Geographic Maps & DAX

Proportional Symbol Map (PSM)

A thematic map that uses different size symbols to represent quantities. For example, if your data contains geographic data you can use PSM to quickly view the profitability of each country on a map by adding the geographical field and then adding a field such as Profit.

The following exercise shows you the profit in each country using different size bubbles.

Create a PSM

1. Open the file **Proportional.pbix** file.
2. Click **Build Visual**
3. Click Map  , visual appears on the canvas.
4. Expand the **Financials** table to expose the field listing.
5. Click **Country**,
    a. The field appears in the **Location Box**
    b. **Country Data** is displayed on the Visual
6. Click on the visual, the selection handles appear, **drag down to the right to expand**.
    a. Notice, the Blue Circles, indicates the countries in the dataset.
    b. Notice, the circles are the same size at this point.
7. Click **Sales**, sales data is added to the visual
    a. The Blue circles change size to indicate the proportion of sales for each country.
8. Hold the pointer over a **blue circle** to display the sales data.
9. Click **Save**
10. Take a **screenshot** of the map **showing the different** circle sizes.
11. Click **Close**.

Choropleth Maps

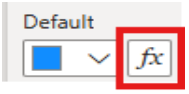
Allows you to represent various regions on the map as differently colored areas. Also referred to as filled maps, choropleth maps use different color shades to encode the information for defined areas, such as countries, provinces or states. They can be used to show the distribution of discrete categories, for example, the leading party per constitution in an election.

Create a Choropleth Map

1. Open the **Choropleth.pbix** file.
2. Click **Build Visual**
3. Click **Filled map**  , visual appears on the canvas.
4. Expand the **Financials** table to expose the field listing.
5. Click **Country**,

    a. **Country** field appears in the **location box**.
    b. **Country** data is displayed on the visual
6. Click the visual, the **selection handles** appear, **drag down to the right** to expand.
    a. Notice, the **Blue shaded areas** indicate countries in the dataset.
    b. Move the pointer over a shaded area to **display its name**.
7. Click **Save**
8. Take a **screenshot.**
9. Use this chart for the next exercise.

Add Conditional Formatting to a Choropleth Map

1. Click **Format Visual**
2. Click **Visual.**
3. Click **Fill colors**, to expand section.
4. Click **Conditional formatting** 

, the Default Color – **Fill colors dialog box** opens.
5. Set **Format Style to** "gradient"
6. Click **What field should we base this on?**
7. Click the **field you want to use**. Select **Profit.**
8. Click the **Minimum color** Swatch and then click the **color** to use for **minimum profit**.
9. Click **the Maximum color** swatch and then click the **color** to use **for maximum profit**.
10. Click **add middle color,** the center controls appear.
11. Click the **Center color** swatch and then click the **color** for the **middle scale**.
12. From the Financials table click the field **Profits** to add it to the **tooltips**
13. Click **Save**
14. Hover the cursor over a country, notice the profit.
    a. The countries in the dataset take on the colors to indicate their relative profitability.
15. Take a **screenshot.**
16. Click **Close.**

Isarithmic Maps

Also called **heat maps** can be used to display a range of quantities. Isorhythmic maps show data as a third **dimension on a map** and are useful for **mapping surface elevations** or for **weather** and **sales** data.

To create an isarithmic map, you must enable the **Azure Maps feature** or the **preview feature**. This unfortunately is not available in the current version of Power BI for Desktop.

Skyscraper maps

Also called a bar chart map or a bar chart on a map is typically used for **displaying geodata along values**. The Skyscraper map is a **combination** of a **map** with **locations** representing a city, a

country, or some geographical entity. As such the height and volume of the bars is proportional to the values they represent.

To create an isarithmic map, you must enable the **Azure Maps feature** or enable the preview feature. This unfortunately is not available in the current version of Power BI for Desktop.

Dax and Calculated Columns

What is Dax?

DAX (**Data Analytics Expressions**) is a suite of functions and operators used by Power BI. The first use of DAX was in Microsoft Excel for implementing formulars and functions. Even though DAX is very powerful if you are familiar with Excel formal creation and use, the transition to DAX is straightforward.

What can you do with DAX?

DAX enables you to perform calculations by using its functions and operations to **derive key values that your data sources do not provide directly**.

Dax enables you to create two types of calculated expressions.

- The first type is **calculated columns**.
- The second type is **calculated measures.**

What is a Calculated Column?

A **calculated column** is a column that contains a **calculated value**. A calculated column uses the **data already loaded into your data mode**l as opposed to drawing it from elsewhere. When you create a calculated column formular Power BI automatically **applies it to the entire table**, **evaluating the formular separately for each row**. Thus, the calculated column is computed at the **row level** within the table that contains it.

What is a Calculated Measure?

A calculated measure uses **an aggregation function** to calculate an **aggregate value** from **multiple rows** in a table. A calculated measure is a dynamic calculation formula whose results change depending on the context. Power BI **evaluates a measure** at the **cell level** rather than at the row level.

The SUM Function

In this exercise the **SUM function** will be used to create a **calculated measure**. The function is **not** useful for calculated columns because it simply returns the same number as the row number.

Add all Numbers in a Column

1. Open the **Add.pbix** file.
2. In the field pane, **right click** on the table you want to create the calculated measure. For this exercise use **Table 1**.
3. In the contextual menu, click **New Measure**
    a. Notice, the formular bar appears, showing the default text "**Measure= ”**
    b. The table expands.
    c. The **new measure** field appears in the table.
4. Type the measure name, **replacing** the default name "**Measure”** with **SumOfSales**.
5. **Type =** to start the DAX formula
6. Type **SUM (** ,
7. In the menu of tables and columns, click **'Table 1' [Sales].**
    a. Notice the information is added to the formula.
8. Type **)** to complete the DAX formula.
9. Click **Enter**, Power BI creates the **SumOfSales** measure as a new field in the table.
10. Click **Country**, a map visual of countries may be created.
11. Click **SumOfSales** to add it to the map visual.
12. Click **Table**, map is converted to a summarized table using the SumOfSales measure.
13. Click **Save**
14. Take a **screenshot** of the table.
15. **Use for next Exercise**.

Note: *To delete a measure simply,* ***Right click the measure****, from the drop-down menu, select* ***Delete from Model***

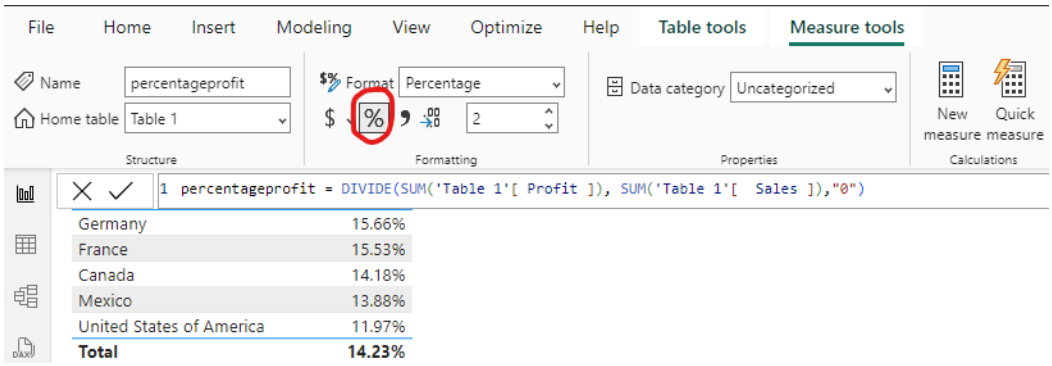
The DIVIDE Function

This function is used to perform mathematical division on your data. The DIVIDE function can automatically handle divide-by-zero or cases where the numerator or denominator is blank.

Perform Division

1. Click the plus sign next to "**Page 1**" at the bottom of the Report view.
2. Right click **Page 2** and rename it to **Divide**.
3. Right click the table you want to create the measure on. **Use Table 1**
4. Click New measure,
    a. Notice, the formular bar appears, showing the default text " **MEASURE** = ”
    b. The table expands.
    c. The new measure appears in the table.

5. Type the measure name, **PercentageProfit**.0
6. Type **=** to start the DAX formula
7. Type **DIVIDE** (**SUM** ('Table 1'[**Profit**]), **SUM** ('Table 1'**[Sales]**), "0") to complete the DAX formula.
8. Click **Enter**
9. Click **Country**, Country field is added to Default visual placeholder.
10. Click **PercentageProfit**, PrecentageProfit data added to default visual placeholder.
11. **Note** - If Visual is **NOT** a **Table**, then proceed to step 12, **ELSE** go to step **13**
12. Click **Table,**
    a. default visual is converted to a summarized table using the PercentageProfit measure.
    b. The measure appears in decimal format.
13. Click **PercentageProfit**,
    a. The **Measure Tools** contextual tab appears on the **ribbon.**
    b.



14. Click Percentage **(%)**, data is displayed in percentage format.
15. Click **Save**
16. Take a **screenshot**.
17. **Use in next exercise**.

IF evaluates a given expression and determines whether it is **true** or **false** returning a value for the respective condition. If functions can be **nested** within each other as needed to **create logical loops, conditional columns** and **measures** or **conditional formatting**.

The following exercise uses the **IF Function to create a Calculated Column**.

Check a Condition

1. Open another page.
2. Rename page to **Conditions**.
3. Right click **Table 1** in the fields pane.
4. Click **New Column**

    a. Notice, the formular bar appears, showing the default text "**Column =** "
    b. The table expands.
    c. The new Column appears in the table.
5. Type the column name **SumOfSalesForCanada**.
6. Type **=** to start the DAX formula
7. Type **IF**('**Table1**'[**Country**]=" **Canada**","**Table1**'[**Sales**], **0**) to complete the DAX formula.
8. Click **Enter**
    a. **SumOfSalesForCanada** calculated column is created.
9. Click **Country,** visual is created.
10. Click **SumOfSalesForCanada**, data is added to visual.
11. **Note** - If Visual is **NOT** a Table, then **proceed** to **step 12**, **ELSE** go to **step 13.**
12. Click **Table**,
    a. Summarized table with **SumOfSalesForCanada** calculated column is displayed.
13. Click **Save**
14. Take a **screenshot**.

Count the Number of Cells in a Column

1. Open another page.
2. Rename page to **CellCount**.
3. Right click **Table 1** in the fields pane.
4. Click **New Measure**,
    i. Notice, the formular bar appears, showing the default text " **MEASURE =** "
    ii. The table expands.
    iii. The new measure appears in the table.
5. Type the measure name, **CountOfCellsContainingData**.
6. Type **=** to start the DAX formula
7. Type COUNT('**Table1**'[**Country**]) to complete the DAX formula.
8. Click **Enter**
    a. **CountOfCellsContainingData** calculated measure is created.
9. Click **Country**, Country data is added to Default visual placeholder.
10. Click **CountOfCellsContainingData**, data added to default visual placeholder.
11. Click **Table**,
12. Click **Save**
13. Take a **screenshot**.
14. **Use in next exercise**.

Note: Other COUNT Functions

- **COUNTA** – counts number of rows in a given column that contains non-blank values.
- **COUNTAX** – same as above but including cells containing expressions that results in empty strings.

- **COUNTBLANK** – returns number of blank cells in a column.
- **COUNTROWS** – returns number of rows in a table.
- **COUNTX** – returns the number of rows containing non-blank values or expressions that evaluate to nonblank values.

Return the Average of All Numbers in a Column

1. Open a new page.
2. Rename the page, **Average**.
3. In the fields pane **right click Table1**
4. Click on **New Measure**
    a. Notice, the formular bar appears, showing the default text " **MEASURE =** "
    b. The table expands.
    c. The new measure appears in the table.
5. Type the measure name, **AverageManCost**.
6. Type **=** to start the DAX formula
7. Type **AVERAGE (** .
8. Click '**Table 1**'[**Manufacturing Price**].
9. Type **)** to complete the DAX formular
10. Click **Enter**
    a. **AverageManCost** calculated measure is created.
11. Click **Country**, Country data is added to Default visual placeholder.
12. Click **AverageManCost**, data added to default visual placeholder.
13. Click **Table**,
    a. default visual is converted to a summarized table using the AverageManCost measure.
    b. The measure appears in decimal format.
14. Click **Save**
15. Take a **screenshot**.

Join Two Text Strings into One Text String

1. Open a new page.
2. Rename the page, **Strings.**
3. In the fields pane **right click** the **Table1** table
4. Click **New Column**
    a. Notice, the formular bar appears, showing the default text **" Column =** "
    b. The table expands.
    c. The new measure appears in the table.
5. Type the column name, **Country_DiscountBand**
6. Type **=** to start the DAX formula

7. Type **CONCATENATE(‘Table1’[Country], ‘Table1’[DISCOUNT BAND])**) to complete the DAX formula.
8. Click Enter
    a. **Country_DiscountBand** calculated measure is created.
9. Click **Country**, Country data is added to Default visual placeholder.
10. Click **Discount Band**, data added to default visual placeholder.
11. Click **Table**,
    a. Click **Country_DiscountBand**
    b. default visual is converted to a summarized table using the **Country_DiscountBand** column.
12. Click **Save**
13. Take a **screenshot**.

Apply conditional Formatting.

1. Open a new page.
2. Rename the page, **ConditionalFormat**.
3. In the fields pane **right click** the **Table1** table
4. Click **New Column**
    a. Notice, the formular bar appears, showing the default text “ **Column =** ”
    b. The table expands.
    c. The new measure appears in the table.
5. Type the column name, **CountryColors**.
6. Type **=** to start the DAX formula
7. Press ***Shift* + *Enter*** twice to create two new lines.
    a. Each line is numbered for your reference.
8. Type **IF (‘** to start creating the DAX formula.
9. Click the ‘**Table 1’**[**Country**] item.
10. Type **=” Canada”, “#DAF7A6”,** to complete this line in the formular
11. Press ***Shift* + *Enter*** to create a new line.
12. Enter the remainder of the DAX formular on the multiple lines, pressing ***Shift* + *Enter*** to create each new line as follows:

    IF (‘Table 1’[Country]=” United States of America”, **“#FF9F33**”,

    IF (‘Table 1’[Country]=” Germany”, “**#FFFC33**”,

    IF (‘Table 1’[Country]=” France”, “**#99FF33**”,

    IF (‘Table 1’[Country]=” Mexico”, “**#33A8FF**”, BLANK ())))))

13. Click **Enter**
    a. Notice, **CountryColors** calculated column is created.
14. Click **Country**, visual using Country data is created.
15. Click **CountryColors**, CountryColors are added to the visual
16. Click **Table,** summarized table with CountryColors measure appears.

17. Click **Format Visual**
18. Click **Visual**
19. Click **cell elements**, expand this section.
20. Click the **Background Color** switch to **ON**.
    a. Background Color **dialog box opens.**
21. Click **Format style**, use **Field Value**.
22. Click **Apply** to note the options, then use **Values Only**.
23. Click **What field should we base this on?** The drop-down menu opens.
24. Click the field to use, in this case use **CountryColors.**
25. Click **Summarization**, then click First or Last as needed. Use **First**.
26. Click **OK**
    a. Notice the change in the **background color** of **Country Column**.
27. Click **Save**
28. Take a **screenshot**.
29. Click **Close**.