Climate Change

Window functions with SQL

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Summary

The following short project is intended to showcase SQL window functions with the “state_climate” table .

Questions / Tasks

1. How does average temperature change over time in each state?
2. What are the lowest temperatures by state?
3. What are the highest temperatures by state?
4. What's the temperature change each year by state?
5. Rank the lowest temperatures on record
6. Rank the warmest temperatures by state
7. What are the average yearly temperatures by quartile in each state?
8. Average yearly temperatures in quintiles

Query Results

state	year	tempf	tempc
Alabama	1895	61.64166667	16.46759259
Alabama	1896	64.26666667	17.92592593
Alabama	1897	64.19166667	17.88425926
Alabama	1898	62.98333333	17.21296296
Alabama	1899	63.1	17.27777778
Alabama	1900	63.40833333	17.44907407
Alabama	1901	61.39166667	16.3287037
Alabama	1902	63.58333333	17.5462963
Alabama	1903	61.975	16.65277778
Alabama	1904	62.76666667	17.09259259

```
1   -- Preview the data
2   SELECT *
3   FROM state_climate
4   LIMIT 10;
-
```

Preview The Data

state	year	tempf	running_avg_temp
Alabama	1895	61.64166667	63.19540000016
Arizona	1895	58.49166667	59.65120000008
Arkansas	1895	58.85833333	60.54313333368
California	1895	56.45833333	57.63326666664
Colorado	1895	42.43333333	44.83566666656
Connecticut	1895	46.6	48.32773333328
Delaware	1895	52.70833333	54.5246666668
Florida	1895	68.71666667	70.32766666672
Georgia	1895	62.025	63.5255333332
Idaho	1895	41.40833333	42.7985999996

```
6   -- How average temperature changes over time in each state
7   SELECT state, year, tempf, AVG(tempf)
8   OVER (PARTITION BY state) AS 'running_avg_temp'
9   FROM state_climate
10  ORDER BY year
11  LIMIT 10;
```

1. Average temperature change over time by state

state	year	tempf	lowest_temp
Alabama	1976	60.675	60.675
Alabama	1968	61.0	60.675
Alabama	1940	61.175	60.675
Alabama	1983	61.19166667	60.675
Alabama	1958	61.21666667	60.675
Alabama	1979	61.35833333	60.675
Alabama	1969	61.36666667	60.675
Alabama	1901	61.39166667	60.675
Alabama	1960	61.54166667	60.675
Alabama	1895	61.64166667	60.675

```
13    -- Lowest temperatures for each state
14    SELECT state, year, tempf,
15    FIRST_VALUE(tempf) OVER (PARTITION BY state
16    ORDER BY tempf)
17    AS 'lowest_temp'
18    FROM state_climate
19    LIMIT 10;
```

2. Lowest temperatures by state

state	year	tempf	highest_temp
Alabama	1976	60.675	65.70833333
Alabama	1968	61.0	65.70833333
Alabama	1940	61.175	65.70833333
Alabama	1983	61.19166667	65.70833333
Alabama	1958	61.21666667	65.70833333
Alabama	1979	61.35833333	65.70833333
Alabama	1969	61.36666667	65.70833333
Alabama	1901	61.39166667	65.70833333
Alabama	1960	61.54166667	65.70833333
Alabama	1895	61.64166667	65.70833333

```
21  -- Highest temperatures for each state
22  SELECT state, year, tempf,
23  LAST_VALUE(tempf) OVER (PARTITION BY state ORDER BY tempf
24  RANGE BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING)
25  AS 'highest_temp'
26  FROM state_climate
27  LIMIT 10;
```

3. Highest temperatures by state

state	year	tempf	change_in_temp
North Dakota	1952	40.63333333	5.01666666
Minnesota	2015	43.49166667	4.85
Montana	1900	42.85	4.75
Michigan	1998	48.25	4.71666667
Wisconsin	1998	47.3	4.65833333
Minnesota	1973	42.26666667	4.6
Wisconsin	2015	44.81666667	4.59166667
Indiana	1921	54.93333333	4.55833333
South Dakota	2012	49.26666667	4.49166667
Indiana	1998	54.95	4.45

```
29  -- Temperature change each year in each state
30  SELECT state, year, tempf,
31  tempf - LAG(tempf, 1, tempf)
32  OVER (PARTITION BY state ORDER BY year) AS 'change_in_temp'
33  FROM state_climate
34  ORDER BY change_in_temp DESC
35  LIMIT 10;
```

4. Temperature change each year by state

state	year	tempf	rank
North Dakota	1950	34.9	1
North Dakota	1951	35.61666667	2
Minnesota	1917	35.675	3
North Dakota	1916	35.73333333	4
North Dakota	1917	35.91666667	5
North Dakota	1899	36.25	6
North Dakota	1896	36.425	7
Minnesota	1950	36.45833333	8
Maine	1904	36.51666667	9
North Dakota	1996	36.51666667	9

```
37    -- Rank the coldest temperatures on record
38    SELECT state, year, tempf,
39    RANK() OVER (ORDER BY tempf)
40    AS 'rank'
41    FROM state_climate
42    LIMIT 10;
```

5. Rank the coldest temperatures on record

state	year	tempf	warmest_rank
Alabama	1921	65.70833333	1
Alabama	1927	65.58333333	2
Alabama	2019	65.375	3
Alabama	2016	65.34166667	4
Alabama	1911	65.325	5
Alabama	1922	65.16666667	6
Alabama	1998	65.125	7
Alabama	1933	65.1	8
Alabama	2017	65.03333333	9
Alabama	1925	64.95833333	10

```
44    -- Rank the warmest for each state
45    SELECT state, year, tempf,
46    RANK() OVER (PARTITION BY state ORDER BY tempf DESC)
47    AS warmest_rank
48    FROM state_climate
49    LIMIT 10;
```

6. Rank the warmest for each state

quartile	year	state	tempf
1	1976	Alabama	60.675
1	1968	Alabama	61.0
1	1940	Alabama	61.175
1	1983	Alabama	61.19166667
1	1958	Alabama	61.21666667
1	1979	Alabama	61.35833333
1	1969	Alabama	61.36666667
1	1901	Alabama	61.39166667
1	1960	Alabama	61.54166667
1	1895	Alabama	61.64166667

6. Average yearly temperatures by quartiles for each state

```
51  -- Average yearly temperatures in quartiles by state
52  SELECT NTILE(4) OVER (PARTITION BY state ORDER BY tempf)
53  AS quartile, year, state, tempf
54  FROM state_climate
55  LIMIT 10;
```

quintile	year	state	tempf
1	1950	North Dakota	34.9
1	1951	North Dakota	35.61666667
1	1917	Minnesota	35.675
1	1916	North Dakota	35.73333333
1	1917	North Dakota	35.91666667
1	1899	North Dakota	36.25
1	1896	North Dakota	36.425
1	1950	Minnesota	36.45833333
1	1904	Maine	36.51666667
1	1996	North Dakota	36.51666667

7. Average yearly temperatures by quintiles

```
57  -- Average yearly temperatures in quintiles
58  SELECT NTILE(5) OVER (ORDER BY tempf)
59  AS quintile, year, state, tempf
60  FROM state_climate
61  LIMIT 10;
```