Steps:

1. Calculate the average performance score for all departments using a Fixed LOD expression.
2. Add this fixed average as a reference line to a bar chart showcasing department-wise performance.
3. Apply filters and selections to the visualization and observe how the reference line remains constant, offering a consistent benchmark.
4. Create a dashboard that showcases both the original visualization and the one with the fixed reference line.
5. Explain the benefits of using Fixed LOD to ensure consistent measurement even with changing filters.

Session Feedback

Next Session:
Formatting in Tableau

THANK YOU!

Please complete your assessments and review the self-learning content for this session on the **PRISM** portal.

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