Course Overview

Course Overview

Hi everyone! My name is Adam Crahen, and welcome to my course, Tableau Desktop Specialist ‑ Understanding Dimensions vs. Measures and Discrete vs. Continuous. I am the Director of Analytics Practices and Enablement here at Pluralsight, and I am also a former Tableau Zen Master. Tableau is an industry‑leading data visualization tool, and this course is part of our path to the Tableau Desktop Specialist certification. In this course, you will learn how to know what Tableau will draw on the canvas before you even drag and drop. Some of the major topics we will cover include understanding data roles in Tableau, learning about discrete versus continuous filters and color legends, and finally, we will explore all of these concepts with several demos. By the end of this course, you will have the skills and knowledge to know what Tableau will draw on your canvas. Before beginning the course, you should be familiar with Tableau Desktop's primary purpose, have a general knowledge of navigating through the tool, and know how to connect to your data. From here, you should feel comfortable diving into Tableau with courses on Understanding Aggregations, Tableau Desktop Playbook: Building Common Chart Types, and Manipulating Data in Tableau. I hope you'll join me on this journey to prepare for the Tableau Desktop Specialist certification exam with the Tableau Desktop Specialist ‑ Understanding Dimensions vs. Measures and Discrete vs. Continuous course, at Pluralsight.

Dimensions vs. Measures & Discrete vs. Continuous

Overview

Welcome to my course, Tableau Desktop Specialist ‑ Understanding Dimensions vs. Measures and Discrete vs. Continuous. My name is Adam Crahen, and I am the Director of Analytics, Practices, and Enablement here at Pluralsight, and I'm a former Tableau Zen Master. Each year Tableau selects about 30 people in the world that are masters, teachers, and collaborators with their tool, and they give them the title of Zen Master. You can follow me on Twitter @acrahen. This course is part of the Tableau desktop specialist certification path authored by my wife and two‑time Tableau Zen Master Pooja Gandhi and myself. These short courses will give you all the skills and knowledge you need to pass the certification and continue along on your data journey. In this course, Understanding Dimensions vs. Measures and Discrete vs. Continuous, we will explore data field roles to better understand what Tableau will draw on the canvas, date parts versus date values, discrete versus continuous filters, discrete versus continuous legends, and then we will walk through several demos. For this course, it would be helpful if you already have some familiarity with the Tableau Desktop interface. The courses in this path build on each other so you may want to watch my course, Tableau Desktop Specialist ‑ Creating and Modifying a Dashboard. I will be using Tableau Desktop 2021.1 in this course. If you are on an older version of Tableau, the content of this course is still applicable; you might just not have all the new and available features. And finally, please download the exercise files so you have all of the files used throughout this course at your fingertips.

Data Field Roles

In this clip we will talk about data field roles. Let's start with some definitions. Dimensions contain qualitative values such as names, dates, or geographical data. On the other hand, measures contain numeric quantitative values that you can measure. So let's differentiate dimensions and measures on this slide. Once again, dimensions contain qualitative values. You can use dimensions to categorize, segment, and reveal details in your data. Adding a dimension to a view will change the level of detail, while measures contain quantitative values and can be aggregated across rows. Some examples of aggregations are sum, average, min, and max. In this photo we can see the Data pane from the sample Superstore dataset. When we connect to a data source, Tableau analyzes your data source and assigns each data field to the dimensions area or the measures area of the Data pane, depending on the type of data the field contains. In the photo on the left, we can see all of the fields from the Orders table that we connected to. And notice the slight horizontal lines separating our data fields. Tableau identified that the fields above the horizontal line contain qualitative data and assigned them to the dimensions area. Tableau also identified that the fields below the horizontal line contain quantitative data and assigned them to measures. Old versions of Tableau Desktop clearly labeled the dimensions and measures area in the Data pane. I believe the labels were removed in version 2021 to more easily organize the Data pane because it is now possible to have multiple sources at different levels of detail, thanks to the new logical layer of the data model. In my opinion, the concept of data roles in Tableau is one of the most important foundational concepts to understand. This concept defines what Tableau will draw on the canvas as we drag and drop. There are two roles in Tableau, discrete and continuous, and these are mathematical terms. Discrete means individually separate and distinct, while continuous means forming an unbroken whole without interruption. Let's dive into each of these in more detail. In Tableau, discrete fields are represented as blue pills. Tableau treats discrete values as finite. When we drag a discrete pill to our Column or Row shelf, Tableau will add headers to the view. Here is an example showing a discrete dimension with values 1 through 10 on the Columns shelf. Each member of this dimension has its own header. We can draw borders between all the values because headers create panes for each member. We can see Tableau drew our marks within the pane of each header. And in Tableau, continuous fields are represented as green pills. Tableau treats continuous values as having an infinite range. When we drag a continuous pill onto our Columns shelf, Tableau will add an axis or axes to the view. Here is an example showing a continuous dimension with values 1 through 10 on the Columns shelf. Notice that Tableau drew an axis and plotted our marks along the axis. Tableau automatically adds padding on the axis, as we can see by the presence of 0 and 11 on the axis. This view results in a single pane, and we cannot draw borders between all of the values. If you take anything away from this course, remember that blue pills are discrete, and green pills are continuous. As you can see here, Product Name and Year(Order Date) are dimensions. Yet Product Name is discrete and will create headers in a view, while our Year(Order Date) is continuous and could be plotted on an axis. And on the flip side, while the SUM(Sales) is obviously a measure, the SUM(Sales) pill could either be discrete and used as a header or continuous and plotted on an axis. The key to understanding what Tableau is going to draw is to understand the difference between discrete and continuous pills. Once again, discrete pills draw headers, and continuous pills draw axes.

Date Parts vs. Date Values

In this clip, we will learn about date parts and date values. Date parts are part of a date like the day, month or year, and the value of a date part can be numeric or a string data type. Here are the date parts of December 31, 2021 with a timestamp of 15:23:57. The parts of this date and their values are shown below. For example, the month date part would produce either a numeric value of 12 or the string value of December. The weekday date part would produce either a numeric value of 6 or the string value of Friday. One thing to note here is that the ISO date parts use the ISO 8601 standard, which always starts a week with a Monday. Notice how the ISO week date part returns week 52 while the Gregorian calendar that Tableau defaults to would produce week 53. Let's talk about date parts and their data roles. All of the date parts we just saw are dimensions and could either be used in a Tableau view as discrete or continuous pills. When we use a discrete data part like the year of date, Tableau will draw a header as shown on the left. And when we use a continuous date part like the year of date, Tableau will draw an axis as shown on the right. When you use a date part in Tableau, it automatically uses the DATEPART function. Date values return an actual date that is truncated to a specific level. Here is an example that shows the date values of our same December timestamp. Date values always return an actual date that is truncated to the start of a selected period. For example, the month date value would produce December 1st with a 12 AM timestamp. The quarter date value would produce October 1st with a 12 AM timestamp. And if we truncate to the hour, our value would be December 31st with a 3 PM timestamp. Now let's talk about date values and their data roles. All of the date values we just saw are also dimensions and could either be used in Tableau as discrete or continuous pills. When we use a discrete date value like the year of order date, Tableau will draw a header, as shown on the left, and when we use a continuous date value, like the year of order date, Tableau will draw an axis as shown on the right. When you use a date value in Tableau, it automatically uses a DATETRUNC function. Remember that date parts return part of a date as a numeric or string data type while date values return an actual date truncated to a specific level, and they can either be discrete or continuous.

Discrete vs. Continuous Filters

In this clip, we will talk about discrete versus continuous filters. In this example, we are looking at a discrete dimension filter. The Category field was added to the filter shelf in Tableau. You can see the discrete values of the category field available in the list. Deselecting a member will remove all of those rows from the view. Usually, these filters will utilize a select from list interaction if you have just a few members or a drop‑down interaction if you have a lot of members. These drop‑downs can be configured to be single or multi‑select. It is possible to use a slider, but that is a little wonky unless the members of your dimension are ordered like a year. In this example, we are looking at a continuous measure filter. When you drag a continuous measure filter to the filter shelf, you can select an aggregation like sum or average. In this case, Tableau will aggregate all rows for each mark, and this filter will filter all rows based on the aggregated value. Or you could select to use all values, and Tableau will filter based on the row value, and this is essentially a continuous dimension filter. Once we've made our selection, notice how this filter differs from the discrete filter. We can filter values based on a range, at least value, at most value or special values like nulls or non‑nulls, and all of these filters would have a slider for users to interact with your data. Date filters can be either discrete or continuous. When you drag a date to the filter shelf in Tableau, you are prompted to make a selection on the type of filter you want. In this example, we are looking at a discrete date filter. I selected the discrete month and year date parts. This filter acts like the discrete dimension filter where you can see the discrete values of the field available in the list. Deselecting a member will remove all of those rows from the view, and you could configure the filter to display as a select from list, A single or multi‑select drop‑down, or it may make sense to use a slider since dates are ordered. On the other hand, if we selected range of dates when we dragged the date to the filter shelf in Tableau, Tableau will use all values of the date field and will filter based on the row value. This is now a continuous dimension filter. We can filter values based on a range, a starting date, an ending date or special values like nulls or non‑nulls. All of these filters would have a slider for users to interact with your data, and you can click on each slider value to open a calendar to make date selections easier. And we have another option for dates when we drag them to the filter shelf. You could select a relative date filter. Tableau will filter date values based on an anchor date. The anchor date defaults to today, but can be hard coded to a specific date. We have many options here where we could filter by the last or next N years, quarters, months, weeks or days compared to our anchor date or even presets like yesterday, today or tomorrow. The key to understanding what Tableau is going to filter and how the filter interaction will be configured is based on understanding the data role of the pill on the filter shelf.

Discrete vs. Continuous Color Legends

In this clip, we will talk about discrete versus continuous color legends. In this example, we are looking at a discrete color legend and the category field was added to color on our Marks card. You can see how each member of the dimension has been assigned a discrete color from the selected palette. When you're selecting your colors, you can choose from many palettes, but all of these will have a finite selection of colors. You can also add new palettes by modifying the preferences.tps file. And in this example, we are now looking at a continuous color legend. The Order ID field is on our level of detail in our view and the view is colored by sum of sales. Tableau will color each mark in the view by the aggregated value from the sum of sales across the range of values in our view. This view ranges from orders with $1 in sales to $23,661 in sales. You can use the stepped color option to create a discrete number of color shades, this would bucket data into those colors based on a linear division of the range values. You can also reverse the color palette, in this case, so the range would be colored from dark to light, instead of light to dark if you choose, and you can specify the start, center, and end of the value range. For example, instead of having our legend show 1 to 23,661, we may want our legend to start at $0 and go to 25,000. When you're selecting your colors, you can choose from many palettes and all of these palettes have an infinite selection of colors along the continuous range. And you can also add new palettes by modifying the preferences.tps file. The key to understanding how Tableau is going to color marks in a view is based on understanding the data role of the pill on the Marks card. In the next module, we will jump into Tableau and explore these concepts.

Tableau in Action

Demo: Drawing Headers (Blue) and Axes (Green)

Hi. This is Adam Crahen, and in this module, Tableau in Action, we are going to put the concepts of discrete and continuous to work to see what Tableau draws, filters, and colors as we drag and drop. In this demo, we will be drawing headers and axes. Here we are in Tableau, and I have opened the discrete versus continuous workbook from the course materials. This workbook is connected to an extract of the sample superstore dataset that ships with every version of Tableau. In this example, we are going to drag some pills onto the canvas and see what Tableau draws for us. First, let's set our view to Entire View. In the Data pane, notice where subcategory sits in our field list. Subcategory sits in our product hierarchy, it has a string data type as we can see from the abc icon next to the field name, and it is above the horizontal line, meaning it is in the dimensions area, double‑click on the pill to add it to the row shelf. Tableau has assigned subcategory with a discreet dimension data role. Notice that we now have 17 rows of data and Tableau has drawn a header or pane of data for each member of this field. In the Data pane, notice where sales sits in our field list. Sales has a numeric data type and we can see that from the number icon next to the field name. If we click on that icon, we can see that it is a numeric decimal data type to be more specific. It is below the horizontal line, meaning that it is in the Measures area. In fact, if we click and drag sales up a little bit in the Data pane, you can see that Tableau has some hidden labels for the Dimensions and Measures area. If Tableau assigns the field to the wrong area, you can simply drag it into the dimensions or measures area and drop it. Now, sales is a numeric dimension. Click on the drop‑down of the sales field. If Tableau assigns a field wrong, you can select Convert to Continuous if you want to draw an axis or Convert to Measure to organize the fields in the correct area. Click on Convert to Measure and sales will return to our Measure area. Drag the sales pill to the column shelf. Tableau has assigned sales with a continuous measured data role. We can see that Tableau has aggregated our sales field using the sum aggregation and has also drawn our sales X axis and rendered a bar from 0 to the sum of sales amount for each subcategory. We can use the data role to control what Tableau is drawing. Let's pretend that our requirement was to show the sum of profit for each subcategory next to the name. Drag profit onto the Marks card. Tableau has assigned profit with a continuous measure data role. We can see that Tableau has aggregated our profit field using the sum aggregation. If we drag this pill to the row shelf, Tableau will draw a Y axis for profit and change our view into a scatter plot. Let's click on Undo, and if we click on the drop‑down field of the Profit pill on the Marks card and we select discrete, notice that our pill has changed to blue. Drag the pill over to the row shelf, and now, Tableau has created an additional header for our sum of profit value. We were able to tell Tableau exactly what we wanted it to draw by changing between discrete and continuous.

Demo: Date Parts vs. Date Values

In this demo, we will explore date parts and date values. Here we are in Tableau, and I have opened the discrete versus continuous workbook from the course materials. This workbook is connected to an extract of the sample superstore dataset that ships with every version of Tableau. In this example, we are going to drag some pills onto the canvas and see what Tableau draws for us. From the Data pane option, drag Order Date to the Columns shelf. You can also use right‑click and drag on a PC. This will open the Drop Field's dialog. From this window, we can select the data role for our Order Date field. The top section will produce the continuous or discrete values of the Order Date. The next section contains our date parts that return a numeric or string value, followed by the next section that contains aggregations on the field like CNT, CNTD, MIN, and MAX, and the next section are our date values, which return a truncated date. And finally, you can select an (ATTR)Order Date, which will always produce a single value. Click on the MONTH(Order Date) date part. Date parts return part of a date. On the canvas, we have our month names listed. Now don't let this fool you, though. We still have many years of data in this view. From the Data pane, if we drag Order Date to the Rows shelf and then double‑click on Sales to add it to Label on the Marks card, now you can see how the data has been broken down by month name for the four years of data in the view. Let's change this view up slightly. Click on the YEAR pill and hold down Shift, and click on the Sales pill to highlight both pills. Right‑click on Sales again and select Swap. Click on the icon next to YEAR on the Marks card and change it to Color. Now we have a year over year line chart. Our discrete dimension date part of month has created headers at the bottom of the screen for each month. If I click on January, notice that the January points of each line are highlighted because clicking on a header will highlight all marks in a data pane. This view allows us to directly compare years for each month with the lines plotted on top of each other. Now, if we click on the month of Order Date pill on the Columns shelf, change the pill to compute the month of Order Date value, which will truncate the dates. Notice how our four lines are now all on the same axis because we now have a continuous pill on the Columns shelf. The lines are no longer on top of each other because they are plotted on an actual date. We have four discrete lines because our YEAR dimension is still on the Marks card. If we drag it off, the lines will all connect along our continuous axis. If we click on the month of Order Date field again and change the date value to Discrete, notice that Tableau has once again drawn headers for us instead of an axis. Because our date value is a truncated date, we have a mark for each month and year combination, which is different from our month date part that returned just the month name. Understanding date parts versus date values and discrete versus continuous is essential to building the right view for your analysis over time.

Demo: Discrete vs. Continuous Filters

In this demo, we will explore discrete and continuous filters. Here we are in Tableau, and I have opened the discrete versus continuous workbook from the course materials. This workbook is connected to an extract of the Sample ‑ Superstore dataset that ships with every version of Tableau, and I have the Filters tab open. In this example, we are going to filter our view that is displaying sales by month. Our view is using two continuous pills. We have a continuous dimension, month of order date on columns, drawing our X‑axis, and we have a continuous measure aggregating the sum of sales on the Y‑axis. From the Data pane, drag Sub‑Category to the Filter shelf. Tableau will show us the list of members of the field in the filter. Let's select all members and click. Ok. Tableau has added a discrete dimension filter to the Filter shelf for Sub‑Category. Click on the pill, and Select Show Filter. On the right side of the screen, our filter list has appeared, and this is a multi‑select list filter. For example, if we uncheck All, we could select Accessories, Appliances, and Art. And our line chart is now only showing monthly sales for all of the rows that contained those three values for Sub‑Category. Let's check the All box so all of our rows will return to our view. In the bottom left‑hand corner, we can see that we have 48 marks in our view. What if we were interested in the months that had a profit of at least $5,000? Drag profit to the Filter shelf, and in the dialog that appears, we need to make a selection of All values or Aggregation. Let's select Sum. Now this is a continuous measure filter. We want to see a view that only contains months where the profit was greater than $5,000. Select the At least option, and notice that we cannot change the value for the right side of our slider. We can change the starting point to $5,000, and then we can click on OK. We now only have 24 marks in our view. This filter removed marks where the underlying data did not total $5,000. Click on the drop‑down of the profit filter and select Show Filter. We now have a slider interaction that we can use to change the value that is injected into our filter. Let's drag the slider all the way to the left and bring all of our data back into the view. Let's add one more filter to this view for our dates. From the Data pane, option‑drag the Order Date field to the Filter shelf. A dialog will appear, and Tableau wants us to select a Relative Date filter, a Range of Dates filter, or a date part. I am going to select a range of dates. I'm going to click OK, which will keep all of the dates in our view. If we click on the Order Date filter drop‑down and select Show Filter, we now have a slider for Order Date on the right side of the screen. We could slide the values on either end of the slider to filter the data, or we could even click on the date shown on the card to open a calendar to make date selections easier. Filtering options in Tableau depend on the data role of the pills on the filter shelf.

Demo: Discrete vs. Continuous Color Legends

In this demo, we will explore discrete and continuous color legends. Here we are in Tableau, and I've opened the discrete versus continuous workbook from the course materials. This workbook is connected to an extract of the sample superstore dataset that ships with every version of Tableau, and I have the Color Legends tab open. In this example, we are going to color our marks using a discrete and continuous color palette. On the canvas, we have a simple bar chart that is showing us subcategory sales in descending order. We want to add context to our view using the color preattentive attribute. Let's drag category onto color on the marks card, and on the right side of our screen, our category color legend has appeared and now along with our ranking by subcategory, we can immediately see which categories each subcategory belong to. Phones is in the technology category and office supplies has the bottom six subcategories ranked by sales. If we double‑click on one of the colors in the legend, Tableau will open the legend and we can select our palette from the drop‑down. Because the category pill is a discrete dimension, Tableau colors the members using a finite number of colors in each pallet. Now click on OK. This is useful, but what if we wanted to know which subcategory was the most profitable. From the Data pane, drag Profit onto the marks card and drop it right on top of category on the marks card. Our new color legend has appeared on the right side of the screen. This legend is coloring the marks along a continuous range from negative $18,000 to approximately $55,000 on a diverging color palette. If we double‑click on the legend, notice the options are different for the continuous color legend. You could use a stepped color which would bucket values into a discrete number of colors or we could reverse the legend, so blue is bad and orange is good, or you can click on the full color range option to use a darker orange instead of the lighter shade used by the legend. And there are advanced options where you can hardcode the start, center, and end of the continuous range on the legend. Now let's click on OK. On this view, we have a very different story. We can see that while phones had the largest sales, that copiers is actually the most profitable subcategory. Tables had the fourth most sales, but it is by far the least profitable subcategory. Make sure to use color smartly. If you have more than four or five dimension members, you should think about coloring your chart using a continuous legend.

Summary

To wrap up this course on Understanding Dimensions vs. Measures and Discrete vs. Continuous, we learned about data field roles to better understand what Tableau will draw on the canvas, the difference between date parts and date values, discrete versus continuous filters, discrete versus continuous legends, and then we walked through several demos of each. Some things to remember from this course are that dimensions contain qualitative values while measures contain quantitative values. Discrete pills draw headers and continuous pills draw axes. For more information on organizing, exploring, and transforming your data, check out my course, Manipulating Data in Tableau Desktop. We hope you continue on this path towards the Tableau Desktop Specialist certification, and we wish you luck on the exam. Don't forget to check out all of our other courses on the platform, and please take a moment to rate this course.