Double-click (or enter) to edit

written material

going to grab this data from gh: https://raw.githubusercontent.com/stefanbund/py3100/main/ProductList_118.csv

The Ulta Beauty Problem

our work entails designing and delivering a business intelligence application that serves a major retail enterprise. The system ....

first, install the plotly visualization library.

```
!pip install plotly-geo
```

```
Collecting plotly-geo
  Downloading plotly_geo-1.0.0-py3-none-any.whl (23.7 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 23.7/23.7 MB 6.5 MB/s eta 0:00:00
Installing collected packages: plotly-geo
Successfully installed plotly-geo-1.0.0
```

The command in this cell above indicates the installation of a package that further describes geographical plotting.

our system depends on the use of the pandas and numpy libraries.

```
import pandas as pd
import numpy as np
```

"pd" is short for "pandas" and "np" is short for "numpy". These shorthand abbreviations will be used throughout the notebook, and are used as time saving and easy shortcuts.

```
url ='https://raw.githubusercontent.com/stefanbund/py3100/main/ProductList_118.csv'
url_m = 'https://raw.githubusercontent.com/stefanbund/py3100/main/matrix.csv'
```

The links presented allows for the data to be attained by the notebook, and to easier access certain data within.

```
df_m = pd.read_csv(url_m) #make a pandas dataframe
```

Dataframe of Matrix is reached through the given link.

```
df_m
```

	City	1	2	3	4	5	6	7	8	9	...	32	33	
0	Birmingham	8285	5343	6738	6635	5658	8118	4311	8535	3436	...	1340	6923	3(
1	Montgomery	1287	6585	8300	8874	8208	5363	3552	3387	2765	...	4424	8813	6(
2	Mobile	8035	5569	9492	5905	5024	1107	6937	5580	8044	...	5430	1601	9'
3	Huntsville	6280	2841	3399	5448	6173	5451	7488	9981	5236	...	9169	7829	6{
4	Tuscaloosa	4079	1066	3923	4177	4277	4219	9436	8160	4302	...	1556	5533	1{
5	Hoover	9741	7377	9410	9790	8864	2522	5347	9145	8402	...	6031	7673	8'
6	Dothan	7646	2060	4911	4976	7851	4277	7423	6183	6641	...	8253	1565	6(
7	Auburn	4326	2659	6928	4656	1828	5199	5331	6294	3076	...	6128	3737	7'
8	Decatur	3786	2891	8124	2469	3704	3623	2409	8287	2032	...	6622	9742	9'
9	Madison	1934	3628	9190	3275	9344	5778	1256	3523	1781	...	6619	6128	5'
10	Florence	8017	3187	1128	4706	9962	7547	4440	4530	9569	...	8306	1392	1'
11	Gadsden	2290	6402	8598	7547	5158	9731	8038	4435	7357	...	4488	3591	1{
12	Vestavia Hills	9471	9142	4419	3846	2016	5069	4853	6336	9062	...	4613	2942	7'

The Rows and Columns display data that is given for the dataframe for Matrix.

```
df_m.columns #dimensionality of the matrix
```

```
Index(['City', '1', '2', '3', '4', '5', '6', '7', '8', '9', '10', '11', '12',
       '13', '14', '15', '16', '17', '18', '19', '20', '21', '22', '23', '24',
       '25', '26', '27', '28', '29', '30', '31', '32', '33', '34', '35', '36',
       '37', '38', '39', '40', '41'],
      dtype='object')
```

Columns analyzed within dataframe Matrix is listed.

list all cities in the matrix dataframe

```
df_m['City'] #explore a Series inside the dataframe
```

```
0         Birmingham
1         Montgomery
2             Mobile
3         Huntsville
4         Tuscaloosa
5             Hoover
6             Dothan
7             Auburn
8            Decatur
9            Madison
10          Florence
11           Gadsden
12    Vestavia Hills
13        Prattville
14       Phenix City
15         Alabaster
16          Bessemer
17        Enterprise
18           Opelika
19         Homewood
20         Northport
21            Pelham
22        Trussville
23    Mountain Brook
24          Fairhope
Name: City, dtype: object
```

The list of 24 cities is given for dataframe M.

investigate quartile as an analytic tool

```
df_m.dtypes
# df_m.columns
```

```
City    object
1        int64
2        int64
3        int64
4        int64
5        int64
6        int64
7        int64
8        int64
9        int64
10       int64
11       int64
12       int64
13       int64
14       int64
15       int64
16       int64
17       int64
18       int64
19       int64
20       int64
21       int64
22       int64
23       int64
24       int64
25       int64
26       int64
27       int64
28       int64
29       int64
30       int64
31       int64
32       int64
33       int64
34       int64
35       int64
36       int64
37       int64
38       int64
39       int64
40       int64
41       int64
dtype: object
```

The data types for each column is shown for dataframe M.

Quantiles for each display, all stores

```
df_3 = df_m.quantile([0.25, 0.5, 0.75], numeric_only=True, axis=1)
df_3
```

	0	1	2	3	4	5	6	7	8	9	...	
0.25	3082.0	3633.0	2236.0	3473.0	3657.0	4628.0	4254.0	3588.0	3704.0	3451.0	...	344
0.50	5343.0	5431.0	5311.0	5771.0	5131.0	7588.0	5156.0	5331.0	6589.0	5875.0	...	647
0.75	7242.0	8074.0	7508.0	7935.0	7490.0	9145.0	6840.0	7606.0	8221.0	7783.0	...	743

3 rows × 25 columns

Quartile split up between 0.25, 0.5, 0.75 and displayed within the 25 columns.

per store, the quartile values

```
l = df_3.T.columns  #transpose, T
l
```

```
Float64Index([0.25, 0.5, 0.75], dtype='float64')
```

```
df_3.T.mean()
```

```
0.25    3535.24
0.50    5826.36
```

```
0.75    7953.00
dtype: float64
```

define the global quartile boundary, per q

```
df_3.T[0.25].mean()
```

```
3535.24
```

This cell describes the mean or average of quartile, "0.25" as per store dataframe.

Double-click (or enter) to edit

```
df_3.T[0.5].mean()
```

```
5826.36
```

This cell describes the mean or average quartile, "0.50" as per store dataframe.

```
df_3.T[0.75].mean()
```

```
7953.0
```

This cell describes the mean or average of quartile, "0.75" as per store dataframe.

Double-click (or enter) to edit

```
kk = df_3.T.mean()
kk #series
```

```
0.25    3535.24
0.50    5826.36
0.75    7953.00
dtype: float64
```

Although "kk" is not a direct abbreviation to particular words, it is still used as a placeholder to represent certain data.

what percentage of displays are at or below the 25th quartile, per store? exercise

```
# n =
((df_m.iloc[:, 1:] <= kk[0.25]).sum(axis=1) / df_m.shape[1]) * 100
# print(round(n))
```

```
0     28.571429
1     21.428571
2     38.095238
3     26.190476
4     21.428571
5     16.666667
6     19.047619
7     23.809524
8     21.428571
9     28.571429
10    26.190476
11    19.047619
12    26.190476
13    23.809524
14    28.571429
15    28.571429
16    14.285714
17    19.047619
18    28.571429
19    19.047619
20    28.571429
21    23.809524
22    33.333333
23    19.047619
```

```
24    33.333333
dtype: float64
```

Data within the 25th quartile compared.

```
la = df_m['25qt'] = round(((df_m.iloc[:, 1:] <= kk[0.25]).sum(axis=1) / df_m.shape[1]) * 100,1)
ll = df_m['50qt'] = round(((df_m.iloc[:, 1:] <= kk[0.50]).sum(axis=1) / df_m.shape[1]) * 100,1)
lll = df_m['75qt'] = round(((df_m.iloc[:, 1:] <= kk[0.75]).sum(axis=1) / df_m.shape[1]) * 100,1)
print(la, ll, lll)
```

```
18    28.6
19    19.0
20    28.6
21    23.8
22    33.3
23    19.0
24    33.3
dtype: float64 0     55.8
1     55.8
2     60.5
3     51.2
4     60.5
5     34.9
6     55.8
7     51.2
8     46.5
9     48.8
10    48.8
11    41.9
12    53.5
13    44.2
14    48.8
15    41.9
16    46.5
17    41.9
18    55.8
19    41.9
20    53.5
21    51.2
22    48.8
23    53.5
24    67.4
dtype: float64 0     77.3
1     70.5
2     79.5
3     77.3
4     79.5
5     59.1
6     90.9
7     79.5
8     70.5
9     75.0
10    63.6
11    68.2
12    70.5
13    75.0
14    75.0
15    84.1
16    70.5
17    72.7
18    72.7
19    68.2
20    75.0
21    72.7
22    75.0
23    70.5
24    86.4
dtype: float64
```

```
# df_m
```

"df" means dataframe, followed by the "m" which refers to the matrix datasheet. This command asks to give the data for m.

```
end_set = ['City','25qt','50qt','75qt']
df_m[end_set]
```

	City	25qt	50qt	75qt
0	Birmingham	28.6	55.8	77.3
1	Montgomery	21.4	55.8	70.5
2	Mobile	38.1	60.5	79.5
3	Huntsville	26.2	51.2	77.3
4	Tuscaloosa	21.4	60.5	79.5
5	Hoover	16.7	34.9	59.1
6	Dothan	19.0	55.8	90.9
7	Auburn	23.8	51.2	79.5
8	Decatur	21.4	46.5	70.5
9	Madison	28.6	48.8	75.0
10	Florence	26.2	48.8	63.6
11	Gadsden	19.0	41.9	68.2
12	Vestavia Hills	26.2	53.5	70.5
13	Prattville	23.8	44.2	75.0
14	Phenix City	28.6	48.8	75.0
15	Alabaster	28.6	41.9	84.1
16	Bessemer	14.3	46.5	70.5
17	Enterprise	19.0	41.9	72.7
18	Opelika	28.6	55.8	72.7
19	Homewood	19.0	41.9	68.2
20	Northport	28.6	53.5	75.0
21	Pelham	23.8	51.2	72.7
22	Trussville	33.3	48.8	75.0
23	Mountain Brook	19.0	53.5	70.5

Cities organized based on City, the 25th quartile, 50th quartile, and 75th quartile.

create a choropleth for each store

```
#choropleth:
import pandas as pd

# Create a sample dataframe
data = {'City': ['Birmingham', 'Montgomery', 'Mobile', 'Huntsville', 'Tuscaloosa', 'Hoover', 'Dothan', 'Auburn', 'Decatur', 'Madison', 'Flor
        'Zip Code': ['35201','36101','36601','35801','35401','35216','36301','36830','35601','35756','35630','35901','35216','36066','36867'

df = pd.DataFrame(data)

# Create a list of zip codes
zip_codes = ['35201', '36101', '36601', '35801', '35401', '35216',
             '36301', '36830', '35601', '35756', '35630', '35901',
             '35216', '36066', '36867', '35007', '35020',
             '36330', 36801, 35209, 35473, 35124, 35173, 35213, 36532]

# Add the list of zip codes as a new column to the dataframe
# df = df.assign(Zip_Codes=zip_codes)
df_m = df_m.assign(zip=zip_codes)


print(df_m)
```

```
              City     1     2     3     4     5     6     7     8     9  ...  \
0       Birmingham  8285  5343  6738  6635  5658  8118  4311  8535  3436  ...
1       Montgomery  1287  6585  8300  8874  8208  5363  3552  3387  2765  ...
2           Mobile  8035  5569  9492  5905  5024  1107  6937  5580  8044  ...
3       Huntsville  6280  2841  3399  5448  6173  5451  7488  9981  5236  ...
4       Tuscaloosa  4079  1066  3923  4177  4277  4219  9436  8160  4302  ...
```

5	Hoover	9741	7377	9410	9790	8864	2522	5347	9145	8402	...
6	Dothan	7646	2060	4911	4976	7851	4277	7423	6183	6641	...
7	Auburn	4326	2659	6928	4656	1828	5199	5331	6294	3076	...
8	Decatur	3786	2891	8124	2469	3704	3623	2409	8287	2032	...
9	Madison	1934	3628	9190	3275	9344	5778	1256	3523	1781	...
10	Florence	8017	3187	1128	4706	9962	7547	4440	4530	9569	...
11	Gadsden	2290	6402	8598	7547	5158	9731	8038	4435	7357	...
12	Vestavia Hills	9471	9142	4419	3846	2016	5069	4853	6336	9062	...
13	Prattville	6039	8003	6180	4610	3548	7115	6720	8512	9954	...
14	Phenix City	8788	8269	6838	2863	6753	6608	4048	8774	4513	...
15	Alabaster	1733	9767	3274	7125	7437	5748	5399	6513	3038	...
16	Bessemer	6559	2453	1578	5158	3058	8075	7066	8530	8346	...
17	Enterprise	8436	7800	7234	5063	4274	1948	7887	6647	1320	...
18	Opelika	9998	8953	7923	6176	4369	9503	2126	1816	9224	...
19	Homewood	2373	7188	9880	9236	5969	9998	8703	8440	4643	...
20	Northport	3536	9231	8651	6374	4842	5704	8484	6322	2012	...
21	Pelham	6830	3736	2734	6443	8494	6206	7290	8518	6176	...
22	Trussville	2794	8273	9174	2850	8351	3978	5995	4632	7693	...
23	Mountain Brook	8433	9368	2141	2357	6566	1482	4787	3900	6615	...
24	Fairhope	8114	1464	2811	3090	4686	7995	7676	1304	7332	...

	36	37	38	39	40	41	25qt	50qt	75qt	zip
0	3555	1341	1756	7598	1509	1861	28.6	55.8	77.3	35201
1	2805	4601	4449	5727	2315	8822	21.4	55.8	70.5	36101
2	9807	2652	9296	2815	4886	7458	38.1	60.5	79.5	36601
3	7935	2605	9982	3338	9116	3875	26.2	51.2	77.3	35801
4	3657	2158	4469	2513	8135	6963	21.4	60.5	79.5	35401
5	9748	7224	4628	8107	6143	1671	16.7	34.9	59.1	35216
6	5650	4400	7842	4006	9335	3571	19.0	55.8	90.9	36301
7	4387	6890	2833	5083	9707	2116	23.8	51.2	79.5	36830
8	9305	6509	6848	5408	3707	8744	21.4	46.5	70.5	35601
9	1746	4470	7054	6573	3556	1374	28.6	48.8	75.0	35756
10	5929	1123	7306	8746	4000	6943	26.2	48.8	63.6	35630
11	2549	5175	5997	9608	7230	9731	19.0	41.9	68.2	35901
12	5142	9619	9601	8099	1391	6276	26.2	53.5	70.5	35216
13	1591	4401	3457	4245	4341	2573	23.8	44.2	75.0	36066
14	3520	7654	6845	7738	3828	1202	28.6	48.8	75.0	36867
15	2479	9673	7478	7207	7006	3523	28.6	41.9	84.1	35007
16	4810	7641	5365	3545	6812	9483	14.3	46.5	70.5	35020
17	3461	2640	4375	8634	4917	2830	19.0	41.9	72.7	36330
18	5191	9304	2720	3100	3912	1548	28.6	55.8	72.7	36801
19	8787	5459	8389	5242	2224	6025	19.0	41.9	68.2	35209
20	6947	5401	6681	9018	1668	8307	28.6	53.5	75.0	35473
21	2777	4045	7309	4745	4284	2640	23.8	51.2	72.7	35124
22	1650	9470	6356	4700	3344	8743	33.3	48.8	75.0	35173
23	5765	3653	5198	9266	4945	3935	19.0	53.5	70.5	35213
24	3457	4808	7227	5482	6355	4553	33.3	67.4	86.4	36532

[25 rows x 46 columns]

The data that will be included within the chloropleth that will allow a different visualization to compare statistics within the states.

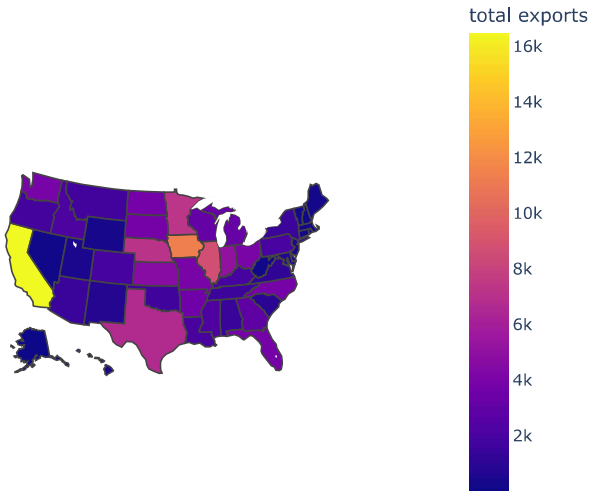
experiment with chloropleths

```
df_m.columns
```

```
Index(['City', '1', '2', '3', '4', '5', '6', '7', '8', '9', '10', '11', '12',
       '13', '14', '15', '16', '17', '18', '19', '20', '21', '22', '23', '24',
       '25', '26', '27', '28', '29', '30', '31', '32', '33', '34', '35', '36',
       '37', '38', '39', '40', '41', '25qt', '50qt', '75qt', 'zip'],
      dtype='object')
```

Dataframe is setting up the columns in which the chloropleth graph will compare.

```
import plotly.express as px
import pandas as pd

# Load data
df_demo = pd.read_csv('https://raw.githubusercontent.com/plotly/datasets/master/2011_us_ag_exports.csv')

# Create choropleth map
fig = px.choropleth(df_demo, locations='code', locationmode='USA-states', color='total exports', scope='usa')

# Show map
fig.show()
```



Cloropleth graph shows states' statistics of total experts, with different shades of color descrbibing different number of exports. California is a clear outlier as it is highlighted in yellow, proving to have reached the 16k in total exports benchmark.

```
df_demo
```

	code	state	category	total exports	beef	pork	poultry	dairy	fruits fresh	fruits proc
0	AL	Alabama	state	1390.63	34.4	10.6	481.0	4.06	8.0	17.1
1	AK	Alaska	state	13.31	0.2	0.1	0.0	0.19	0.0	0.0
2	AZ	Arizona	state	1463.17	71.3	17.9	0.0	105.48	19.3	41.0
3	AR	Arkansas	state	3586.02	53.2	29.4	562.9	3.53	2.2	4.7
4	CA	California	state	16472.88	228.7	11.1	225.4	929.95	2791.8	5944.6
5	CO	Colorado	state	1851.33	261.4	66.0	14.0	71.94	5.7	12.2
6	CT	Connecticut	state	259.62	1.1	0.1	6.9	9.49	4.2	8.9
7	DE	Delaware	state	282.19	0.4	0.6	114.7	2.30	0.5	1.0
8	FL	Florida	state	3764.09	42.6	0.9	56.9	66.31	438.2	933.1
9	GA	Georgia	state	2860.84	31.0	18.9	630.4	38.38	74.6	158.9
10	HI	Hawaii	state	401.84	4.0	0.7	1.3	1.16	17.7	37.8
11	ID	Idaho	state	2078.89	119.8	0.0	2.4	294.60	6.9	14.7
12	IL	Illinois	state	8709.48	53.7	394.0	14.0	45.82	4.0	8.5
13	IN	Indiana	state	5050.23	21.9	341.9	165.6	89.70	4.1	8.8
14	IA	Iowa	state	11273.76	289.8	1895.6	155.6	107.00	1.0	2.2
15	KS	Kansas	state	4589.01	659.3	179.4	6.4	65.45	1.0	2.1
16	KY	Kentucky	state	1889.15	54.8	34.2	151.3	28.27	2.1	4.5
17	LA	Louisiana	state	1914.23	19.8	0.8	77.2	6.02	5.7	12.1
18	ME	Maine	state	278.37	1.4	0.5	10.4	16.18	16.6	35.4
19	MD	Maryland	state	692.75	5.6	3.1	127.0	24.81	4.1	8.8
20	MA	Massachusetts	state	248.65	0.6	0.5	0.6	5.81	25.8	55.0
21	MI	Michigan	state	3164.16	37.7	118.1	32.6	214.82	82.3	175.3
22	MN	Minnesota	state	7192.33	112.3	740.4	189.2	218.05	2.5	5.4

Dataframe is statistically divided into 28 states comparing number of sales in different categories.

```
df_demo.columns
```

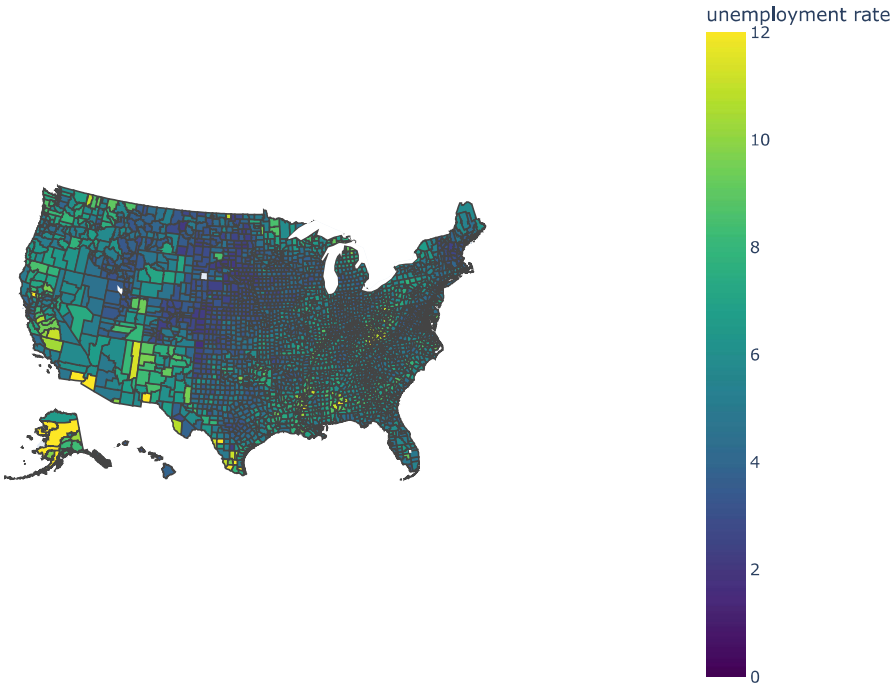
```
Index(['code', 'state', 'category', 'total exports', 'beef', 'pork', 'poultry',
       'dairy', 'fruits fresh', 'fruits proc', 'total fruits', 'veggies fresh',
       'veggies proc', 'total veggies', 'corn', 'wheat', 'cotton'],
      dtype='object')
```

The list of columns in which the dataframe compares statistics in.

30	NM	New Mexico	state	751.58	117.2	0.1	0.3	191.01	32.6	69.3

map demo #2: state of AL

```
from urllib.request import urlopen
import json
with urlopen('https://raw.githubusercontent.com/plotly/datasets/master/geojson-counties-fips.json') as response:
    counties = json.load(response)

import pandas as pd
df_us = pd.read_csv("https://raw.githubusercontent.com/plotly/datasets/master/fips-unemp-16.csv",
                    dtype={"fips": str})

import plotly.express as px

fig = px.choropleth(df_us, geojson=counties, locations='fips', color='unemp',
                           color_continuous_scale="Viridis",
                           range_color=(0, 12),
                           scope="usa",
                           labels={'unemp':'unemployment rate'})
fig.update_layout(margin={"r":0,"t":0,"l":0,"b":0})
fig.show()
```



Unemployment rates shown in chloropleth graph. Unemployment rates are taken from each every country in every state.

```
df_us.columns
```

```
Index(['fips', 'unemp'], dtype='object')
```

Dataframe for columns of states within the US.

```
df_us
```

	fips	unemp
0	01001	5.3
1	01003	5.4
2	01005	8.6
3	01007	6.6
4	01009	5.5
...	...	...
3214	72145	13.9
3215	72147	10.6
3216	72149	20.2
3217	72151	16.9
3218	72153	18.8

3219 rows × 2 columns

Dataframe of US that compares the FIPS to its Unemployment rates.

documentation here, with more discusssion here, and specifially to do counties, here

county **list** for ulta stores in Alabama, by FIPS code

```
al_fips =[
    {'County': 'Autauga', 'FIPS Code': '01001'},
    {'County': 'Baldwin', 'FIPS Code': '01003'},
    {'County': 'Barbour', 'FIPS Code': '01005'},
    {'County': 'Bibb', 'FIPS Code': '01007'},
    {'County': 'Blount', 'FIPS Code': '01009'},
    {'County': 'Bullock', 'FIPS Code': '01011'},
    {'County': 'Butler', 'FIPS Code': '01013'},
    {'County': 'Calhoun', 'FIPS Code': '01015'},
    {'County': 'Chambers', 'FIPS Code': '01017'},
    {'County': 'Cherokee', 'FIPS Code': '01019'},
    {'County': 'Chilton', 'FIPS Code': '01021'},
    {'County': 'Choctaw', 'FIPS Code': '01023'},
    {'County': 'Clarke', 'FIPS Code': '01025'},
    {'County': 'Clay', 'FIPS Code': '01027'},
    {'County': 'Cleburne', 'FIPS Code': '01029'},
    {'County': 'Coffee', 'FIPS Code': '01031'},
    {'County': 'Colbert', 'FIPS Code': '01033'},
    {'County': 'Conecuh', 'FIPS Code': '01035'},
    {'County':'Greene', 'FIPS Code' : '28073'},
    {'County':'Hale', 'FIPS Code' : '28065'},
    {'County':'Henry','FIPS Code' : '28067'},
    {'County':'Houston', 'FIPS Code' : '28069'},
    {'County':'Jackson', 'FIPS Code' : '28071'},
    {'County':'Jefferson', 'FIPS Code' : '28073'},
    {'County':'Lamar', 'FIPS Code' : '28073'}]
len(al_fips)
```

```
25
```

FIPS codes listed.

```
df_m.columns
```

```
Index(['City', '1', '2', '3', '4', '5', '6', '7', '8', '9', '10', '11', '12',
       '13', '14', '15', '16', '17', '18', '19', '20', '21', '22', '23', '24',
       '25', '26', '27', '28', '29', '30', '31', '32', '33', '34', '35', '36',
       '37', '38', '39', '40', '41', '25qt', '50qt', '75qt', 'zip'],
      dtype='object')
```

```
df_m
```

	City	1	2	3	4	5	6	7	8	9	...	36	37	
0	Birmingham	8285	5343	6738	6635	5658	8118	4311	8535	3436	...	3555	1341	1
1	Montgomery	1287	6585	8300	8874	8208	5363	3552	3387	2765	...	2805	4601	4
2	Mobile	8035	5569	9492	5905	5024	1107	6937	5580	8044	...	9807	2652	9
3	Huntsville	6280	2841	3399	5448	6173	5451	7488	9981	5236	...	7935	2605	9
4	Tuscaloosa	4079	1066	3923	4177	4277	4219	9436	8160	4302	...	3657	2158	4
5	Hoover	9741	7377	9410	9790	8864	2522	5347	9145	8402	...	9748	7224	4

Dataframe for matrix shown in table, 25 rows and 46 columns.

7	Auburn	4326	2659	6928	4656	1828	5199	5331	6294	3076	...	4387	6890	2

```
df_m.shape[0]
```

```
25
```

transform al_fips, the list of county fps codes, into a pandas dataframe

```
print(len(al_fips))
df_counties = pd.DataFrame(al_fips)
df_counties.size
```

```
25
50
```

```
print(df_counties.columns)
```

```
Index(['County', 'FIPS Code'], dtype='object')
```

df_m: all display data, per store

20	Northport	3536	9231	8651	6374	4842	5704	8484	6322	2012	...	6947	5401	6

```
df_m.shape[0]
```

```
25
```

fips codes per county

24	Fairhope	8114	1464	2811	3090	4686	7995	7676	1304	7332	...	3457	4808	7

```
df_counties.shape[0]
```

```
25
```

```
df_counties.columns
```

```
Index(['County', 'FIPS Code'], dtype='object')
```

merge the county fips codes with the stores sales results (df_m)

```
merged_df = pd.concat([df_m, df_counties], axis=1)
merged_df.head()
```

	City	1	2	3	4	5	6	7	8	9	...	38	39	4
0	Birmingham	8285	5343	6738	6635	5658	8118	4311	8535	3436	...	1756	7598	15
1	Montgomery	1287	6585	8300	8874	8208	5363	3552	3387	2765	...	4449	5727	23
2	Mobile	8035	5569	9492	5905	5024	1107	6937	5580	8044	...	9296	2815	48
3	Huntsville	6280	2841	3399	5448	6173	5451	7488	9981	5236	...	9982	3338	91
4	Tuscaloosa	4079	1066	3923	4177	4277	4219	9436	8160	4302	...	4469	2513	81

use the merged_df as data source for the choropleth

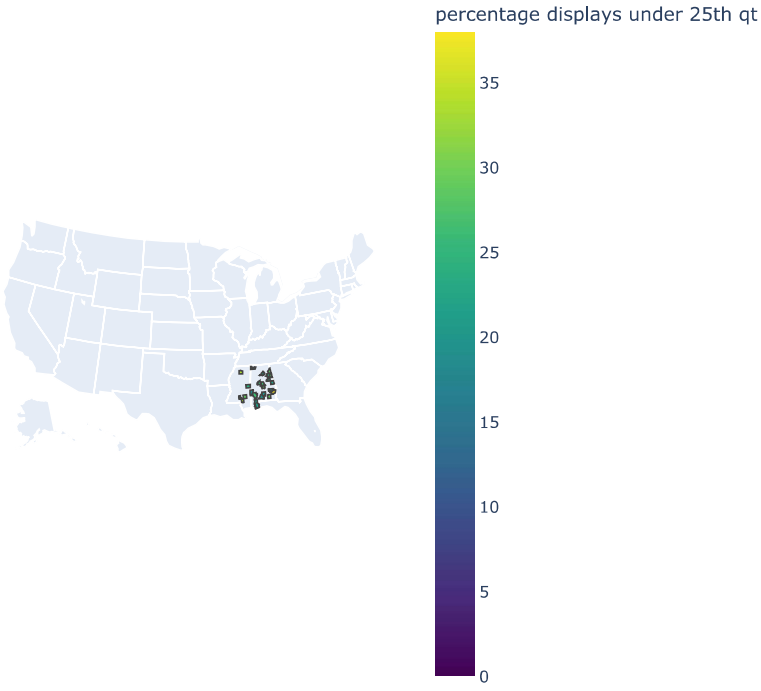
```
merged_df.columns
```

```
Index(['City', '1', '2', '3', '4', '5', '6', '7', '8', '9', '10', '11', '12',
       '13', '14', '15', '16', '17', '18', '19', '20', '21', '22', '23', '24',
       '25', '26', '27', '28', '29', '30', '31', '32', '33', '34', '35', '36',
       '37', '38', '39', '40', '41', '25qt', '50qt', '75qt', 'zip', 'County',
       'FIPS Code'],
      dtype='object')
```

Dataframe structures columns with quartile, zip codes, county, & FIPS code.

use the plotly api, feed it the merged_df information to do a map, with encoded quantile values

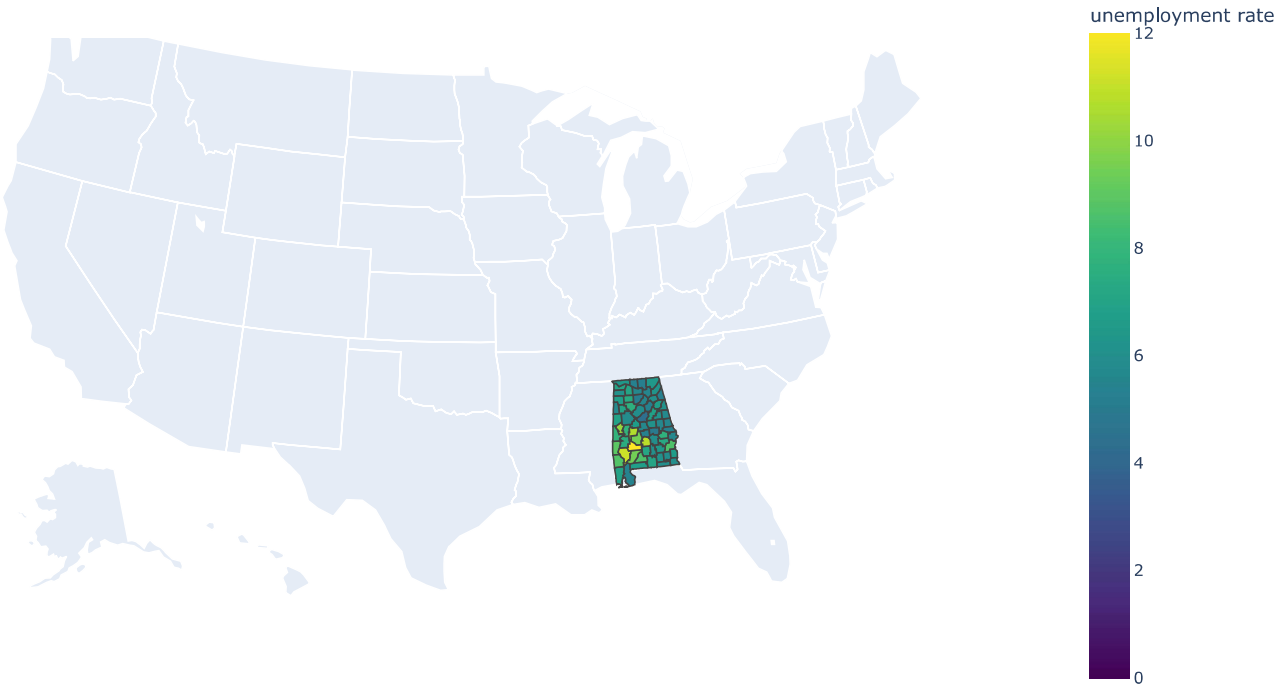
```
import plotly.express as px

fig = px.choropleth(merged_df, geojson=counties, locations='FIPS Code', color='25qt',
                           color_continuous_scale="Viridis",
                           range_color=(0, 38),
                           scope="usa",
                    hover_name="City",
                    hover_data=["City"],
                           labels={'25qt':'percentage displays under 25th qt'}  #
                          )
fig.update_layout(margin={"r":0,"t":0,"l":0,"b":0})
fig.show()
```



Clorpleth map outlines Fips codes and cities within the 25th quartile of highest percentage.

```
import plotly.express as px
import requests
import json
import pandas as pd

# Load the geojson data for Alabama's counties
r = requests.get('https://raw.githubusercontent.com/plotly/datasets/master/geojson-counties-fips.json')
counties = json.loads(r.text)

# Filter the geojson data to only include Alabama's counties
target_states = ['01']
counties['features'] = [f for f in counties['features'] if f['properties']['STATE'] in target_states]

# Load the sample data for Alabama's counties
df = pd.read_csv('https://raw.githubusercontent.com/plotly/datasets/master/fips-unemp-16.csv', dtype={'fips': str})

# Create the choropleth map
```

```
fig = px.choropleth(df, geojson=counties, locations='fips', color='unemp',
                    color_continuous_scale='Viridis', range_color=(0, 12),
                    scope='usa', labels={'unemp': 'unemployment rate'})
fig.update_layout(margin={'r': 0, 't': 0, 'l': 0, 'b': 0})
fig.show()
```



Unemployment rates described within the state of Alabama. Cloropleth map represents lighter color as higher uneployment rate.