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Sharing Power BI reports is critical, and one important aspect is readability. If you use background colors to represent specific categories, you need to make any text used in combination with that background as clear as possible. Note: Using only background colors to represent categories can make it difficult for people with color blindness to consume reports. Consider using background colors in combination with a written label (or icon) to make your report easier to use. Recently, I assigned a background color (defined as hexagonal triplets) to a value in a column in a matrix. I also wanted to impose text that showed the value for this particular cell. By default, you can select only one font color for a value for a specific field in tables/mats. However, conditional formatting allows you to specify a font color based on specific criteria. In general, the best option is black or white text, depending on the brightness of the background. But how can we dynamically calculate the best option for a given background color? With Ilmari Karonen's answer to this Graphic Design Stack Exchange question, I could formulate a good way to achieve this with DAX. Under no circumstances am I an expert in color theory, so please read Ilmari's response to read further in the logic of the code shown further in this blog. Here's the end result: Let's say I have the following table, which consists of several categories of the appropriate colors: Creating a table visualization and adding it to the canvas results in the following default formatting (at least with the default Power BI theme applied): alternating white and gray rows (that is, what you get in the Default style style for the table visualization. To apply conditional background formatting, we've come to the drop-down list in the Category box in the Visualization Fields pane, and then move to Conditional Formatting > Background Color according to the following: Clicking in this pane opens the conditional formatting context window. Because our data model defines our colors, we want to create conditional formatting rules using field values. Next, select the Color column in the Categories table. By selecting this and hitting OK, we can see our table with background colors according to their mappings in our data model: We can immediately notice some problems. We don't see a category 2 value because the background and font color are actually the same. Similarly, dark blue and purple background colors make it necessary to stretch to bring out the values in these cells. Ideally, we need cells to show white text, and some will show black, based on the corresponding background color. The magic of DAX is coming to achieve this. Let's go through each section: We select the current hexadecimal value for the background color for the current row. Because Three pairs of numbers representing red, green and blue color components, we need to divide each digit for each color. We do this using the MID function. Next, we translate this value into its decimal representation using the SWITCH function. Unfortunately, there is no support for custom DAX features, which is why there are many repetitions. Fortunately, Hex triplets have a fixed length - namely 6 digits - so we will never have more lines of code than the above (that is, unless the color is defined in abbreviated form, in which case additional handling would be necessary). We attribute gamma value as Ilmari Karonen's response to stack exchange post. First, calculate the RGB values as numbers from 0 to 255. Then, according to the post, normalize the values from 0 to 1. Apply luminance calculation according to the bar. This includes factors that are weighted in such a way that the Green component is of greater importance, for the reasons described in the Ilmari post. Note that we use DAX POWER to apply a gamma exponent to each number. Finally, apply the condition. If the luminance is greater than 0.5, return Black. Otherwise, return White. To apply this logic to the text in our table, we follow similar steps to the steps we took to apply background color. First, we've come to the drop-down list in the Category box in the Fields pane, and then we go to Conditional Formatting > Font Color according to the following: When you see the dialog box, you want to go back to the Field Value option in the Format After drop-down menu. This time, however, we have our logic defined as far as the column in our data model. However, conditional formatting is not important unless it is confirmed that the measure returns a value that matches the current operation (that is, the measure returns a color value). Choosing our measure and clicking OK, we finally get the result after which we were: So the logic in the middle determined that 7 of these background colors are dark enough to justify the white font, and 4 black font. But the most important thing is that all the values are now completely legible. Neat, right? By Scott Murray | Updated: 2019-12-17 | Comments (7) | Related: More issues > Power BI What's new in Power BI conditional formatting? Conditional solution formatting options were a highly desirable option in Power BI. In several early versions of Power BI, conditional formatting was not available in several feature categories. Fortunately, this has changed significantly as Power BI has continued to evolve over the past few years, and many options are now available, including rule-based dynamic formatting. In addition, the four main ways of conditional formatting is to either change the background color, change the font color, add an icon, or add a color data bar. In each of these areas, you have the opportunity to different color options as color gradients and upper and lower thresholds, which will be discussed in a few examples in this tip. Before we look at the examples, download the latest version of the Power BI desktop here. In addition, we will use the WideWorldImportersDW database as a basis for our data sources; this database can be downloaded from GitHub. If you need to refresh information about entering data into Power BI, see this guidance. Power BI sample project To help us get started, I created a simple Power BI report PBIX file and added a tab to the report. The tab contains a table, tab, and matrix, as shown in the next printout of the screen. Set up conditional formatting in Power BI First, we'll start visualizing the table and matrix because they have similar methods that can be used to apply conditional formatting with two large exceptions. Conditional formatting can be applied to any field in the table, but only to values or measure fields in the matrix (for table visualizations, all fields are values). Second, conditional formatting does not apply to subtotal or row/column totals. You can potentially work around the problem in the matrix by placing the field in a well-valued value, but it uses the aggregation function for nonnumeric fields (First or Last) to evaluate the formatting of a conditional expression. Starting with table visualization, there are two main ways to access conditional formatting options. First, as shown in the figure, you can click the down arrow next to the field name in the value area. Alternatively, you can add or change conditional formatting by going to the Format tab (paint brush), and then scrolling to and expand the conditional formatting properties. You can select a field in conditional formatting properties, and then select the type of formatting that you want to apply, such as background color, font color, and icons. Note that if the field selected from the list is not numeric (not a measure), the data bar option will not be displayed. However, as shown below, this option is displayed for fields that are considered a measure (numeric values). Conditional formatting of the Power BI color scale Let's start by changing the background color for the profit measure. To do this, select the arrow to the right of Profit from the visual well. Then select conditional formatting and background color. When you open the conditional formatting screen, the box in the upper-left corner contains three methods that format rules can be applied: 1) Color Scale 2) Rules 3) Field Value. Color scale options provide a continuous range of colors relative to the minimum (lowest to highest) set of values. A low-value color and a high-value color are selected with all color variations matched between the selected colors. Selecting Divergence provides the third color option for the middle or middle set of values. specify the actual minimum and maximum values (and the measure for the divergent option) as opposed to allowing Power BI to set a minimum minimum maximum values. Numbers outside the range will have the background color closest to the value (on the high or low page). Configure the color scale from gray to green to blue color scale, the background colors will then move from gray to bottom to blue at the top level. You can select colors from the color picking list, or you can select custom colors or enter a HEX code for the color (you can search for HEX codes here). Here's the final result of choosing conditional formatting. Note due to the dark nature of the background, the font color had to be changed to white to display the value of the profit measure. Other options that are available for correction include changing the summary calculations as shown below to include elements such as volatility, standard deviation, and mean. Finally, the default formatting option shows what coloring to apply when the value is empty or null. You can define this field as no color formatting, use the same color as 0, or finally use a specific color. Now we can move on to using the second Format after option, which is Rule-based Rules. While the color scale option lets you quickly create a set of color formatting, rule-based formatting lets you adjust color formatting to a much more detailed level. Using the same table, the following configuration shows how to use a rule-based configuration to define background colors for drawing. Thus, in this example, values between 0 and 1,000,000 will receive a red background, while colors between 1,000,001 and 5,000,000 will display a light green background. In the next illustration, you can see that the colored background is applied according to the rule. Note, however, how several Southeast profit values do not show a background color, as rules that you have entered do not apply to values above 5,000,000. Therefore, no formatting is applied; care should be taken to ensure that outliers are allocated to these situations if coloring is needed for all values. In this example, a very large value less than it can be input (for example, 200 million). The same problem would apply if the aggregated values existed below the lowest threshold (0 in the example above). Also note that this external value feature works differently between color scale and rule-based formatting. The second element to look out for is that if the aggregated value is within the bounds of two rules, the last rule will be applied. Notice in the following example that you have added a third row of rules to display a yellow background when the values are between 0 and 500,000. Therefore, values between 0 and 500,000 will display a yellow background color, as shown below, because this is the last rule that applies. To change the order of the application, arrows rules allow the report designer to move rules higher and lower in the rule list. Additionally, clicking x will delete this particular rule. For example, if you want to use the Use a text value to specify a color that can be achieved by changing the Based on field. however, the summary options will then only count and county (distinct). Move to the last format by the options that you want to use the field value. This process requires some preliminary work to implement, but it also provides the ability to use DAX or M to define the spectrum of colors to be used. The new column must be added to the dataset to reflect the desired color that will be used (or the color column can be defined in the database query!); thus, in the following illustration, a new column called ProfitColor is created, which is filled with a color value (a valid HTML color) based on what sales territory is associated with that amount of profit. For example, profits associated with New England sales territory will show a purple background. To achieve this result, we use the SWITCH and TRUE functions, as opposed to an embedded set of IF statements. Conditional formatting of Power BI field values Now that a color column is defined, we can configure the Format option by using the field value option. Use the Based on field option to select a newly created column named ProfitColor as the basis for the background color. The summary property allows you to select the first or last value. The resulting table shows a rainbow of colors, now based on the sales territory column in our dataset. Remove conditional formatting in Power BI At any time, you can remove the conditional formatting you applied by turning off the switch in the visualization formatting pane, or by going to Values Well and selecting the down arrow next to our field and selecting Remove Conditional Formatting. Power BI conditional formatting for font color Up to this point, the background color is focused, but we can apply the same processes to the conditional font color change. Each format by function works exactly the same with conditional formatting based on font colors, so we won't review each of these examples. Instead, the following example shows a single swatch with a color scale from green to red. For the result table, notice that the total row remains unchanged because conditional formatting does not apply to total rows or columns. Conditional formatting of data bars in Power BI Switching to conditional formatting of data bars contains only one method for defining the data bars that you want to display. An additional caveat is that data bars can only be displayed in measure fields; therefore, the value of profit in our example is a measure, so it works well. However, the sales area, region, and date are not measures and as such do not allow data bars. As shown below, positive data bars will be displayed as green while the axis will be displayed as and the negative data bars will be displayed in red (note I had to create a new profit column to generate some negative profit values). The results are quite deep as they quickly show how each sale compared to other territories, and also proficiency shows which regions are negative. Additional options that can be useful in data bars include displaying only data bars, no numbers, and the ability to switch from left to right to right to left, just like a funnel chart. Finally, you can change the minimum and maximum values to use raw values rather than the highest and lowest values; Nevertheless, I would not recommend changing these options, as it is easy to create a situation where no data bars will be displayed because the base value is outside the specified input range. Icon-based conditional formatting in Power BI The last method of conditional formatting we'll discuss in this tip refers to the use of icons. For conditional icon formatting, there are two Format by option options, one by rule (similar to the rule-based method shown in the background colors section) and one by field. Starting with a rule-based method, a similar selection of summary options is available, such as average, standard deviation, and variability. In addition, you can set the position of the icon relative to the measure value to the left or right of the measure value, or you can select only an icon that does not display the measure value at all. Icon alignment determines whether the icon is placed vertically at the top, middle, or bottom of the field where the value is located (especially important when wrapping text). The Style option contains many pre-filled icon sets that can be useful to quickly get a set of 3 different icon values. When you go to actual rules, the default options create a set of 3 rules based on the percentage of total. The percentage automatically calculates based on the values of the measures (Profit_Negative in our example). The percent option allows you to change the summary value without having to change the raw numbers that contain the values. Still, often people would like to show negative numbers with a red flag or circle and positive numbers with a green flag or circle. In this way, you can easily change the percentage to a number, and then set the range to a very small negative number to less than 0; positive numbers would then be between 0 and a very large number. As with rule-based configurations for background colors and fonts, be especially careful when defining these ranges so that you do not exclude an outlier value. Similarly, if two rules apply to a value, the icon that will be displayed will be the icon associated with the last rule in the list. The results for the above icon-based rule set are shown below. If you want to add additional icons, you can do so as part of a theme that you design and import from an external source. You can review the process of importing themes at this end. Additionally, icons can be referenced from a field. This field must indicate types of icon, gif, jpeg, or svg image files, which are then displayed based on the information in the field. Field Field must tell Power BI where to find the icon you want to display. In the following example, again using the sales area column and the new calculated column, Power BI looks for xml and W3 specifications to draw the shape of the rectangle (we actually draw the square because the height and width are the same). Then each rectangle is filled with a different color based on the sales area. Of course, this example uses a calculated DAX column, but similar data values can be designed in the source (query) that populates the dataset. The above graphical specifications allow for a uniform graphical icon of a single source, which can be adjusted according to the color; please see these links about using svg files in Power BI: and the other site helped me get the svg syntax correct! Similarly, you can also point to an online GIF (make sure Power BI can access any of these files or a website); gif files can also be animated. Matrix-based conditional formatting in Power BI Up to this point, all examples have used table visualizations. However, all the same conditional formatting options can be applied to the matrix. The results of formatting the conditional matrix profit value are displayed on the next printout of the screen. Keep in mind, however, that only those fields in well-valued values, or measures, can be conditionally formatted. Moving on to conditional formatting for tab visualizations, we can see that this visualization uses a different path. When you select a visual card, go to the Format tab (ink brush tab), and then conditional formatting options may be available in any of the following locations (note that these locations are available in most visualization types, not just for the tab): Background title of the data label category In the following example, the data label changes from green to blue to red based on the profit field. The results of this conditional form rule are shown below. The data label is changed to red. Also note that conditional formatting works with power bi selection and highlighting. When you select one of the regions in the matrix visualization, shown later, the card visualization is filtered only to the Great Lakes sales area, and the card data label changes to blue accordingly. Of course, this feature works in all different conditional formatting methods. As we saw in this tip, conditional formatting in Power BI is really a Power feature that offers great flexibility and functionality. Its richest application is in the table, but other visualizations also use significant conditional formatting features. Do you want to perform conditional formatting data in the chart? Rahul Mehta shows you how to complete this process at the end of dynamic Power BI conditional formatting. Next steps Download power bi PBIX file All MSSQLTips.com power bi last last guidelines 2019-12-17 2019-12-17

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