Free Training Transcript: Introduction to LOD Expressions

Welcome to this introductory video on Level of Detail Expressions. You can download the Exercise workbook to follow along in your own copy of Tableau.

Level of Detail, or LOD Expressions, allow us to easily compute aggregations that are not at the level of detail of the view.

Average Profit

Let's say we want to see average profit per country. Here, we have a map colored by average profit, and we see that Argentina has an average profit of negative $48. But what does that actually mean? If we click to bring up the tooltip buttons, go to view data, and the full data tab, we see that more often than not there are multiple items in an order.

Now we understand what the map shows. The Average Profit shown for each country is the average profit of all the line items in that country, which is the granularity of the data set. But is that what we want? Wouldn't it be nice if we could find the average profit of all of the Orders within the Country, even when there are multiple line items in an order? In other words, can we aggregate up to the order level to compute the profit?

Using an LOD Expression

To find the average profit per order, two things need to happen: First, we must sum up the profit for each order ID. Then, we need to average all of those values for each country. First, we want to sum the profits per order. This is exactly where a Level of Detail Expression is useful. The expression looks like this: { INCLUDE [Order ID] : SUM([Profit]) }. That is, we want to roll up all the line items to their Order ID when we compute Sum of Profit.

We'll go over the syntax in more depth in a moment, just remember that this expression sums up the profit for each Order ID. Now we want to average those values for each country. We take care of that in the view itself. Bring Profit per Order ID to Color. And we need to change the aggregation to Average by clicking on the pill, going to Measure, and choosing average. We see that the average profit per Order in Argentina is negative $98, substantially different from the negative $48 we saw before. In fact, let's see the two calculations side by side.

Comparison of Average Profits

Here we see all countries. On the left is average profit of all line items within each country, like the first map. On the right is the average profit of all Orders within those countries, the LOD Expression from the second map. Both sets of blue bars show an average. But the averages have been calculated at different levels of detail. The level of detail on the left is

Country. The level of detail on the right is Country and Order ID. Notice that we have not added Order ID directly to the view. We wanted to know the Average profit per Order, by Country.

1. The LOD Expression itself gave us the Profit per Order

2. The Country field broke out those totals by country

3. And the Average aggregation on the pill averaged the values.

LOD Expression Syntax

Now that we've seen what LOD Expressions can do, let's take a moment to review the syntax. Right click on Profit per Order ID and click Edit to bring up the Calculation Editor again. LOD Expressions are enclosed in curly braces. The first piece inside the curly brace is a keyword, either FIXED, INCLUDE, or EXCLUDE. After the keyword, we enter dimensions that the keyword will act on. FIXED computes the value using the specified dimension without reference to any other dimensions in the view. INCLUDE computes the value using the specified dimension in addition to whatever other dimensions are in the view. In our example here, we included the Order ID, in the LOD expression, along with the dimension in the view (in our case, Country). The last keyword option is EXCLUDE, which will ignore the specified dimension even if it is used in the view. Next, enter a colon. This tells Tableau that we're done declaring the Level of Detail and are about to enter the aggregate expression. Finally, the aggregate expression itself – this is what we actually want the calculation to do, such as give us a MIN([Order Date]) or AVG([Discount]).

FIXED and INCLUDE

In our example with Average Profits per country, we could have used FIXED instead of INCLUDE if our Order IDs were unique worldwide. Because Order IDs in our data set are unique only per country, with some Order IDs used independently multiple countries, FIXED and INCLUDE will give different results in this setup. Why is that?

FIXED only cares about Order ID, therefore it sums profits from orders occurring in multiple countries. FIXED is going to count France's negative $8 order ending in 051 against Belgium's sum of profits because that Order ID was also present in Belgium, and FIXED only cares about the Order ID.

In contrast, INCLUDE looks at both Order ID (from the LOD expression) and Country (from the view), so it treats France and Belgium's versions of the 051 order as separate and only considers the value for Belgium when displaying the profit for Belgium. So this value, for INCLUDE, is higher by $8 than it is for FIXED.

If the Order IDs were globally unique, like the bars on the left, FIXED and INCLUDE would have the same results. To look at it another way, with Order IDs not globally unique, FIXED ignores the country dimension and takes the sum per order ID. INLCUDE breaks the Order down based on how the view is structured, therefore by country. If we add the two values for INCLUDE, we see they sum to the value given by FIXED.

Conclusion

Thank you for watching this Introduction to LOD Expressions video. We invite you to continue with the Free training to learn more about using Tableau.