Aggregate functions

Aggregate functions summarize the values from each event to create a single, meaningful value. Common aggregate functions include Average, Count, Minimum, Maximum, Standard Deviation, Sum, and Variance.

Most aggregate functions are used with numeric fields. However, there are some functions that you can use with either alphabetic string fields or numeric fields. The function descriptions indicate which functions you can use with alphabetic strings.

For an overview, see statistical and charting functions.

avg(<value>)

Description

Returns the average of the values of the field specified.

Usage

You can use this function with the chart, mstats, stats, timechart, and tstats commands, and also with sparkline() charts.

For a list of the related statistical and charting commands that you can use with this function, see Statistical and charting functions.

Basic examples

Example 1

The following example returns the average (mean) "size" for each distinct "host".

```
... | stats avg(size) BY host
```

Example 2

The following example returns the average "thruput" of each "host" for each 5 minute time span.

Example 3

The following example charts the ratio of the average (mean) "size" to the maximum "delay" for each distinct "host" and "user" pair.

```
... | chart eval(avg(size)/max(delay)) AS ratio BY host user
```

Example 4

The following example displays a timechart of the average of cpu_seconds by processor, rounded to 2 decimal points.

```
... | timechart eval(round(avg(cpu_seconds),2)) BY processor
```

Extended examples

Example 1

There are situations where the results of a calculation can return a different accuracy to the very far right of the decimal point. For example, the following search calculates the average of 100 values:

```
| makeresults count=100 | eval test=3.99 | stats avg(test)
```

The result of this calculation is:

avg(test)
3.9900000000000055

When the count is changed to 10000, the results are different:

```
| makeresults count=10000 | eval test=3.99 | stats avg(test)
```

The result of this calculation is:

avg(test)
3.990000000000215

This occurs because numbers are treated as double-precision floating-point numbers.

To mitigate this issue, you can use the `sigfig` function to specify the number of significant figures you want returned.

However, first you need to make a change to the `stats` command portion of the search. You need to change the name of the field `avg(test)` to remove the parenthesis. For example `stats avg(test) AS test`. The `sigfig` function expects either a number or a field name. The `sigfig` function cannot accept a field name that looks like another function, in this case `avg`.

To specify the number of decimal places you want returned, you multiply the field name by 1 and use zeros to specify the number of decimal places. If you want 4 decimal places returned, you would multiply the field name by 1.0000. To return 2 decimal places, multiply by 1.00, as shown in the following example:

```
| makeresults count=10000 | eval test=3.99 | stats avg(test) AS test |
eval new_test=sigfig(test*1.00)
```

The result of this calculation is:

test
3.99

Example 2

Chart the average number of events in a transaction, based on transaction duration.

> This example uses the sample data from the Search Tutorial. To try this example on your own Splunk instance, you must download the sample data and follow the instructions to get the tutorial data into Splunk. Use the time range All time when you run the search.

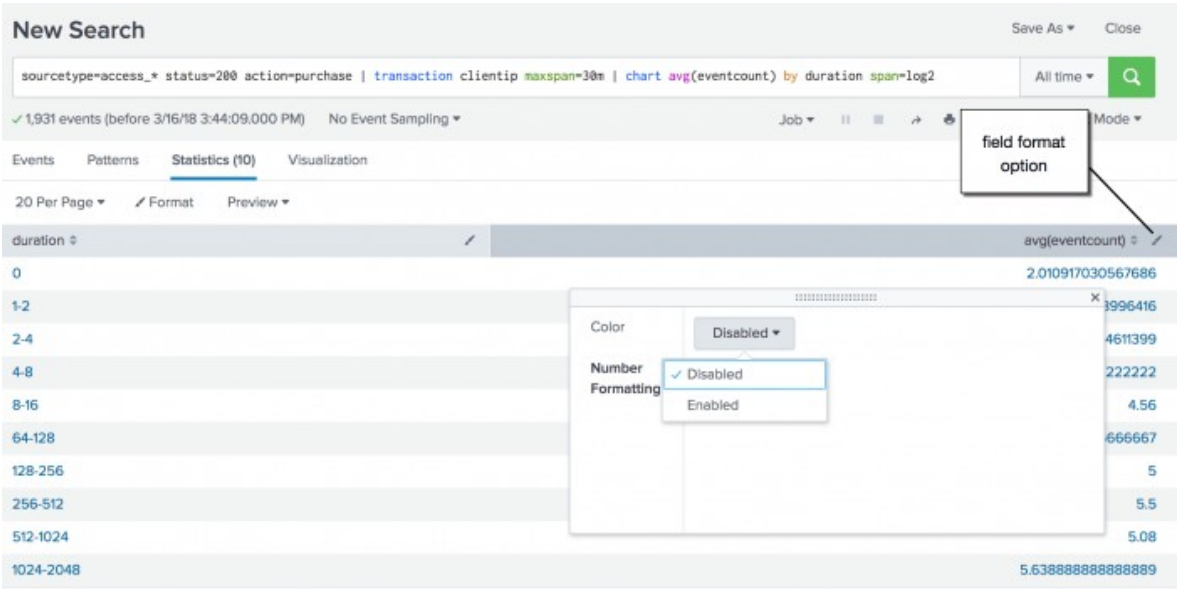
1. Run the following search to create a chart to show the average number of events in a transaction based on the duration of the transaction.

   ```
   sourcetype=access_* status=200 action=purchase | transaction
   clientip maxspan=30m  | chart avg(eventcount) by duration
   span=log2
   ```

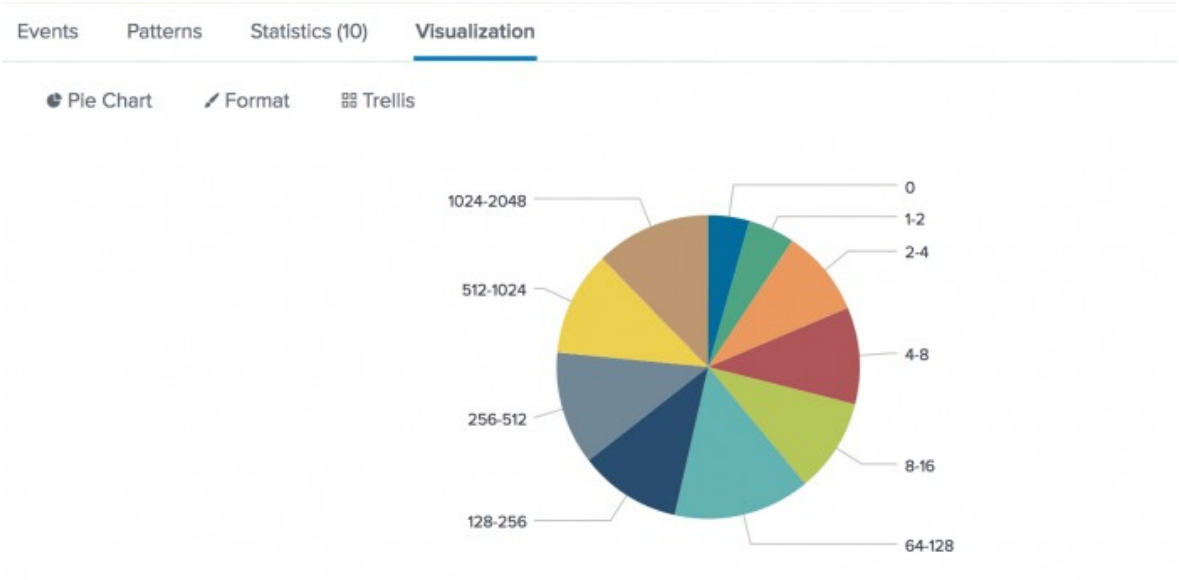
   The `transaction` command adds two fields to the results `duration` and `eventcount`. The `eventcount` field tracks the number of events in a single transaction.

In this search, the transactions are piped into the `chart` command. The `avg()` function is used to calculate the average number of events for each duration. Because the duration is in seconds and you expect there to be many values, the search uses the `span` argument to bucket the duration into bins using logarithm with a base of 2.

2. Use the field format option to enable number formatting.



3. Click the Visualization tab and change the display to a pie chart.



Each wedge of the pie chart represents a duration for the event transactions. You can hover over a wedge to see the average values.

count(<value>) or c(<value>)

Description

Returns the number of occurrences of the field specified. To indicate a specific field value to match, format <value> as eval(field="value"). Processes field values as strings. To use this function, you can specify `count(<value>)`, or the abbreviation `c(<value>)`.

Usage

You can use this function with the chart, mstats, stats, timechart, and tstats commands, and also with sparkline() charts.

Basic examples

The following example returns the count of events where the `status` field has the value "404".

```
...| stats count(eval(status="404")) AS count_status BY sourcetype
```

This example uses an eval expression with the `count` function. See Using eval expressions in stats functions.

The following example separates search results into 10 bins and returns the count of raw events for each bin.

```
... | bin size bins=10 | stats count(_raw) BY size
```

The following example generates a sparkline chart to count the events that use the `_raw` field.

```
... sparkline(count)
```

The following example generates a sparkline chart to count the events that have the `user` field.

```
... sparkline(count(user))
```

The following example uses the `timechart` command to count the events where the `action` field

contains the value `purchase`.

```
sourcetype=access_* | timechart count(eval(action="purchase")) BY
productName usenull=f useother=f
```

Extended examples

Count the number of earthquakes that occurred for each magnitude range

This search uses recent earthquake data downloaded from the USGS Earthquakes website. The data is a comma separated ASCII text file that contains magnitude (mag), coordinates (latitude, longitude), region (place), etc., for each earthquake recorded.

You can download a current CSV file from the USGS Earthquake Feeds and upload the file to your Splunk instance. This example uses the All Earthquakes data from the past 30 days.

1. Run the following search to calculate the number of earthquakes that occurred in each magnitude range. This data set is comprised of events over a 30-day period.

   ```
   source=all_month.csv | chart count AS "Number of Earthquakes" BY
   mag span=1 | rename mag AS "Magnitude Range"
   ```

   - This search uses `span=1` to define each of the ranges for the magnitude field, `mag`.
   - The rename command is then used to rename the field to "Magnitude Range".

   The results look something like this:

Magnitude Range	Number of Earthquakes
-1-0	18
0-1	2088
1-2	3005
2-3	1026
3-4	194
4-5	452
5-4	109
6-7	11
7-8	3

Count the number of different page requests for each Web server

This example uses the sample data from the Search Tutorial but should work with any format of Apache web access log. To try this example on your own Splunk instance, you must download the sample data and follow the instructions to get the tutorial data into Splunk. Use the time range All time when you run the search.

1. Run the following search to use the `chart` command to determine the number of different page requests, GET and POST, that occurred for each Web server.

```
sourcetype=access_* | chart count(eval(method="GET")) AS GET,
count(eval(method="POST")) AS POST BY host
```

   This example uses `eval` expressions to specify the different field values for the `stats` command to count. The first clause uses the `count()` function to count the Web access events that contain the `method` field value `GET`. Then, using the AS keyword, the field that represents these results is renamed GET.

   The second clause does the same for POST events. The counts of both types of events are then separated by the web server, using the BY clause with the `host` field.

   The results appear on the Statistics tab and look something like this:

host	GET	POST
www1	8431	5197
www2	8097	4815
www3	8338	465

2. Click the Visualization tab. If necessary, format the results as a column chart. This chart displays the total count of events for each event type, GET or POST, based on the `host` value.

host	GET	POST
www1	8431	5197
www2	8097	4815
www3	8338	4654

distinct_count(<value>) or dc(<value>)

Description

Returns the count of distinct values of the field specified. This function processes field values as strings. To use this function, you can specify `distinct_count(<value>)`, or the abbreviation `dc(<value>)`.

Usage

You can use this function with the chart, mstats, stats, timechart, and tstats commands, and also with sparkline() charts.

Basic examples

The following example removes duplicate results with the same "host" value and returns the total count of the remaining results.

```
... | stats dc(host)
```

The following example generates sparklines for the distinct count of devices and renames the field, "numdevices".

```
...sparkline(dc(device)) AS numdevices
```

The following example counts the distinct sources for each sourcetype, and buckets the count for

each five minute spans.

```
...sparkline(dc(source),5m) BY sourcetype
```

Extended example

This example uses the sample data from the Search Tutorial. To try this example on your own Splunk instance, you must download the sample data and follow the instructions to get the tutorial data into Splunk. Use the time range Yesterday when you run the search.

1. Run the following search to count the number of different customers who purchased something from the Buttercup Games online store yesterday. The search organizes the count by the type of product (accessories, t-shirts, and type of games) that customers purchased.

   ```
   sourcetype=access_* action=purchase | stats dc(clientip) BY
   categoryId
   ```

   - This example first searches for purchase events, `action=purchase`.
   - These results are piped into the `stats` command and the `dc()` function counts the number of different users who make purchases.
   - The `BY` clause is used to break up this number based on the different category of products, the `categoryId`.

   The results appear on the Statistics tab and look something like this:

categoryId	dc(clientip)
ACCESSORIES	37
ARCADE	58
NULL	8
SHOOTER	31
SIMULATION	34
SPORTS	13
STRATEGY	74
TEE	38

estdc(<value>)

Description

Returns the estimated count of the distinct values of the field specified. This function processes field values as strings. The string values 1.0 and 1 are considered distinct values and counted separately.

Usage

You can use this function with the chart, stats, timechart, and tstats commands.

> NOTE: By default, if the actual number of distinct values returned by a search is below 1000, the Splunk software does not estimate the distinct value count for the search. It uses the actual distinct value count instead. This threshold is set by the `approx_dc_threshold` setting in `limits.conf`.

Basic examples

The following example removes duplicate results with the same "host" value and returns the estimated total count of the remaining results.

```
... | stats estdc(host)
```

The results look something like this:

estdc(host)
6

The following example generates sparklines for the estimated distinct count of the `devices` field and renames the results field, "numdevices".

```
...sparkline(estdc(device)) AS numdevices
```

The following example estimates the distinct count for the sources for each sourcetype. The results are displayed for each five minute span in sparkline charts.

```
...sparkline(estdc(source),5m) BY sourcetype
```

estdc_error(<value>)

Description

Returns the theoretical error of the estimated count of the distinct values of the field specified. The error represents a ratio of the `absolute_value(estimate_distinct_count - real_distinct_count)/ real_distinct_count`. This function processes field values as strings.

Usage

You can use this function with the chart, stats, and timechart commands.

Basic examples

The following example determines the error ratio for the estimated distinct count of the "host" values.

```
... | stats estdc_error(host)
```

exactperc<percentile>(<value>)

Description

Returns a percentile value of the numeric field specified.

Usage

You can use this function with the chart, stats, timechart, and tstats commands, and also with `sparkline()` charts.

The `exactperc` function provides the exact value, but is very resource expensive for high cardinality fields. The `exactperc` function can consume a large amount of memory in the search head, which might impact how long it takes for a search to complete.

Examples

See the `perc<percentile>(<value>)` function.

max(<value>)

Description

Returns the maximum value of the field specified. If the values in the field are non-numeric, the

maximum value is found using lexicographical ordering.

Processes field values as numbers if possible, otherwise processes field values as strings.

Usage

You can use this function with the chart, mstats, stats, and timechart commands, and also with sparkline() charts.

Lexicographical order sorts items based on the values used to encode the items in computer memory. In Splunk software, this is almost always UTF-8 encoding, which is a superset of ASCII.

- If the items are all numeric, they're sorted in numerical order based on the first digit. For example, the numbers 10, 9, 70, 100 are sorted as 10, 100, 70, 9.
- if the items are mixed, they're sorted in numeric and then lexicographical order with all numbers sorted before non-numeric items. For example, the items 1, c, a, 2, 100, b, 4, 9 are sorted as 1, 2, 4, 9, 100, a, b, c.
- if all items are non-numeric, they're sorted in lexicographical order.
- Uppercase letters are sorted before lowercase letters.
- Symbols are not standard. Some symbols are sorted before numeric values. Other symbols are sorted before or after letters.

Basic examples

This example returns the maximum value of the `size` field.

```
... | stats max(size)
```

Extended example

Calculate aggregate statistics for the magnitudes of earthquakes in an area

This search uses recent earthquake data downloaded from the USGS Earthquakes website. The data is a comma separated ASCII text file that contains magnitude (mag), coordinates (latitude, longitude), region (place), etc., for each earthquake recorded.

You can download a current CSV file from the USGS Earthquake Feeds and upload the file to your Splunk instance. This example uses the All Earthquakes data from the past 30 days.

1. Search for earthquakes in and around California. Calculate the number of earthquakes that were recorded. Use statistical functions to calculate the minimum, maximum, range (the difference between the min and max), and average magnitudes of the recent earthquakes. List the values by magnitude type.

```
source=all_month.csv place=*California* | stats count, max(mag),
min(mag), range(mag), avg(mag) BY magType
```

The results appear on the Statistics tab and look something like this:

magType	count	max(mag)	min(mag)	range(mag)	avg(mag)
H	123	2.8	0.0	2.8	0.549593
MbLg	1	0	0	0	0.0000000
Md	1565	3.2	0.1	3.1	1.056486
Me	2	2.0	1.6	.04	1.800000
Ml	1202	4.3	-0.4	4.7	1.226622
Mw	6	4.9	3.0	1.9	3.650000
ml	10	1.56	0.19	1.37	0.934000

mean(<value>)

Description

Returns the arithmetic mean of the field specified.

The `mean` values should be exactly the same as the values calculated using the `avg()` function.

Usage

You can use this function with the chart, mstats, stats, and timechart commands, and also with sparkline() charts.

Basic examples

The following example returns the mean of "kbps" values:

```
... | stats mean(kbps)
```

Extended example

This search uses recent earthquake data downloaded from the USGS Earthquakes website. The data is a comma separated ASCII text file that contains magnitude (mag), coordinates (latitude, longitude), region (place), etc., for each earthquake recorded.

You can download a current CSV file from the USGS Earthquake Feeds and upload the file to your Splunk instance. This example uses the All Earthquakes data from the past 30 days.

1. Run the following search to find the mean, standard deviation, and variance of the magnitudes of recent quakes by magnitude type.

   ```
   source=usgs place=*California* | stats count mean(mag),
   stdev(mag), var(mag) BY magType
   ```

   The results look something like this:

magType	count	mean(mag)	std(mag)	var(mag)
H	123	0.549593	0.356985	0.127438
MbLg	1	0.000000	0.000000	0.000000
Md	1565	1.056486	0.580042	0.336449
Me	2	1.800000	0.346410	0.120000
Ml	1202	1.226622	0.629664	0.396476
Mw	6	3.650000	0.716240	0.513000
ml	10	0.934000	0.560401	0.314049

median(<value>)

Description

Returns the middle-most value of the field specified.

Usage

You can use this function with the chart, mstats, stats, and timechart commands.

If you have an even number of events, by default the median calculation is approximated to the higher of the two values.

> ⓘ NOTE: This function is, by its nature, nondeterministic. This means that subsequent runs of a search using this function over identical data can contain slight variances in their results.

If you require results that are more exact and consistent you can use `exactperc50()` instead. However, the `exactperc<percentile>(<value>)` function is very resource expensive for high cardinality fields. See `perc<percentile>(<value>)`.

Basic examples

Consider the following list of values, which counts the number of different customers who purchased something from the Buttercup Games online store yesterday. The values are organized by the type of product (accessories, t-shirts, and type of games) that customers purchased.

categoryId	count
ACCESSORIES	37
ARCADE	58
NULL	8
SIMULATION	34
SPORTS	13
STRATEGY	74
TEE	38

When the list is sorted the median, or middle-most value, is 37.

categoryId	count
NULL	8
SPORTS	13
SIMULATION	34
ACCESSORIES	37
TEE	38
ARCADE	58
STRATEGY	74

min(<value>)

Description

Returns the minimum value of the field specified. If the values of X are non-numeric, the minimum value is found using lexicographical ordering.

This function processes field values as numbers if possible, otherwise processes field values as strings.

Usage

You can use this function with the chart, mstats, stats, and timechart commands.

Lexicographical order sorts items based on the values used to encode the items in computer memory. In Splunk software, this is almost always UTF-8 encoding, which is a superset of ASCII.

- If the items are all numeric, they're sorted in numerical order based on the first digit. For example, the numbers 10, 9, 70, 100 are sorted as 10, 100, 70, 9.
- If the items are mixed, they're sorted in numeric and then lexicographical order with all numbers sorted before non-numeric items. For example, the items 1, c, a, 2, 100, b, 4, 9 are sorted as 1, 2, 4, 9, 100, a, b, c.
- If all items are non-numeric, they're sorted in lexicographical order.
- Uppercase letters are sorted before lowercase letters.
- Symbols are not standard. Some symbols are sorted before numeric values. Other symbols are sorted before or after letters.

Basic examples

The following example returns the minimum size and maximum size of the HotBucketRoller component in the _internal index.

```
index=_internal component=HotBucketRoller | stats min(size), max(size)
```

The following example returns a list of processors and calculates the minimum cpu_seconds and the maximum cpu_seconds.

```
index=_internal | chart min(cpu_seconds), max(cpu_seconds) BY processor
```

Extended example

See the Extended example for the `max()` function. That example includes the `min()` function.

mode(<value>)

Description

Returns the most frequent value of the field specified.

Processes field values as strings.

Usage

You can use this function with the chart, stats, and timechart commands.

Basic examples

The `mode` returns the most frequent value. Consider the following data:

firstname	surname	age
Claudia	Garcia	32
David	Mayer	45
Alex	Garcia	29
Wei	Zhang	45
Javier	Garcia	37

When you search for the mode in the `age` field, the value `45` is returned.

```
...| stats mode(age)
```

You can also use mode with fields that contain string values. When you search for the mode in the `surname` field, the value `Garcia` is returned.

```
...| stats mode(surname)
```

Here's another set of sample data:

_time	host	sourcetype
04-06-2020 17:06:23.000 PM	www1	access_combined
04-06-2020 10:34:19.000 AM	www1	access_combined
04-03-2020 13:52:18.000 PM	www2	access_combined
04-02-2020 07:39:59.000 AM	www3	access_combined
04-01-2020 19:35:58.000 PM	www1	access_combined

If you run a search that looks for the mode in the `host` field, the value `www1` is returned because it is the most common value in the `host` field. For example:

```
... |stats mode(host)
```

The results look something like this:

mode(host)
www1

perc<percentile>(<value>)

Description

The percentile functions return the Nth percentile value of the numeric field <value>. You can think of this as an estimate of where the top percentile starts. For example, a 95th percentile says that 95% of the values in field Y are below the estimate and 5% of the values in field <value> are above the estimate.

Valid percentile values are floating point numbers between 0 and 100, such as 99.95.

There are three different percentile functions that you can use:

Function	Description
perc<percentile>(<value>) or the abbreviation p<percentile>(<value>)	Use the `perc` function to calculate an approximate threshold, such that of the values in field Y, X percent fall below the threshold. The `perc` function returns a single number that represents the lower end of the approximate values for the percentile requested.
upperperc<percentile>(<value>)	When there are more than 1000 values, the `upperperc` function gives the approximate upper bound for the percentile requested. Otherwise the `upperperc` function returns the same percentile as the `perc` function.
exactperc<percentile>(<value>)	The `exactperc` function provides the exact value, but is very resource expensive for high cardinality fields. The `exactperc` function can consume a large amount of memory, which might impact how long it takes for a search to complete.

The percentile functions process field values as strings.

> ⓘ NOTE: The `perc` and `upperperc` functions are, by their nature, nondeterministic, which means that that subsequent runs of searches using these functions over identical data can contain slight variances in their results.

If you require exact and consistent results, you can use `exactperc<X>(Y)` instead.

Usage

You can use this function with the chart, mstats, stats, timechart, and tstats commands.

Differences between Splunk and Excel percentile algorithms

If there are less than 1000 distinct values, the Splunk percentile functions use the nearest rank algorithm. See http://en.wikipedia.org/wiki/Percentile#Nearest_rank. Excel uses the NIST interpolated algorithm, which basically means you can get a value for a percentile that does not exist in the actual data, which is not possible for the nearest rank approach.

Splunk algorithm with more than 1000 distinct values

If there are more than 1000 distinct values for the field, the percentiles are approximated using a custom radix-tree digest-based algorithm. This algorithm is much faster and uses much less memory, a constant amount, than an exact computation, which uses memory in linear relation to the number of distinct values. By default this approach limits the approximation error to < 1% of rank error. That means if you ask for 95th percentile, the number you get back is between the 94th and 96th percentile.

You always get the exact percentiles even for more than 1000 distinct values by using the `exactperc` function compared to the `perc`.

Basic examples

Consider this list of values `Y = {10,9,8,7,6,5,4,3,2,1}`.

The following example returns 5.5.

```
...| stats perc50(Y)
```

The following example returns 9.55.

```
...| stats perc95(Y)
```

Extended example

Consider the following set of data, which shows the number of visitors for each hour a store is open:

hour	visitors
0800	0
0900	212
1000	367
1100	489
1200	624
1300	609
1400	492
1500	513
1600	376
1700	337

This data resides in the `visitor_count` index. You can use the `streamstats` command to create a cumulative total for the visitors.

```
index=visitor_count | streamstats sum(visitors) as 'visitors total'
```

The results from this search look like this:

hour	visitors	visitors total
0800	0	0
0900	212	212
1000	367	579
1100	489	1068
1200	624	1692
1300	609	2301
1400	492	2793
1500	513	3306
1600	376	3673
1700	337	4010

Let's add the `stats` command with the `perc` function to determine the 50th and 95th percentiles.

```
index=visitor_count | streamstats sum(visitors) as 'visitors total' |
stats perc50('visitors total') perc95('visitors total')
```

The results from this search look like this:

perc50(visitors total)	perc95(visitors total)
1996.5	3858.35

The `perc50` estimates the 50th percentile, when 50% of the visitors had arrived. You can see from the data that the 50th percentile was reached between visitor number 1996 and 1997, which was sometime between 1200 and 1300 hours. The `perc95` estimates the 95th percentile, when 95% of the visitors had arrived. The 95th percentile was reached with visitor 3858, which occurred between 1600 and 1700 hours.

range(<value>)

Description

Returns the difference between the max and min values of the field specified. The values in the field must be numeric.

Usage

You can use this function with the chart, mstats, stats, timechart, and tstats commands, and also with

sparkline() charts.

Basic example

This example uses events that list the numeric sales for each product and quarter, for example:

products	quarter	sales	quota
ProductA	QTR1	1200	1000
ProductB	QTR1	1400	1550
ProductC	QTR1	1650	1275
ProductA	QTR2	1425	1300
ProductB	QTR2	1175	1425
ProductC	QTR2	1550	1450
ProductA	QTR3	1300	1400
ProductB	QTR3	1250	1125
ProductC	QTR3	1375	1475
ProductA	QTR4	1550	1300
ProductB	QTR4	1700	1225
ProductC	QTR4	1625	1350

It is easiest to understand the `range` if you also determine the `min` and `max` values. To determine the range of sales by product, run this search:

```
source="addtotalsData.csv" | chart sum(sales) min(sales) max(sales)
range(sales) BY products
```

The results look like this:

quarter	sum(sales)	min(sales)	max(sales)	range(sales)
QTR1	4250	1200	1650	450
QTR2	4150	1175	1550	375
QTR3	3925	1250	1375	125
QTR4	4875	1550	1700	150

The range(sales) is the max(sales) minus the min(sales).

Extended example

See the Extended example for the `max()` function. That example includes the `range()` function.

stdev(<value>)

Description

Returns the sample standard deviation of the field specified.

Usage

You can use this function with the chart, mstats, stats, timechart, and tstats commands, and also with sparkline() charts.

Basic examples

This example returns the standard deviation of wildcarded fields "*delay" which can apply to both, "delay" and "xdelay".

```
... | stats stdev(*delay)
```

Extended example

This search uses recent earthquake data downloaded from the USGS Earthquakes website. The data is a comma separated ASCII text file that contains magnitude (mag), coordinates (latitude, longitude), region (place), etc., for each earthquake recorded.

You can download a current CSV file from the USGS Earthquake Feeds and upload the file to your Splunk instance. This example uses the All Earthquakes data from the past 30 days.

1. Run the following search to find the mean, standard deviation, and variance of the magnitudes of recent quakes by magnitude type.

   ```
   source=usgs place=*California* | stats count mean(mag),
   stdev(mag), var(mag) BY magType
   ```

   The results look something like this:

magType	count	mean(mag)	std(mag)	var(mag)
H	123	0.549593	0.356985	0.127438
MbLg	1	0.000000	0.000000	0.000000
Md	1565	1.056486	0.580042	0.336449
Me	2	1.800000	0.346410	0.120000
Ml	1202	1.226622	0.629664	0.396476
Mw	6	3.650000	0.716240	0.513000
ml	10	0.934000	0.560401	0.314049

stdevp(<value>)

Description

Returns the population standard deviation of the field specified.

Usage

You can use this function with the chart, mstats, stats, timechart, and tstats commands, and also with sparkline() charts.

Basic examples

Extended example

sum(<value>)

Description

Returns the sum of the values of the field specified.

Usage

You can use this function with the chart, mstats, stats, timechart, and tstats commands, and also with sparkline() charts.

Basic examples

You can create totals for any numeric field. For example:

```
...| stats sum(bytes)
```

The results look like this:

sum(bytes)
21502

You can rename the column using the AS keyword:

```
...| stats sum(bytes) AS "total bytes"
```

The results look something like this:

total bytes
21502

You can organize the results using a BY clause:

```
...| stats sum(bytes) AS "total bytes" by date_hour
```

The results look something like this:

date_hour	total bytes
07	6509
11	3726
15	6569
23	4698

sumsq(<value>)

Description

Returns the sum of the squares of the values of the field specified.

The sum of the squares is used to evaluate the variance of a dataset from the dataset mean. A large sum of the squares indicates a large variance, which tells you that individual values fluctuate widely from the mean.

Usage

You can use this function with the chart, mstats, stats, timechart, and tstats commands, and also with sparkline() charts.

Basic examples

The following table contains the temperatures taken every day at 8 AM for a week.

You calculate the mean of the these temperatures and get 48.9 degrees. To calculate the deviation from the mean for each day, take the temperature and subtract the mean. If you square each number, you get results like this:

day	temp	mean	deviation	square of temperatures
sunday	65	48.9	16.1	260.6
monday	42	48.9	-6.9	47.0
tuesday	40	48.9	-8.9	78.4
wednesday	31	48.9	-17.9	318.9
thursday	47	48.9	-1.9	3.4
friday	53	48.9	4.1	17.2
saturday	64	48.9	15.1	229.3

Take the total of the squares, 954.9, and divide by 6 which is the number of days minus 1. This gets you the sum of squares for this series of temperatures. The standard deviation is the square root of the sum of the squares. The larger the standard deviation the larger the fluctuation in temperatures during the week.

You can calculate the mean, sum of the squares, and standard deviation with a few statistical functions:

```
...|stats mean(temp), sumsq(temp), stdev(temp)
```

This search returns these results:

mean(temp)	sumsq(temp)	stdev(temp)
48.857142857142854	17664	12.615183595289349

upperperc<percentile>(<value>)

Description

Returns an approximate percentile value, based on the requested percentile of the numeric field.

When there are more than 1000 values, the `upperperc` function gives the approximate upper bound for the percentile requested. Otherwise the `upperperc` function returns the same percentile as the `perc` function.

See the percentile<percentile>(<value>) function.

Usage

You can use this function with the chart, mstats, stats, timechart, and tstats commands, and also with sparkline() charts.

Examples

See the perc function.

var(<value>)

Description

Returns the sample variance of the field specified.

Usage

You can use this function with the chart, mstats, stats, timechart, and tstats commands, and also with sparkline() charts.

Example

See the Extended example for the mean() function. That example includes the `var()` function.

varp(<value>)

Description

Returns the population variance of the field specified.

Usage

You can use this function with the chart, mstats, stats, timechart, and tstats commands, and also with sparkline() charts.

Basic examples