SQLite AVG

Summary: in this tutorial, you will learn how to use the SQLite `AVG` function to calculate the average value of a set of values.

Introduction to SQLite AVG function

The `AVG` function is an aggregate function (https://www.sqlitetutorial.net/sqlite-aggregate-functions/) that calculates the average value of all **non-NULL values** within a group.

The following illustrates the syntax of the `AVG` function:

```
AVG([ALL | DISTINCT] expression);
```

By default, the `AVG` function uses `ALL` clause whether you specify it or not. It means the AVG function will take all non-NULL values when it calculates the average value.

In case you want to calculate the average value of distinct (or unique) values, you need to specify the DISTINCT (https://www.sqlitetutorial.net/sqlite-select-distinct) clause explicitly in expression.

If a column stores mixed data types (https://www.sqlitetutorial.net/sqlite-data-types/) such as integer, real, BLOB, and text, SQLite `AVG` function interprets the BLOB that does not look like a number as zero (0).

The value of the `AVG` function is always a floating point value or a `NULL` value. The `AVG` function only returns a `NULL` value *if and only if* all values in the group are `NULL` values.

You can take a quick test to see how the SQLite function works with various data types.

First, create a new table (https://www.sqlitetutorial.net/sqlite-create-table/) named `avg_tests` using the following statement:

```
CREATE TABLE avg_tests (val);
```

Try It ›

Next, insert (https://www.sqlitetutorial.net/sqlite-insert/) some mixed values into the `avg_tests` table.

```
INSERT INTO avg_tests (val)
VALUES
 (1),
 (2),
 (10.1),
 (20.5),
 ('8'),
 ('B'),
 (NULL),
 (x'0010'),
 (x'0011');
```

Try It ›

Then, query data (https://www.sqlitetutorial.net/sqlite-select/) from the `avg_tests` table.

```
SELECT rowid,
       val
  FROM avg_tests;
```

Try It ›

rowid	val
1	1
2	2
3	10.1
4	20.5
5	8
6	B
7	*NULL*
8	
9	

After that, you can use the `AVG` function to calculate the average of the first four rows that contain only numeric values.

```
SELECT
       avg(val)
FROM
```

```
        avg_tests
WHERE
        rowid < 5;
```

Try It ›

avg(val)
8.4

Finally, apply the `AVG` function to all the values in the `val` column of the `avg_tests` table.

```
SELECT
        avg(val)
FROM
        avg_tests;
```

Try It ›

avg(val)
5.2

You have 9 rows in the `avg_tests` table. The row 7 is `NULL` . Therefore, when calculating the average, the `AVG` function ignores it and takes 8 rows into the calculation.

The first four rows are the integer and real values: 1,2, 10.1, and 20.5. The SQLite AVG function uses those values in the calculation.

The 5th and 6th row are text type because we inserted the as ‘B’ and ‘8’. Because 8 looks like a number, therefore SQLite interprets B as 0 and ‘8’ as 8.

The 8th and 9th rows are `BLOB` types that do not look like numbers, therefore, SQLite interprets these values as 0.

The `AVG(cal)` expression uses the following formula:

```
AVG(val) = (1 + 2 + 10.1 + 20.5 + 8 + 0 + 0 + 0 )/ 8 = 5.2
```

Let’s see how the `DISTINCT` clause works.

First, insert a new row into the `avg_tests` table with a value already exists.

```
INSERT INTO avg_tests (val)
VALUES (10.1);
```

Try It ›

Second, apply the `AVG` function without `DISTINCT` clause:

```
SELECT
        avg(val)
FROM
        avg_tests;
```

Try It ›

avg(val)
5.7444444444

Third, add the `DISTINCT` clause to the `AVG` function:

```
SELECT
        avg(DISTINCT val)
FROM
        avg_tests;
```

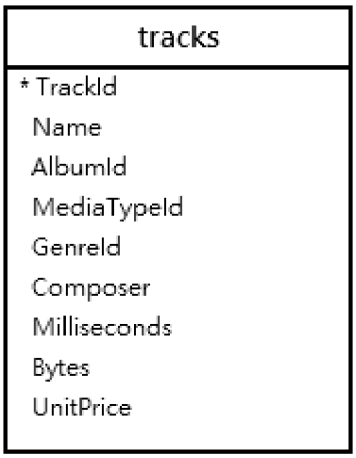
Try It ›

avg(DISTINCT val)
5.2

Because the `avg_tests` table has two rows with the same value 10.1, the `AVG(DISTINCT)` takes only the one row for calculation. Therefore, you got a different result.

SQLite AVG function practical examples

We will use the `tracks` table in the sample database (https://www.sqlitetutorial.net/sqlite-sample-database/) for the demonstration.



To calculate the average length of all tracks in milliseconds, you use the following statement:

```
SELECT
        avg(milliseconds)
FROM
        tracks;
```

Try It ›

avg(milliseconds)
393599.212103911

SQLite AVG function with GROUP BY clause

To calculate the average length of tracks for every album, you use the `AVG` function with the `GROUP BY` (https://www.sqlitetutorial.net/sqlite-group-by/) clause.

First, the `GROUP BY` clause groups a set of tracks by albums. Then, the `AVG` function calculates the average length of tracks for each album.

See the following statement.

```
SELECT
        albumid,
        avg(milliseconds)
FROM
        tracks
GROUP BY
        albumid;
```

Try It ›

SQLite AVG function with INNER JOIN clause example

To get the album title together with the `albumid` column, you use the INNER JOIN (https://www.sqlitetutorial.net/sqlite-inner-join/) clause in the above statement like the following query:

```
SELECT
        tracks.AlbumId,
        Title,
        round(avg(Milliseconds), 2) avg_length
FROM
        tracks
INNER JOIN albums ON albums.AlbumId = tracks.albumid
GROUP BY
        tracks.albumid;
```

Try It ›

AlbumId	Title	avg_length
1	For Those About To Rock We Salute You	240041.5
2	Balls to the Wall	342562.0
3	Restless and Wild	286029.33
4	Let There Be Rock	306657.38
5	Big Ones	294113.93
6	Jagged Little Pill	265455.77
7	Facelift	270780.42
8	Warner 25 Anos	207637.57

Notice that we used the `ROUND` function to round the floating value to 2 digits to the right of the decimal point.

SQLite AVG function with HAVING clause example

You can use either the `AVG` function or its column's alias in the HAVING clause (https://www.sqlitetutorial.net/sqlite-having/) to filter groups. The following statement only gets the albums whose average length are between 100000 and 200000.

```
SELECT
        tracks.albumid,
```

```
        title,
        round(avg(milliseconds),2)  avg_leng
FROM
        tracks
INNER JOIN albums ON albums.AlbumId = tracks.albumid
GROUP BY
        tracks.albumid
HAVING
        avg_leng BETWEEN 100000 AND 200000;
```

Try It ›

In this tutorial, we have shown you how to use the SQLite `AVG` function to calculate the average values of non-NULL values in a group.