Dhiva - Advanced Measure Functions

Reference Guide

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Document Purpose

This document will layout each measure function and display a use case as an example to understand the features of the function in detail.

The examples in this document are based on demo data. The attributes and measures used may differ in your own environment. This document should only be used as reference to understand the functions. Please follow best practices to recreate in your own environments.

Functions

Average Function

The Average function computes the average of the measure values for the selected attribute considering the granularity of the report.

Use Case

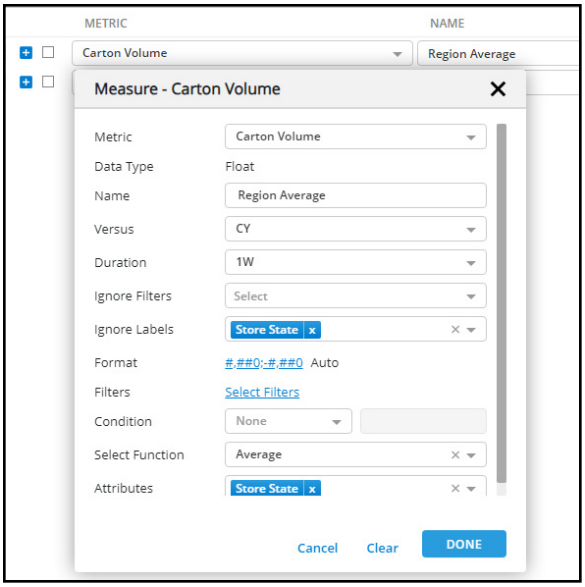
Consider a scenario where a user wants to compare the sales volume by state against the regional average to identify the high selling states. This can be achieved by computing average Volume across states.

Report selection

Rows: Region, Store State

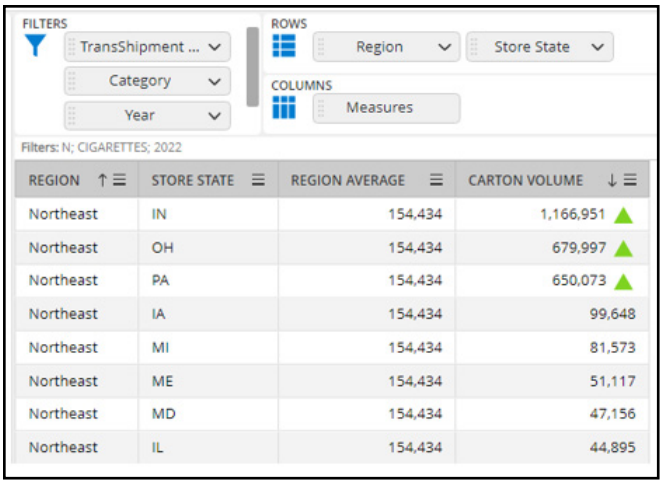
Measures:

- Carton Volume CY 1Wk
- Region Average computed over Carton Volume CY 1Wk



Since we want to compute the average across all store states, first ignore the store state label and instead select it as an attribute for the average function. This will display the averages across states within each region.

Report Result:



REGION	STORE STATE	REGION AVERAGE	CARTON VOLUME
Northeast	IN	154,434	1,166,951
Northeast	OH	154,434	679,997
Northeast	PA	154,434	650,073
Northeast	IA	154,434	99,648
Northeast	MI	154,434	81,573
Northeast	ME	154,434	51,117
Northeast	MD	154,434	47,156
Northeast	IL	154,434	44,895

Each region will display the total average and carton volume by state. This allows users to compare state to region averages by marking their higher selling states as shown in the screenshot above.

Average Running Total

The Average running total function enables user to compute running averages based on any attribute or measure in a particular sort order.

Use Case

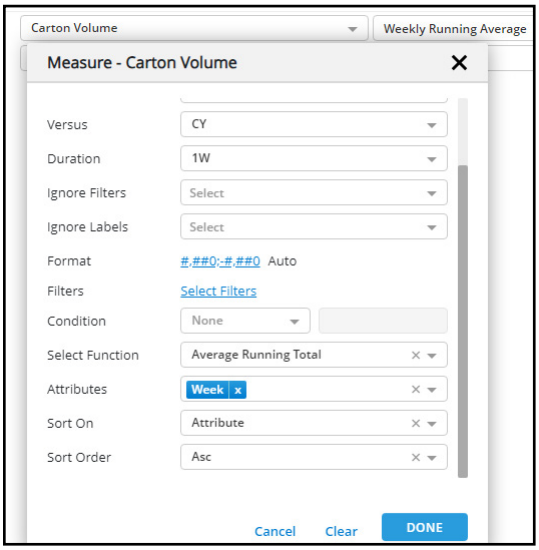
Consider a scenario where a user wants to compare weekly sales from the beginning of the year against a running weekly average. This can be achieved by creating a measure with the Average Running Total function.

Report selection

Rows: Region, Week

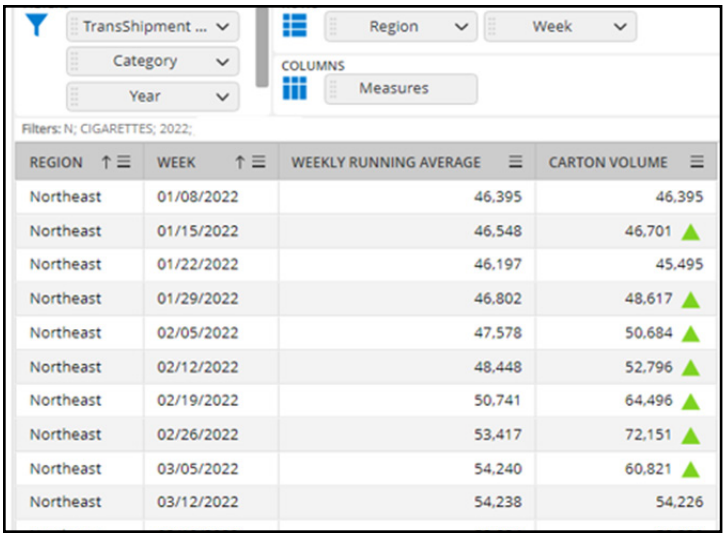
Measures:

- Carton Volume CY 1Wk
- Weekly Running Average computed over Carton Volume using this function



Here we are computing the average Carton Volume across weeks sorted by the attribute order, which in this example will be by Region and Week in ascending order.

Report Result:



REGION	WEEK	WEEKLY RUNNING AVERAGE	CARTON VOLUME
Northeast	01/08/2022	46,395	46,395
Northeast	01/15/2022	46,548	46,701
Northeast	01/22/2022	46,197	45,495
Northeast	01/29/2022	46,802	48,617
Northeast	02/05/2022	47,578	50,684
Northeast	02/12/2022	48,448	52,796
Northeast	02/19/2022	50,741	64,496
Northeast	02/26/2022	53,417	72,151
Northeast	03/05/2022	54,240	60,821
Northeast	03/12/2022	54,238	54,226

Weekly Running average is building over the weeks as shown in the above screenshot.

Average Windowing

The Average windowing function considers averages across the records in a way that is similar to total running average function but is bound by the range of cells preceding/succeeding the current record.

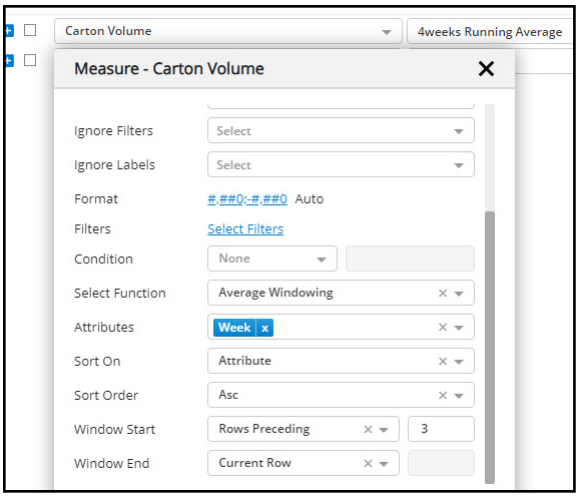
Use Case

Consider a scenario where a user wants to compare the weekly sales from the beginning of the year against a running 4-week average to the current week. This can be achieved by creating a measure with Average Windowing function.

Report selection
Rows: Region, Week

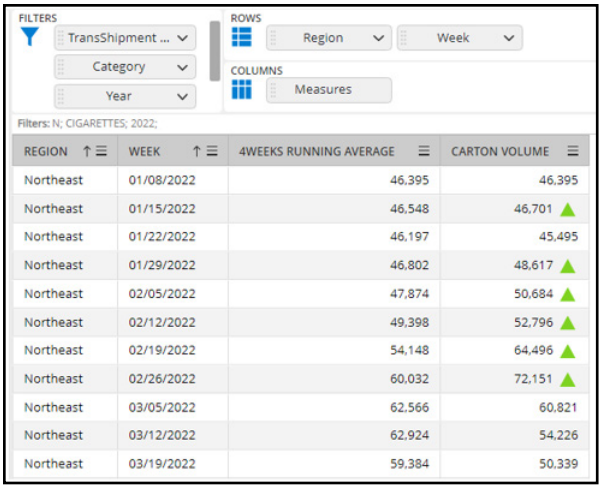
Measures:

- Carton Volume CY 1Wk
- 4weeks Running Average computed on Carton Volume with this function



The Average is calculated on carton volume from the current row (Latest week) and preceding 3 rows (previous 3 weeks). The sorting is applied by attribute week in ascending order.

Report Result:



REGION	WEEK	4WEEKS RUNNING AVERAGE	CARTON VOLUME
Northeast	01/08/2022	46,395	46,395
Northeast	01/15/2022	46,548	46,701
Northeast	01/22/2022	46,197	45,495
Northeast	01/29/2022	46,802	48,617
Northeast	02/05/2022	47,874	50,684
Northeast	02/12/2022	49,398	52,796
Northeast	02/19/2022	54,148	64,496
Northeast	02/26/2022	60,032	72,151
Northeast	03/05/2022	62,566	60,821
Northeast	03/12/2022	62,924	54,226
Northeast	03/19/2022	59,384	50,339

The 4 Week Running average is computed for each week and users can compare the current week Carton Volume against the average as indicated in the screenshot.

Standard Deviation

The Standard Deviation function allows the user to compute the Standard Deviation of values for the selected attribute.

Use Case

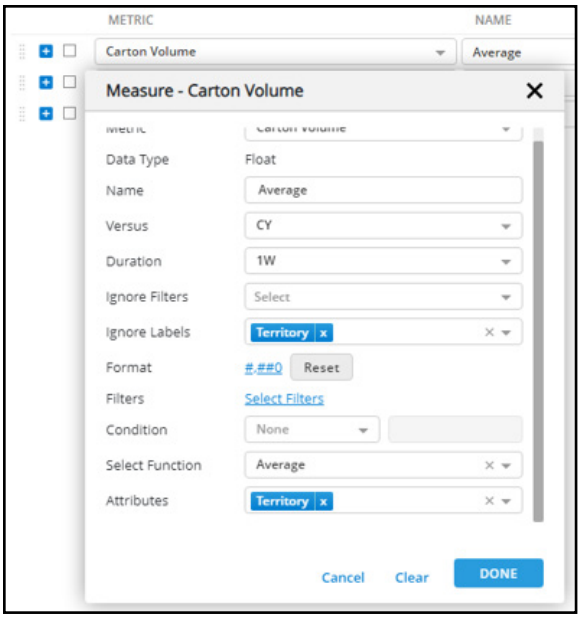
Consider a scenario where a user wants to compare the volume sales for each territory and determine if they are within one standard deviation from the mean. This can be achieved by computing the average and standard deviation to compare the values within a specific range.

Report selection

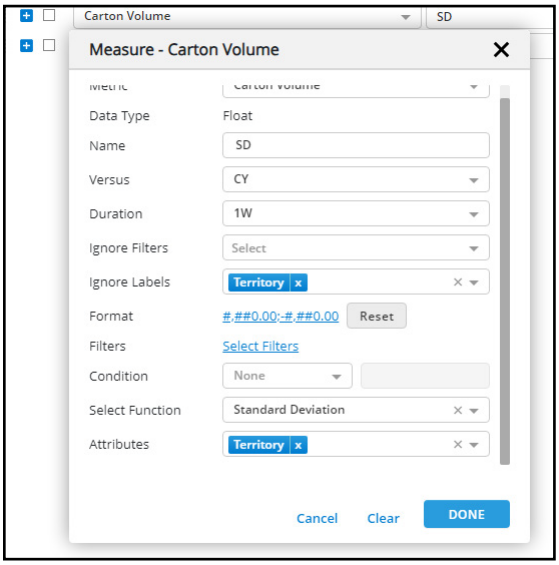
Rows: Store State, Territory (where territories do not cross state lines)

Measures:

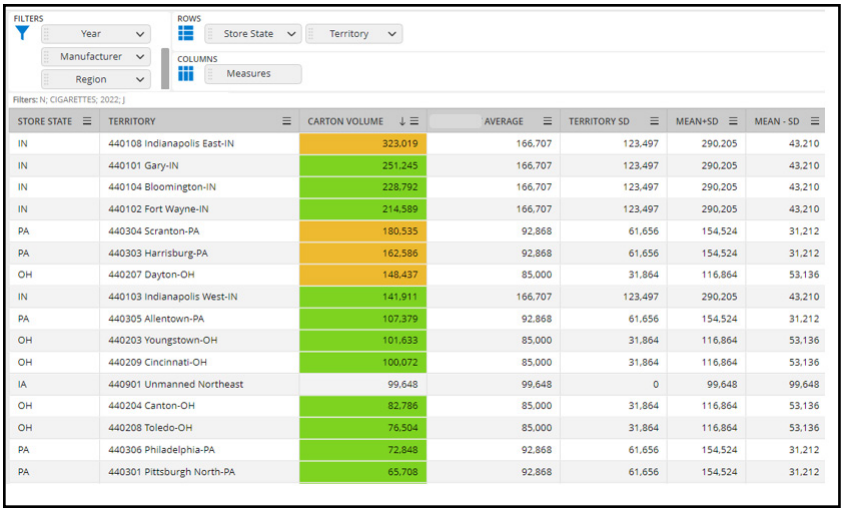
- Carton Volume
- State Average computed on Carton Volume similar to above example by ignoring Territory from the report granularity and using it in Average function attribute parameter



- Standard Deviation is computed on Carton Volume ignoring Territory from the report granularity and using it in SD function Attribute parameter



Report Result:



STORE STATE	TERRITORY	CARTON VOLUME	AVERAGE	TERRITORY SD	MEAN+SD	MEAN - SD
IN	440108 Indianapolis East-IN	323,019	166,707	123,497	290,205	43,210
IN	440101 Gary-IN	251,245	166,707	123,497	290,205	43,210
IN	440104 Bloomington-IN	228,792	166,707	123,497	290,205	43,210
IN	440102 Fort Wayne-IN	214,589	166,707	123,497	290,205	43,210
PA	440304 Scranton-PA	180,535	92,868	61,656	154,524	31,212
PA	440303 Harrisburg-PA	162,586	92,868	61,656	154,524	31,212
OH	440207 Dayton-OH	148,437	85,000	31,864	116,864	53,136
IN	440103 Indianapolis West-IN	141,911	166,707	123,497	290,205	43,210
PA	440305 Allentown-PA	107,379	92,868	61,656	154,524	31,212
OH	440203 Youngstown-OH	101,633	85,000	31,864	116,864	53,136
OH	440209 Cincinnati-OH	100,072	85,000	31,864	116,864	53,136
IA	440901 Unmanned Northeast	99,648	99,648	0	99,648	99,648
OH	440204 Canton-OH	82,786	85,000	31,864	116,864	53,136
OH	440208 Toledo-OH	76,504	85,000	31,864	116,864	53,136
PA	440306 Philadelphia-PA	72,848	92,868	61,656	154,524	31,212
PA	440301 Pittsburgh North-PA	65,708	92,868	61,656	154,524	31,212

As a result of this calculation, we can see the Average and Standard Deviation values. By creating upper and lower limits using custom measures defined as Mean + SD and Mean – SD, we can set a range for the territory sales volume to determine outliers.

First Function

The First function allows the user to find the First value of a Measure according to the selected Attribute at the report granularity.

Use Case

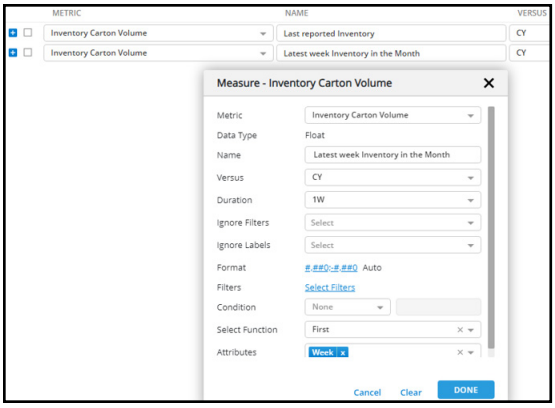
Consider a scenario where a user wants to find out the first week inventory in each month and compare it with the ending inventory for that month. This can be achieved by using the first function.

Report selection

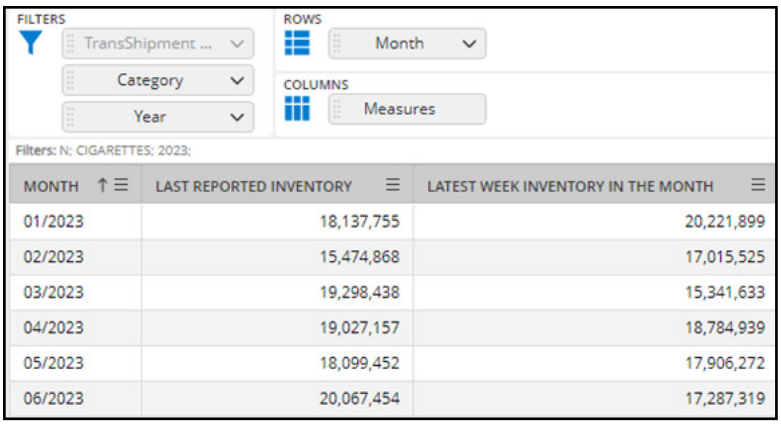
Rows: Month

Measures:

- Latest Reported Inventory Carton Volume 1Wk CY
- First week inventory in the month, computed on Inventory Carton Volume using First function with week in the Attribute selection



Report Result:



MONTH	LAST REPORTED INVENTORY	LATEST WEEK INVENTORY IN THE MONTH
01/2023	18,137,755	20,221,899
02/2023	15,474,868	17,015,525
03/2023	19,298,438	15,341,633
04/2023	19,027,157	18,784,939
05/2023	18,099,452	17,906,272
06/2023	20,067,454	17,287,319

The report displays the Latest reported inventory in each month which is the closing inventory and the computed First Inventory volume in that month which can be considered as beginning inventory.

Similar Measure Functions

The measure functions covered below are similar to the example and use cases stated until this point in the document and will only be described briefly in the following section.

- **Sum:** Similar to the Average function, Sum computes an aggregation of values across the selected attribute granularity.

- **Sum Running Total:** Similar to Average Running Total, a running Sum is computed across values of the selected attribute in an order defined by an Attribute or Measure.

- **Sum Windowing Function:** Similar to Average Windowing, an aggregated rolling Sum is computed based on the window defined.

- **Count, Count Running Total and Count Windowing:** These operate similarly to Sum functions except the values are counted instead of being aggregated.

- **Min, Max, Min Running Total, Max Running Total, Min Windowing and Max Windowing:** Min, Max function return the minimum or maximum value within the range of attribute selection. Min or Max Running Totals return the minimum or maximum value across the range of incremental values. Min or Max Windowing returns the minimum or maximum value across a window limit specified in the function.

- **First Windowing:** Returns first value similar to First function within the windowing range specified by preceding and succeeding values.

- **Last, Last Windowing:** These functions behave and are defined similarly to the first function except it returns the last value of the set or the defined window respectively.

- **Var function:** This function is used to compute the variance value. This is defined similar to the Standard Deviation measure and the value is used to determine the spread of data from mean.

Contributions

The Contributions function allows a user to understand the % contribution of an attribute at the report granularity.

Use Case

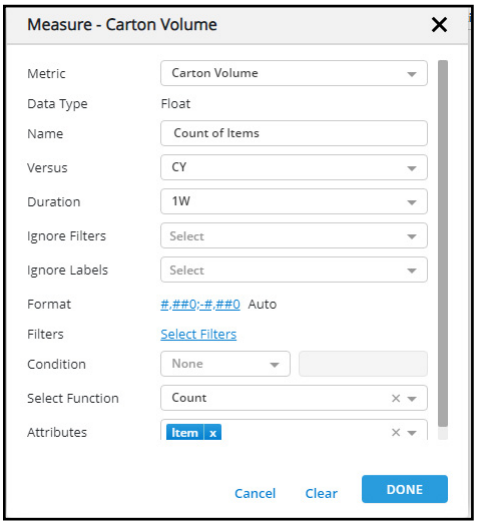
Consider a scenario where a user wants to understand the % of items sold in each state that contributes to top 80% of volume within the state. This can be achieved by using the contribution function.

Report selection

Rows: Region, Store State

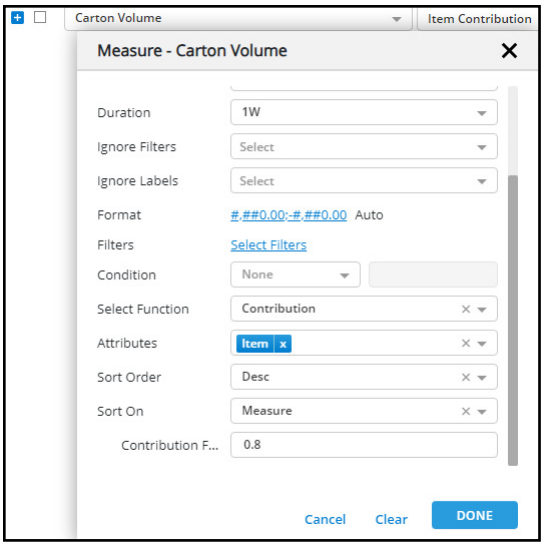
Measures:

- Carton Volume CY 1WK
- Count of Items computed using count measure function



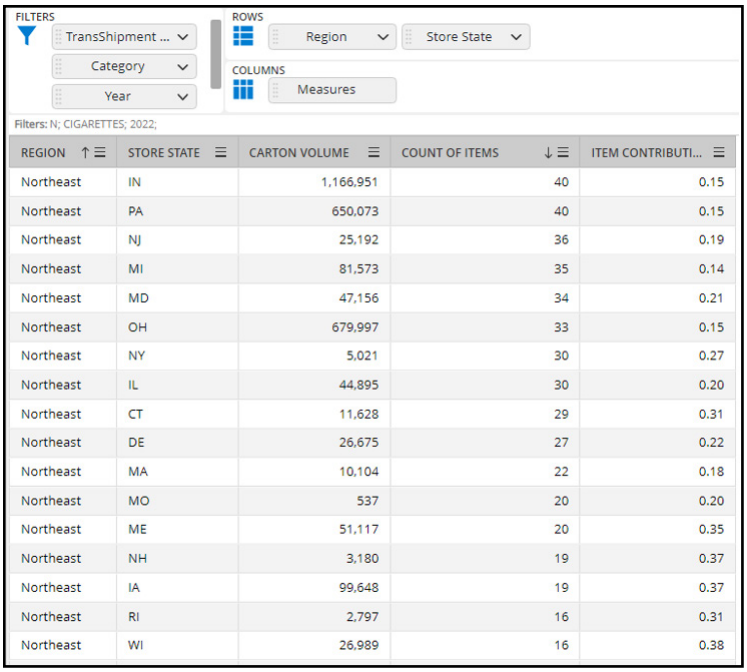
The count measure function is used to count the number of items with volume sales in each state.

- Item Contribution is computed on carton volume using the contribution measure function



This measure returns the fraction of items that contribute to 80% volume out of the total items sold in each state.

Report Result:



REGION	STORE STATE	CARTON VOLUME	COUNT OF ITEMS	ITEM CONTRIBUTI...
Northeast	IN	1,166,951	40	0.15
Northeast	PA	650,073	40	0.15
Northeast	NJ	25,192	36	0.19
Northeast	MI	81,573	35	0.14
Northeast	MD	47,156	34	0.21
Northeast	OH	679,997	33	0.15
Northeast	NY	5,021	30	0.27
Northeast	IL	44,895	30	0.20
Northeast	CT	11,628	29	0.31
Northeast	DE	26,675	27	0.22
Northeast	MA	10,104	22	0.18
Northeast	MO	537	20	0.20
Northeast	ME	51,117	20	0.35
Northeast	NH	3,180	19	0.37
Northeast	IA	99,648	19	0.37
Northeast	RI	2,797	16	0.31
Northeast	WI	26,989	16	0.38

This report shows that 0.15 percent of items sold in IN state contribute to the 80% of the total volume of 1,166,951. Since total items in IN are 40, there are (40*0.15=6) 6 top items in this state contributing to 80% of volume.

Lag Function

The Lag function allows the user to fetch a previous Nth value from the reported data based on the selected attribute and sort order.

Use Case

Consider a scenario where a user wants to analyze weekly change in distributor counts for a particular manufacturer comparing the current week with the previous 4th week value.

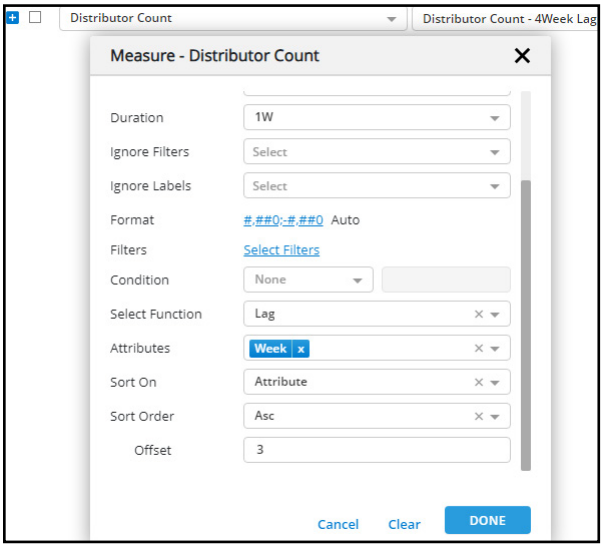
Report selection

Rows: Week

Filtered on a particular manufacturer

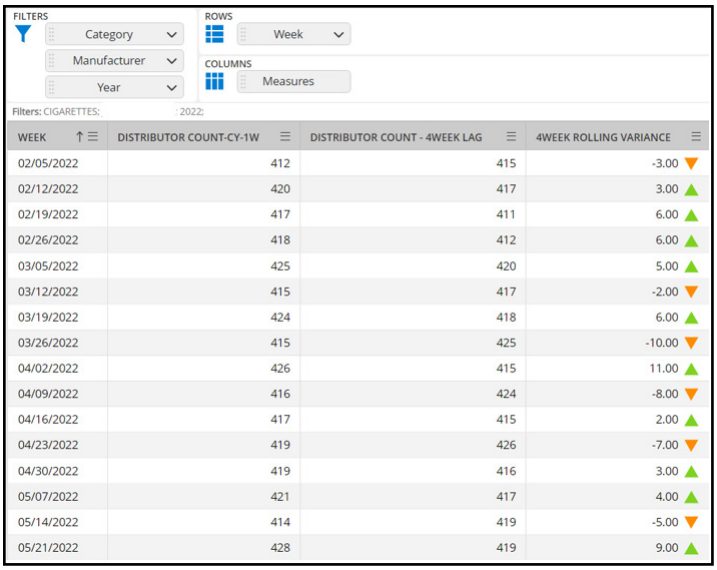
Measures:

- Distributor count 1WK
- Four week Lag on Distributor Count computed using the lag measure over week sorting weeks in ascending order



Here the offset defines the weeks lag and should be provided as x-1 where x is the offset weeks the user wants.

Report Result:



WEEK	DISTRIBUTOR COUNT-CY-1W	DISTRIBUTOR COUNT - 4WEEK LAG	4WEEK ROLLING VARIANCE
02/05/2022	412	415	-3.00 ▼
02/12/2022	420	417	3.00 ▲
02/19/2022	417	411	6.00 ▲
02/26/2022	418	412	6.00 ▲
03/05/2022	425	420	5.00 ▲
03/12/2022	415	417	-2.00 ▼
03/19/2022	424	418	6.00 ▲
03/26/2022	415	425	-10.00 ▼
04/02/2022	426	415	11.00 ▲
04/09/2022	416	424	-8.00 ▼
04/16/2022	417	415	2.00 ▲
04/23/2022	419	426	-7.00 ▼
04/30/2022	419	416	3.00 ▲
05/07/2022	421	417	4.00 ▲
05/14/2022	414	419	-5.00 ▼
05/21/2022	428	419	9.00 ▲

By creating a new custom measure defined as 1W minus 4W lag, users can determine the variance. Variance explains if the distributor counts increased or decreased when compared with a 4-week previous value.

Lead Function

Lead Function is similar to the Lag function and can help with future projection comparison. As an example, Lead or Lag measures will be used to compute BIAS based on the attribute selected and sort order defined.

Rank & Row Number Functions

Rank Function

The Rank function allows the user to create a Rank on measure or attribute ordered in ascending or descending allowing the rank to be numbered respecting the sort.

Use Case

Consider a scenario where a user would want to rank the US states on their count of distributors from highest to lowest. This can be achieved using the rank measure.

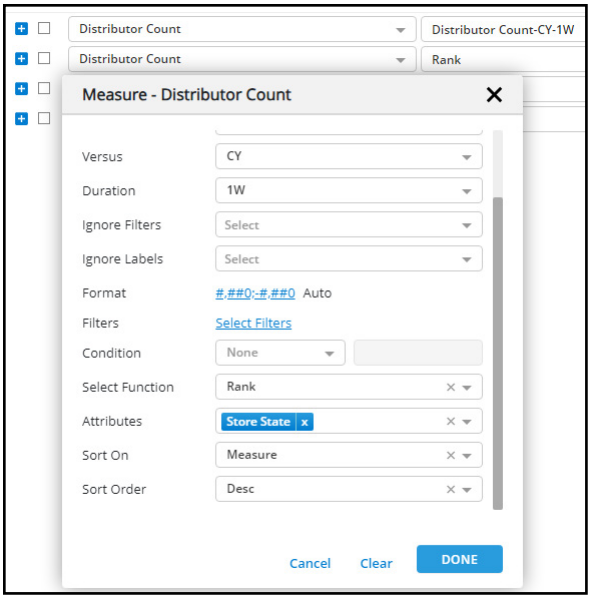
Report selection

Rows: Store State

Filtered on a particular manufacturer

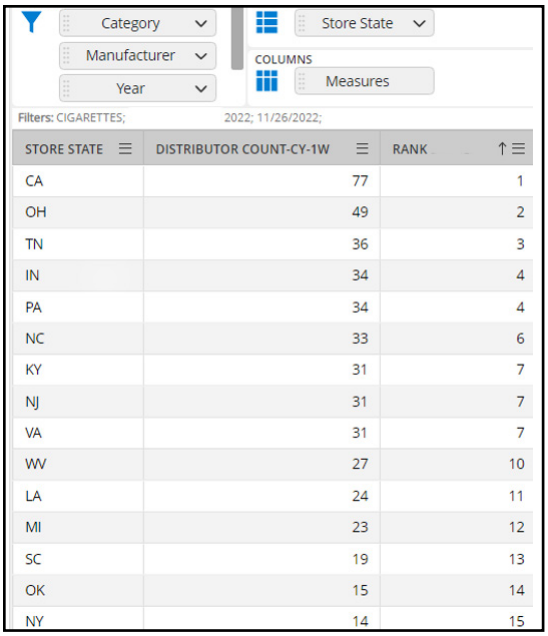
Measures:

- Distributor Count 1Wk CY
- Rank on Distributor Count Measure



Rank is applied on the Store State attribute based on descending order of the Distributor count measure.

Report Result:



STORE STATE	DISTRIBUTOR COUNT-CY-1W	RANK
CA	77	1
OH	49	2
TN	36	3
IN	34	4
PA	34	4
NC	33	6
KY	31	7
NJ	31	7
VA	31	7
WV	27	10
LA	24	11
MI	23	12
SC	19	13
OK	15	14
NY	14	15

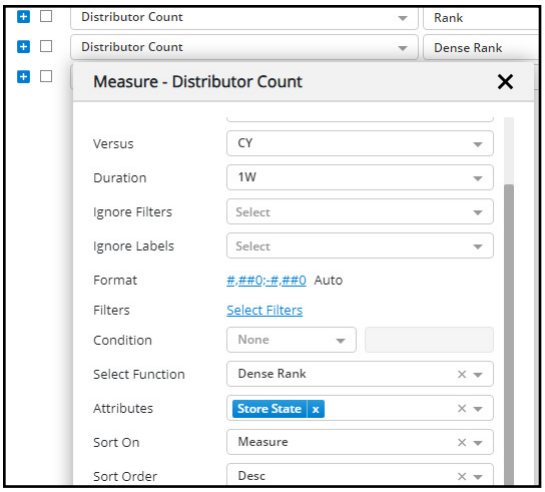
The Rank on state measure display rank from 1 to N based on the highest to lowest distributor counts for states. We can see that the states with a tie in distributor counts are ranked the same. Example States IN and PA are ranked 4 and KY, NJ, VA are all ranked 7 as the distributor count is same. The state following VA which is WV is ranked as 10 as the rank function skips the ranking when tied.

To display only the top 10 ranked states, a user can apply a measure condition to restrict the rank to 10 which would display this list of states only till WV.

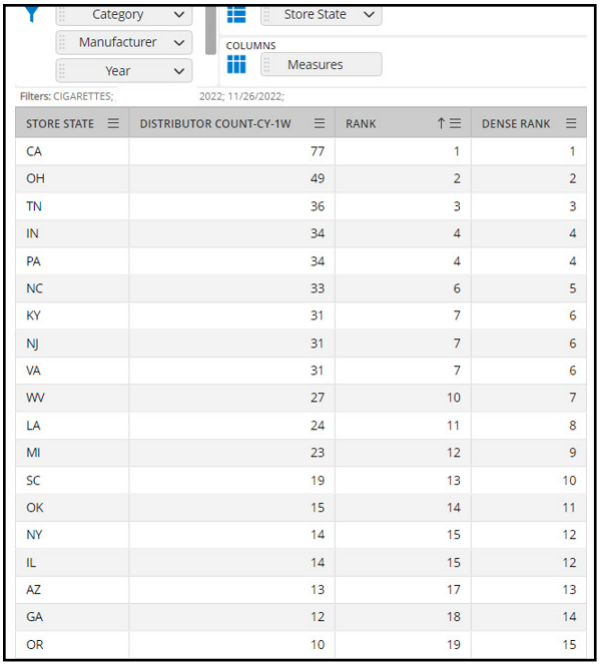
Dense Rank Function

If a user wishes not to skip any items with tied ranks, they can use the Dense Rank function.

Measures: All the conditions for the Dense Rank measure are the same as the Rank measure.



Report Result:



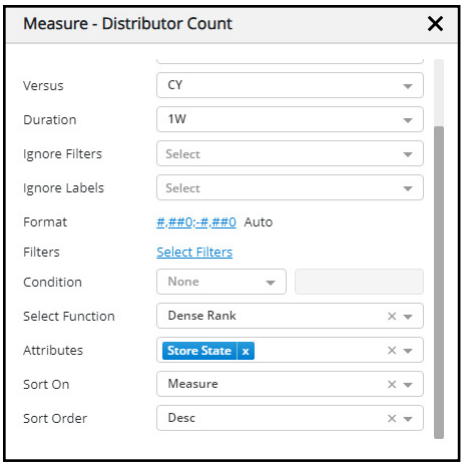
STORE STATE	DISTRIBUTOR COUNT-CY-1W	RANK	DENSE RANK
CA	77	1	1
OH	49	2	2
TN	36	3	3
IN	34	4	4
PA	34	4	4
NC	33	6	5
KY	31	7	6
NJ	31	7	6
VA	31	7	6
WV	27	10	7
LA	24	11	8
MI	23	12	9
SC	19	13	10
OK	15	14	11
NY	14	15	12
IL	14	15	12
AZ	13	17	13
GA	12	18	14
OR	10	19	15

This Dense Rank does not skip the numbers, hence the rank for NC is 5 and the rank post VA which is WV is 7. If a user wants to filter the report to the top 10 ranked states excluding ties, that can be achieved by applying the “<=10” measure condition to Dense Rank.

Row Number Function

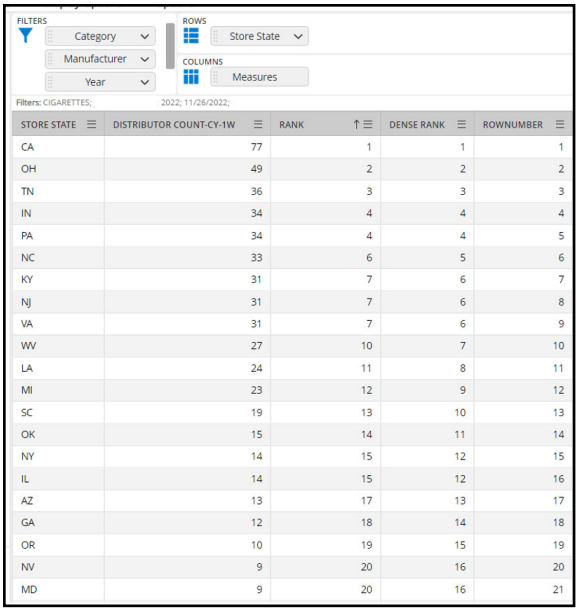
There could be scenarios where users would want to restrict the top X rows irrespective of ties in rank for purposes such as fitting the exported contents in a PPT or an email. For this purpose, the Row Number function can be used which will provide a number to each row in the increasing order of defined attribute/measure.

Measures: All the conditions for the Row number meaure are the same as the Rank and Dense Rank measure.



Here the row number is assigned for each store state based on the distributor count descending.

Report Result:



STORE STATE	DISTRIBUTOR COUNT-CY-1W	RANK	DENSE RANK	ROWNUMBER
CA	77	1	1	1
OH	49	2	2	2
TN	36	3	3	3
IN	34	4	4	4
PA	34	4	4	5
NC	33	6	5	6
KY	31	7	6	7
NJ	31	7	6	8
VA	31	7	6	9
WV	27	10	7	10
LA	24	11	8	11
MI	23	12	9	12
SC	19	13	10	13
OK	15	14	11	14
NY	14	15	12	15
IL	14	15	12	16
AZ	13	17	13	17
GA	12	18	14	18
OR	10	19	15	19
NV	9	20	16	20
MD	9	20	16	21

If the user wishes to restrict the report now only to top 20 states based on distributor count irrespective of ties, Row Number measure can be restricted to <=20 measure condition so that the report returns states till NV and ignores MD despite it having the same rank 20 as NV.

NTILE Function

The NTILE function enables users to group attributes into buckets ranked from 1 to N where N is the max number for the group that is defined as part of the measure definition.

Use Case

Consider a scenario where a user would want to group the US states into buckets 1 to 10 based on the distributor counts. User can then measure the carton volume shipped in these states to understand the relation between the number of distributors and the volume shipped. This can be achieved by the NTILE function.

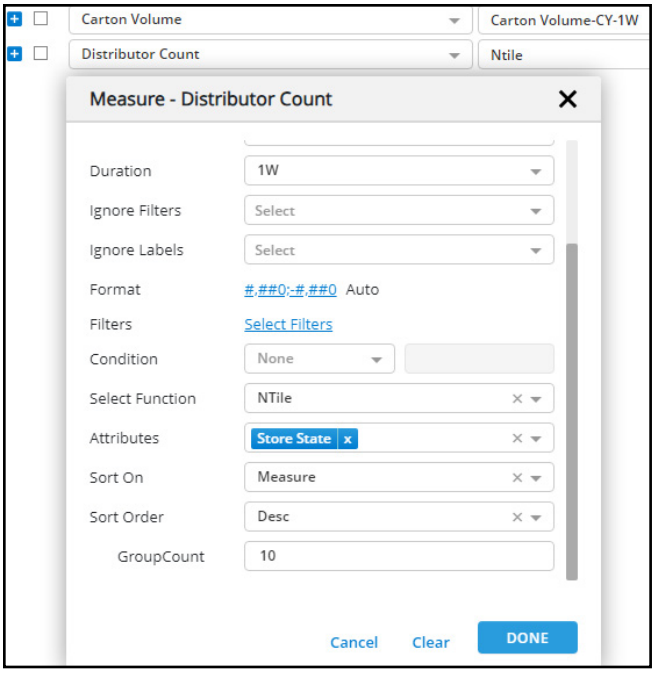
Report selection

Rows: Store State

Filtered on a particular manufacturer

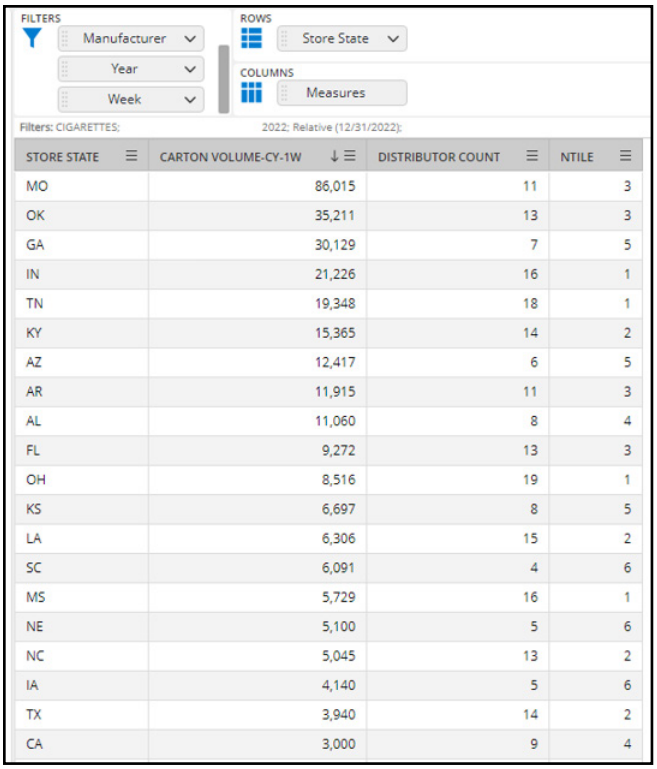
Measures:

- Carton Volume 1Wk CY
- NTILE measure based on the Distributor Count



This measure would display numbers against the states from 1 to 10 based on the bucket they fall under. Since the upper limit is provided as 10, this function divides the 52 US states into 10 groups with top five states numbered 1, next five numbered 2 and so on till 10. Last group may have more than 5 states to adjust for the additional 2 states.

Report result:



STORE STATE	CARTON VOLUME-CY-1W	DISTRIBUTOR COUNT	NTILE
MO	86,015	11	3
OK	35,211	13	3
GA	30,129	7	5
IN	21,226	16	1
TN	19,348	18	1
KY	15,365	14	2
AZ	12,417	6	5
AR	11,915	11	3
AL	11,060	8	4
FL	9,272	13	3
OH	8,516	19	1
KS	6,697	8	5
LA	6,306	15	2
SC	6,091	4	6
MS	5,729	16	1
NE	5,100	5	6
NC	5,045	13	2
IA	4,140	5	6
TX	3,940	14	2
CA	3,000	9	4

This report displays the states in descending order of carton volume shipped. We can observe that MO has highest volume sales but is in the 3rd tile (group) as it has lower distributor count of 11 than the states in Ntile =1. On the other hand, although IN is in top 1 group with 16 distributors, it is in the fourth place on volume sales. This can indicate opportunity in IN to increase distributors.

Percent Of

The Percent Of function enables the user to compute the percentage of total excluding a particular attribute (in defining the denominator). This function can be used to compute shares within the defined report data.

Use Case

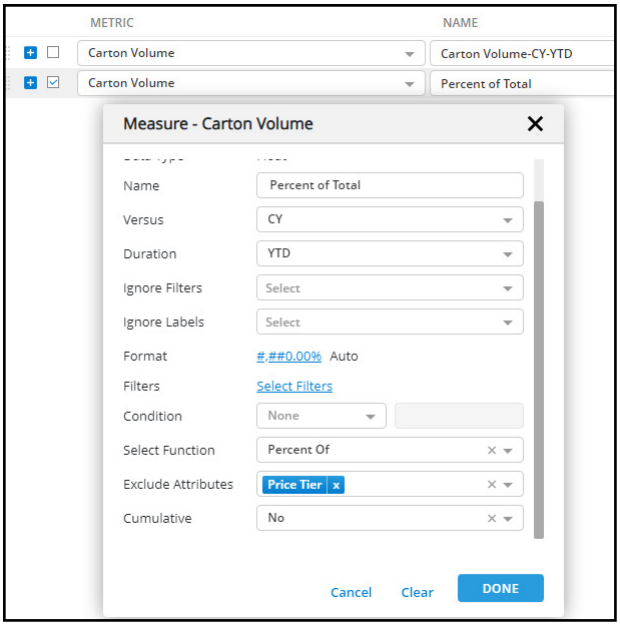
Consider a scenario where a user wants to compute the YTD share of price tiers. This can be achieved using the Percent Of function.

Report selection

Rows: Price Tier

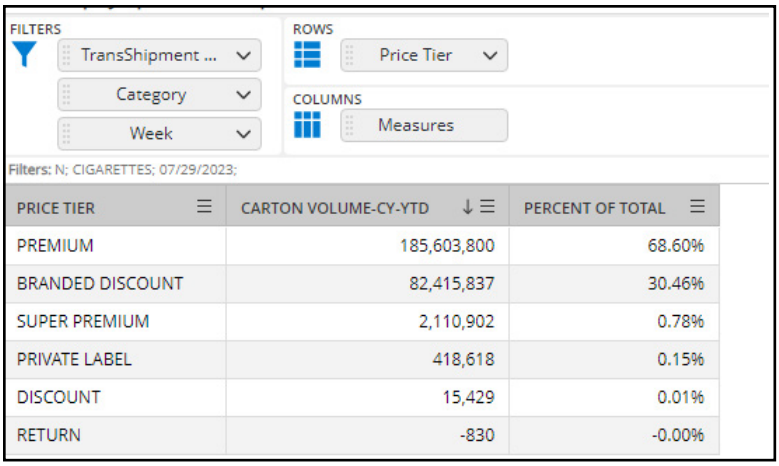
Measures:

- Carton Volume YTD CY
- Percent of Total computed on Carton Volume YTD CY



The cumulative option enables the percent to be cumulative of each row. In this case the cumulative option is set to 'no' as we need individual price tier shares.

Report Result:



PRICE TIER	CARTON VOLUME-CY-YTD	PERCENT OF TOTAL
PREMIUM	185,603,800	68.60%
BRANDED DISCOUNT	82,415,837	30.46%
SUPER PREMIUM	2,110,902	0.78%
PRIVATE LABEL	418,618	0.15%
DISCOUNT	15,429	0.01%
RETURN	-830	-0.00%

The report shows the Price Tier and the share computed along with volume in descending order.

Percentile

The Percentile function enables the user to return X percentile value of all values listed in the report.

Use Case

Consider a scenario where a user wants to set a goal for distributor counts at 80 percentile mark across all states for a manufacturer. This can be achieved by defining a distributor count measure and returning its 80th percentile value.

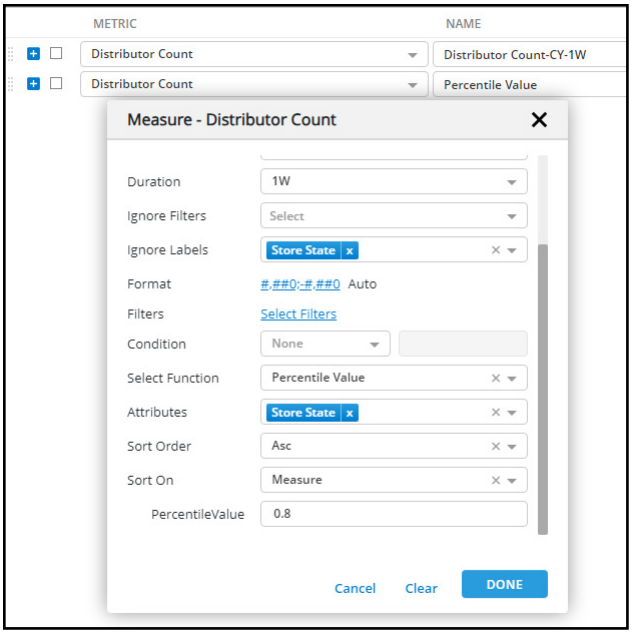
Report selection

Rows: Store State

Filtered for a particular month

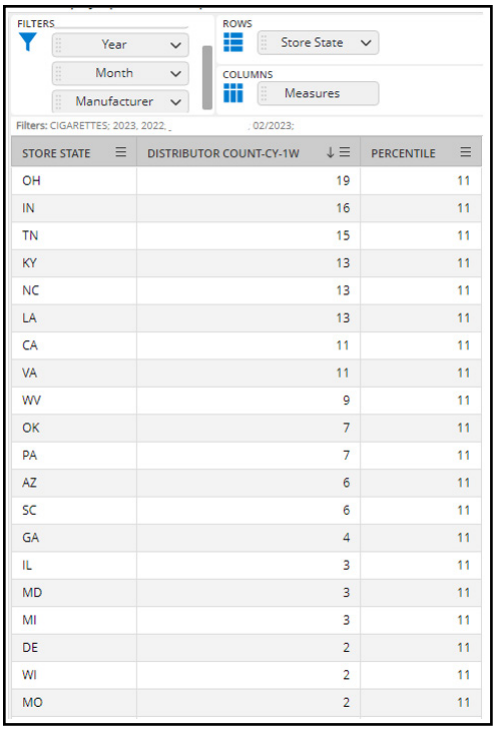
Measures:

- Distributor Count 1Wk CY
- 80 Percentile Value computed on Distributor Count 1Wk CY



The state attribute is first ignored from the computation granularity and then 0.8 percentile value across the states is computed in ascending order of distributor count.

Report Result:



STORE STATE	DISTRIBUTOR COUNT-CY-1W	PERCENTILE
OH	19	11
IN	16	11
TN	15	11
KY	13	11
NC	13	11
LA	13	11
CA	11	11
VA	11	11
WV	9	11
OK	7	11
PA	7	11
AZ	6	11
SC	6	11
GA	4	11
IL	3	11
MD	3	11
MI	3	11
DE	2	11
WI	2	11
MO	2	11

The screenshot above shows a distributor count of 11 is determined as the 80th percentile value.

This can be also set as a target to understand the states that have distributor counts above and below the 80th percentile value.