Tutorial 3

MIS561 Data Visualization, Semester 1, AY2022/2023

Overview

This tutorial is intended to introduce you to calculations in Tableau using a fictional university fundraising data set. In this session, you will accumulate skills in creating calculated fields and creating parameters for interactive visualization in Tableau.

The data set was generated randomly using multiple sources, including http://www.generatedata.com/, popular movie characters, typical university faculty names and random number generators. This data set was created specifically for purposes of visualizing using Tableau.

TASK 1: Familiarize Yourself with the Components of Creating Calculated Fields and Parameters in Tableau

Creating Calculated Fields

In Tableau you can create additional fields by defining a formula that derives the information you need from your data source fields and/or other functions and operators.

To create a calculated field, click on the dropdown arrow icon near the magnifying lens in the Dimensions window and select "Create Calculated Field..."

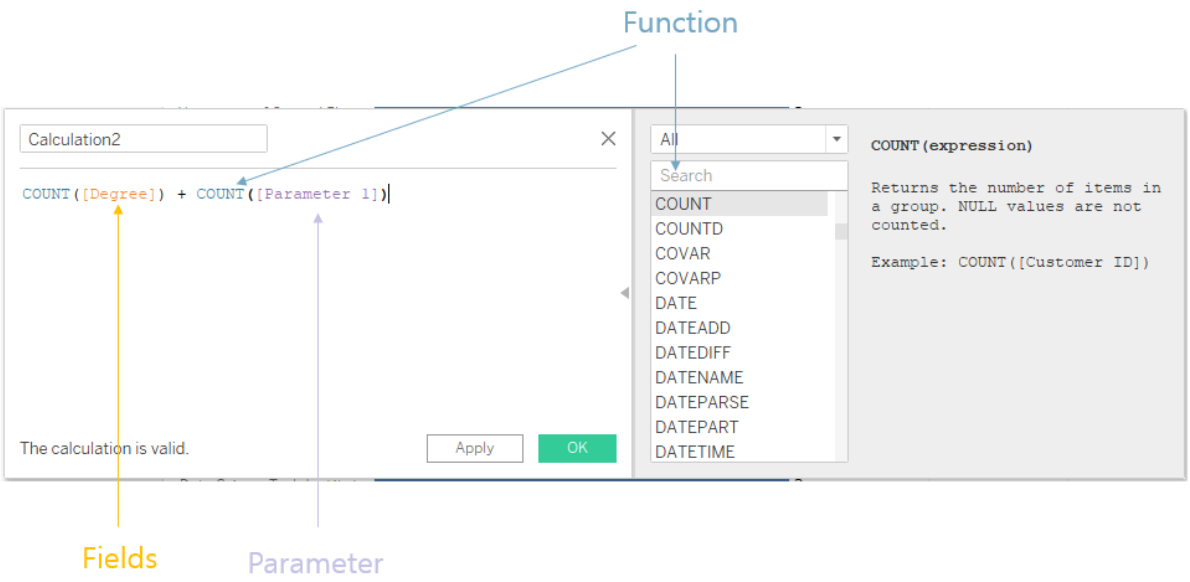
This brings up a calculated field dialog box. In this window, you can fill in the Name and Formula. In the Formula text area, you can include fields, parameters and functions.

- **Fields** are the columns available from your data sources. You can double click them to include them in your formula, or simply type the name in.

- **Parameters** are user-driven values. You can include your user's input in the formula, and allow users to change the input via a parameter control on a worksheet or dashboard.

- **Functions** provide specific functionalities and computations. Tableau has a library of functions that you can readily use. If you are unfamiliar with these, you can click on a function name and its name, syntax, and an example will show up in the right hand descriptions pane.

Example on the next page.



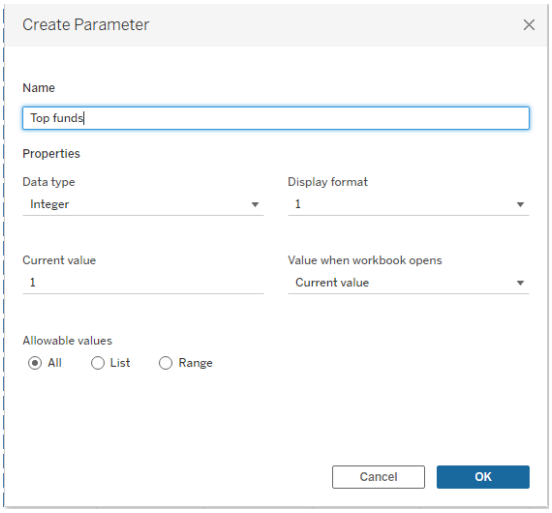
Creating Parameters

You can add interactivity and allow your users to interact with your worksheets and dashboards using parameters. Parameters are values that can change and drive other information in your views.

To create a parameter, click on the dropdown arrow icon near the magnifying lens in the Dimensions window and select "Create Parameter..."

This opens up a parameter dialog box. In this window, you can fill in the Name, Properties, and depending on the allowable values, a few more settings.

In the Formula text area, you can include fields, parameters and functions. The data types can be Integer, Float, String, Boolean, Date and Date & time. The display formats can be changed accordingly. You can also constrain the allowable values to a list, or a range.



TASK 2: Create a Visual – Which degrees donate the most to the university?

After familiarizing yourself with field and parameter creations, download the Tableau workbook from Slack: **Tutorial3_Calcuations in Tableau.twbx**.

Our university receives donations periodically from a variety of individuals. Our university's advancement officer is curious whether people with specific degrees pledge more money to the university than others, and how large the average donation from each degree is.

Follow the steps to create a visual for this question:

1. In the Dimensions window, change the data types for **Pledge Amount**, **Received Amount**, and **Writeoff Amount** from String (icon Abc) to Number (icon #)

   To do this, right click on each of these amount dimensions, select Change Data Type > Number

2. Drag these amount fields (**Pledge Amount**, **Received Amount** and **Writeoff Amount**) from the Dimensions window to the Measures window

3. Create a calculated field called **Average Pledge Amount**.

   In the formula, type:

   ```
   SUM([Pledge Amount])/SUM([Number of Records])
   ```

   Click OK when done. This field will appear under Measures

4. Drag **Degree** to Rows.

5. Drag **Average Pledge Amount** to Columns

6. Drag **Number of Records** to the Color shelf (This will help us see which degrees have more overall donations, in addition to the average pledge amount)

7. Edit the color legend by clicking on the bottom right side of the legend border

8. Choose the Blue Teal color palette

9. Click OK when done

TASK 3: Create a Visual – How are our funds performing?

The University raises money for different fund types. You want to show how these are performing through time. Fund Type information is included in the Fund Name field, and needs to be extracted.

Follow the steps to create a visual for this question:

1. Drag **Pledge Date** dimension to the Columns shelf. This automatically picks discrete YEAR(Pledge Date). Blue pills represent discrete elements, whereas green represent continuous ones

2. Drag **Pledge Amount** measure to the Rows shelf

3. Check the different types of fund currently embedded inside the **Fund Name** field. To see the current values of the Fund Name field, right click on Fund Name and select Describe > Load

   For example, *Muggle Studies - Scholarship* is the name of the fund, and the fund type is *Scholarship*

   Looking at the current data, there are three (3) types of funds in this data set - Scholarship, Bursary and Prize

   Close the window when you're done checking the values

4. Extract the **Fund Type** information by creating a calculated field called **Fund Type**.

   In the Formula, type:

   ```
   IF CONTAINS([Fund Name], "Scholarship")
   THEN "Scholarship"
   ELSEIF CONTAINS([Fund Name], "Bursary")
   THEN "Bursary"
   ELSE "Prize"
   END
   ```

   Click OK when done. Note this will show up in the Dimensions window

5. Drag the new **Fund Type** calculated measure field (icon has an equal sign) to the Color shelf

TASK 4: Create a Visual – Who are our major gift donors?

Donors who give more than $100,000 are considered by the University as major gift donors. You want to identify them and invite them to an event you and your colleagues are preparing as a thank you.

Follow the steps to create a visual for this question:

1. Create a calculated field called **Major Gift Donor?**

   In the Formula, type:

   ```
   IIF(
   SUM([Pledge Amount]) >= 100000,
   //if condition is true
   "Major Gift Donor",
   //otherwise
   "Regular Donor"
   )
   ```

   Click OK when done. Note this will show up in the Measures window

2. Double click on the following fields: **Student ID**, **Last Name**, **First Name** and **Pledge Amount**

   This produces a text table

3. Click on the Descending bars icon on the toolbar (right beside the paper clip)

4. Drag the new **Major Gift Donor?** calculated measure field (icon has an equal sign) to the Color shelf

TASK 5: Create a Visual – Are faculties meeting their goals?

Donations to university go to funds that belong to specific faculties. Donations go in as pledges. These pledges are fulfilled when money pledged has been received, meaning pledge has been fulfilled. Faculties need to track if they are meeting their fulfillment goals.

Follow the steps to create a visual for this question:

1. Create a calculated field called **% Fulfilled**. Use the following formula:

   ```
   SUM([Received Amount])/SUM([Pledge Amount])
   ```

   Click OK when done. Note this will show up in the Measures window.

2. Right click on this new **% Fulfilled** calculated field and select Default Properties > Number Format > Percentage. Choose zero (0) decimal places

3. Create a parameter called **Fulfillment % Goal**

   Data Type: Float
   Current Value: 0.9
   Display format: Percentage, no decimal places
   Allowable values: Range
   Minimum: 0.1
   Maximum: 1
   Step size: 0.05

   Click OK when done. Note this will show up in the Parameters window

4. Right click on **Fulfillment % Goal** parameter and select "Show Parameter." This displays as another card called Fulfillment % Goal, with a slider that can change the goal value. Make sure this is set at 90%

5. Create another calculated field called **Met Goal**. Use the following formula

   ```
   [% Fulfilled] >= [Fulfillment % Goal]
   ```

   Click OK when done. Note this will show up in the Measures window as a boolean (T/F)

6. Drag **Fund Faculty** dimension to the Rows shelf

7. Change the mark type in the Marks card to Shape

8. Drag the calculated measure field **Met Goal** to Shape

9. Change the shapes by clicking on the top right corner of the shape legend (with title AGG(Met Goal)) and choose Edit Shape

   In the Select Shape Palette, choose KPI
   In the Select Data Item, highlight True, and choose the green check icon from the palette
   In the Select Data Item, highlight False, and choose the red x icon from the palette
   Click OK when done

10. Try to change the **Fulfillment % Goal** in your parameter control. Slide the value back to 80%, and then slide it to 100% and see what happens to your view

TASK 6: Create a Visual – What are the top performing funds?

You want to give your fundraisers a way to visualize the top performing funds. You don't know how many funds they want to see, so you want to include a way for them to control how many top funds will show.

Follow the steps to create a visual for this question:

1. Drag the **Fund Name** dimension to the Rows shelf

2. Drag the calculated **Fund Type** dimension to the Rows shelf, to the right of **Fund Name**

3. Drag the **Pledge Amount** measure to the Columns shelf

4. Drag **Received Amount** to Color shelf

5. Click on the **Fund Name** pill on the Rows shelf and perform a descending sort.

6. Create a calculated field called **Rank** using the INDEX() function, which creates a sequential row number. Use the following formula:

   ```
   INDEX()
   ```

   Click OK when done. Note this will show up in the Measures window.

7. Create a parameter called **Top Funds**

   Data Type: Integer
   Current Value: 5
   Display format: Automatic
   Allowable values: All

   Click OK when done. Note this will show up in the Parameters window

8. Right click on **Top Funds** parameter and select "Show Parameter." This displays as another card called Top Funds, with a text field that you can type in

9. Create another calculated field called **In Top Funds**. Use the following formula:

   ```
   [Rank] <= [Top Funds]
   ```

   Click OK when done. Note this will show up in the Measures window

10. Drag **In Top Funds** calculated measure field to the Filters shelf. In the Select from list window, check True. Click OK when done

11. Try to change the **Top Funds** in your parameter control value from 5 to 10 and see what happens to your view

TASK 7: Upload your visual in Tableau Public and Post it in the Discussion Channel