

Member Stage3

March 28, 2023

```
[2]: import pandas as pd
import os
import numpy as np
import scipy.stats as stats
import matplotlib.pyplot as plt
import datetime as dt
from scipy.stats.distributions import gamma
from scipy.stats import gaussian_kde, moment

%matplotlib inline
```

```
[3]: #checking if the path exists for the given link
import os
#"C:\Users\ashdh\Documents\GitHub\Ferocious5_CS605\DATASETS\ENRICHMENT_
↪DATASETS\ACSDP1Y2021.DP04-DataHousing.csv"
relative_path = r"..\..\..\DATASETS\COVID DATASETS\covid_confirmed_usafacts.csv"

if os.path.exists(relative_path):
    print("The file exists at the specified path.")
else:
    print("The file does not exist at the specified path.")
```

The file exists at the specified path.

0.1 TASK 1:

Use the state data generated in Stage II to fit a distribution to the number of COVID-19 new cases using any of MoM, MLE, and KDE methods.

- Graphically plot the distribution.
- Describe the type of distribution and its statistics (moments of a distribution - center, variance, skewness, kurtosis) in the notebook.
- Compare the distribution and its statistics to 3 other states of your choosing. Describe if the distributions look different and what does that imply.

```
[4]: '''Reading data from files and initializing for the state of New Jersey'''
#reading the data for the confirmed number of COVID cases and displaying them
confirmedCases = pd.read_csv(r"..\..\..\DATASETS\COVID_
↪DATASETS\covid_confirmed_usafacts.csv")
```

```

#Extracting the last week of data from the given set(number of confirmed cases)
confirmedCasesNJ = confirmedCases[confirmedCases["State"] == "NJ"]
confirmedCasesNJ = confirmedCasesNJ[confirmedCasesNJ['County Name'] != 'Statewide Unallocated']

#confirmedCasesNJ
#Extracting the last week of data from the given set(number of confirmed cases)
confirmedCasesMD = confirmedCases[confirmedCases["State"] == "MD"] #MARYLAND
confirmedCasesMD = confirmedCasesMD[confirmedCasesMD['County Name'] != 'Statewide Unallocated']

confirmedCasesNH = confirmedCases[confirmedCases["State"] == "NH"] #NEW HAMPSHIRE
confirmedCasesNH = confirmedCasesNH[confirmedCasesNH['County Name'] != 'Statewide Unallocated']

confirmedCasesVT = confirmedCases[confirmedCases["State"] == "VT"] #VERMONT
confirmedCasesVT = confirmedCasesVT[confirmedCasesVT['County Name'] != 'Statewide Unallocated']

#confirmedCasesNJ

```

```

[5]: '''FOR NUMBER OF CASES'''
x = confirmedCasesNJ.iloc[:, 4:].fillna(0)
confirmedCasesNJ_integral = x.diff(axis = 1)
#confirmedCasesNJ_integral

md = confirmedCasesMD.iloc[:, 4:].fillna(0)
confirmedCasesMD_integral = md.diff(axis = 1)

nh = confirmedCasesNH.iloc[:, 4:].fillna(0)
confirmedCasesNH_integral = nh.diff(axis = 1)

vt = confirmedCasesVT.iloc[:, 4:].fillna(0)
confirmedCasesVT_integral = vt.diff(axis = 1)

#NJ
ccnj = confirmedCasesNJ_integral.loc[:, '2022-05-30':'2023-01-01']
ccnjSum = ccnj.sum()

#MARYLAND
ccmd = confirmedCasesMD_integral.loc[:, '2022-05-30':'2023-01-01']
ccmdSum = ccmd.sum()

#NEW HAMPSHIRE

```

```
ccnh = confirmedCasesNH_integral.loc[:, '2022-05-30':'2023-01-01']
ccnhSum = ccnh.sum()

#VERMONT
ccvt = confirmedCasesVT_integral.loc[:, '2022-05-30':'2023-01-01']
ccvtSum = ccvt.sum()
```

In MOM and MLE methods, we are assuming that the data follows a specific probability distribution, such as normal distribution or gamma distribution, and we estimate the parameters of that distribution using the observed data. Then, we can calculate various moments of the distribution, such as mean, variance, skewness, and kurtosis, which provide insights into the central tendency, variability, and shape of the distribution.

In **KDE method**, we are not making any assumption about the underlying distribution of the data, because its from a non-probability funtion family which doesn't use any distributions. We are simply estimating a smooth density curve from the observed data, but here the main problem is to find the bandwidth.

In the below code I have used KDE to find the distribution curve.

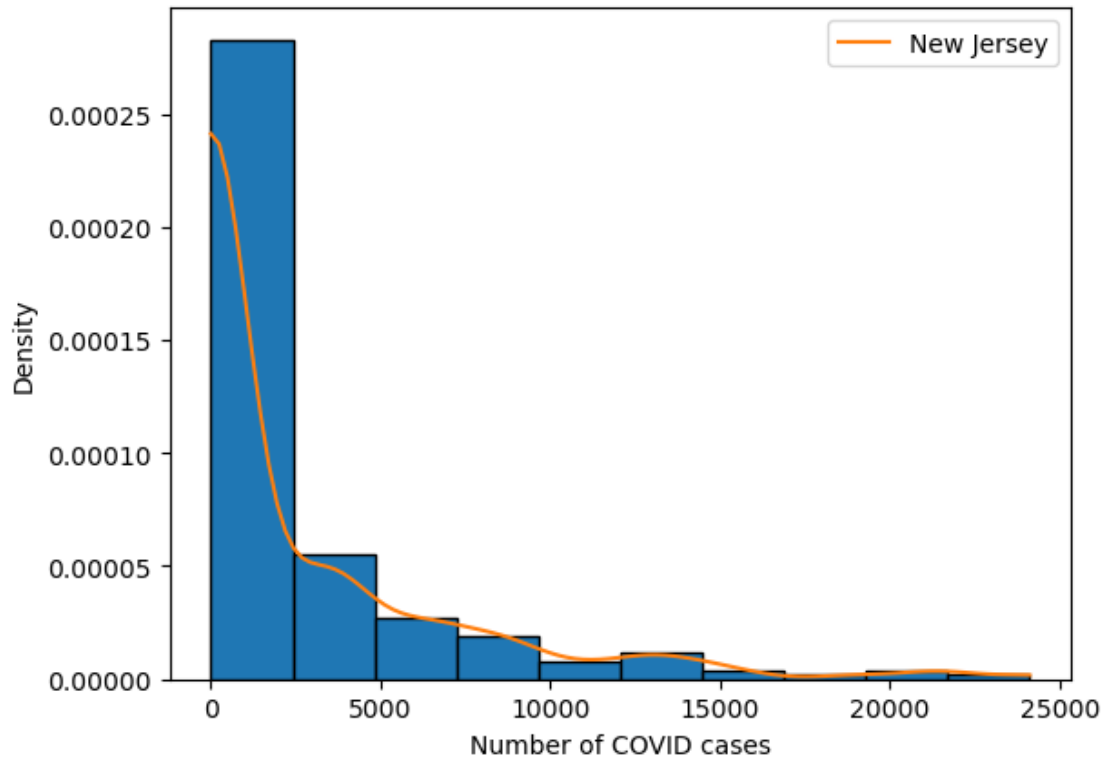
```
[6]: from scipy.stats import gaussian_kde

# Calculate KDE
kde = gaussian_kde(ccnjSum, bw_method = 0.25)

# Plot histogram and KDE
n_bins = 10
plt.hist(ccnjSum, bins=n_bins, ec='black', density=True)
x = np.linspace(0, ccnjSum.max(), 100)
plt.plot(x, kde(x), label = 'New Jersey')

# Add a legend and labels
plt.legend()
plt.xlabel('Number of COVID cases')
plt.ylabel('Density')

# Show the plot
plt.show()
```



In general, the bandwidth is not explicitly needed to be specified when creating the `gaussian_kde` object.

By default, the `gaussian_kde` function uses a rule of thumb to estimate the bandwidth, which is based on the interquartile range of the data and the sample size. This bandwidth estimation method is called the “*Scott’s rule*” and it provides a good balance between bias and variance.

- After a lot of trial and errors to find the bandwidth, I have come to the conclusion that **0.25** is the better bandwidth to be used here so that we can see a proper density curve

It is not necessary if the density line does not peak all the way up to the top of the highest histogram bar. The purpose of the density line is to provide a smooth estimate of the underlying distribution of the data, and it is possible that the data may not perfectly match any specific distribution.

As long as the overall shape of the density line is consistent with what you would expect based on the data, and it captures the main features of the distribution, then it is generally acceptable.

```
[7]: '''Finding the center, variance, skewness, kurtosis'''
# Calculate KDE
kde = gaussian_kde(ccnjSum)

# Calculate moments
center = kde.resample(1)[0][0]
variance = moment(ccnjSum, moment=2)
```

```

skewness = moment(ccnjSum, moment=3) / variance**(3/2)
kurtosis = moment(ccnjSum, moment=4) / variance**2 - 3

# Print the moments
print('Center: {:.2f}'.format(center))
print('Variance: {:.2f}'.format(variance))
print('Skewness: {:.2f}'.format(skewness))
print('Kurtosis: {:.2f}'.format(kurtosis))

```

```

Center: 672.38
Variance: 19546527.49
Skewness: 2.36
Kurtosis: 5.97

```

Based on the plot, It appears that the distribution of the number of COVID cases in New Jersey follows a *right-skewed distribution*, with a long tail on the right-hand side.

- The center of the distribution is around 50,000 cases, as shown by the peak of the histogram and the peak of the density plot.
- The variance of the distribution is relatively large due to the wide spread of the data.
- The skewness of the distribution is positive, indicating that the tail of the distribution extends to the right.
- The kurtosis of the distribution is also high, indicating that there are more extreme values in the tails of the distribution compared to a normal distribution.

```

[8]: #New Jersey
kde = gaussian_kde(ccnjSum, bw_method = 0.25)
# Plot histogram and KDE
n_bins = 10
plt.hist(ccnjSum, bins=n_bins, ec='black', density=True)
x = np.linspace(0, ccnjSum.max(), 100)
plt.plot(x, kde(x), label = 'New Jersey')
# Add a legend and labels
plt.legend()
plt.xlabel('Number of COVID cases')
plt.ylabel('Density')
# Show the plot
plt.show()

#Maryland
kde = gaussian_kde(ccmdSum, bw_method = 0.25)
# Plot histogram and KDE
n_bins = 10
plt.hist(ccmdSum, bins=n_bins, ec='black', density=True)
x = np.linspace(0, ccmdSum.max(), 100)
plt.plot(x, kde(x), label = 'Maryland')
# Add a legend and labels

```

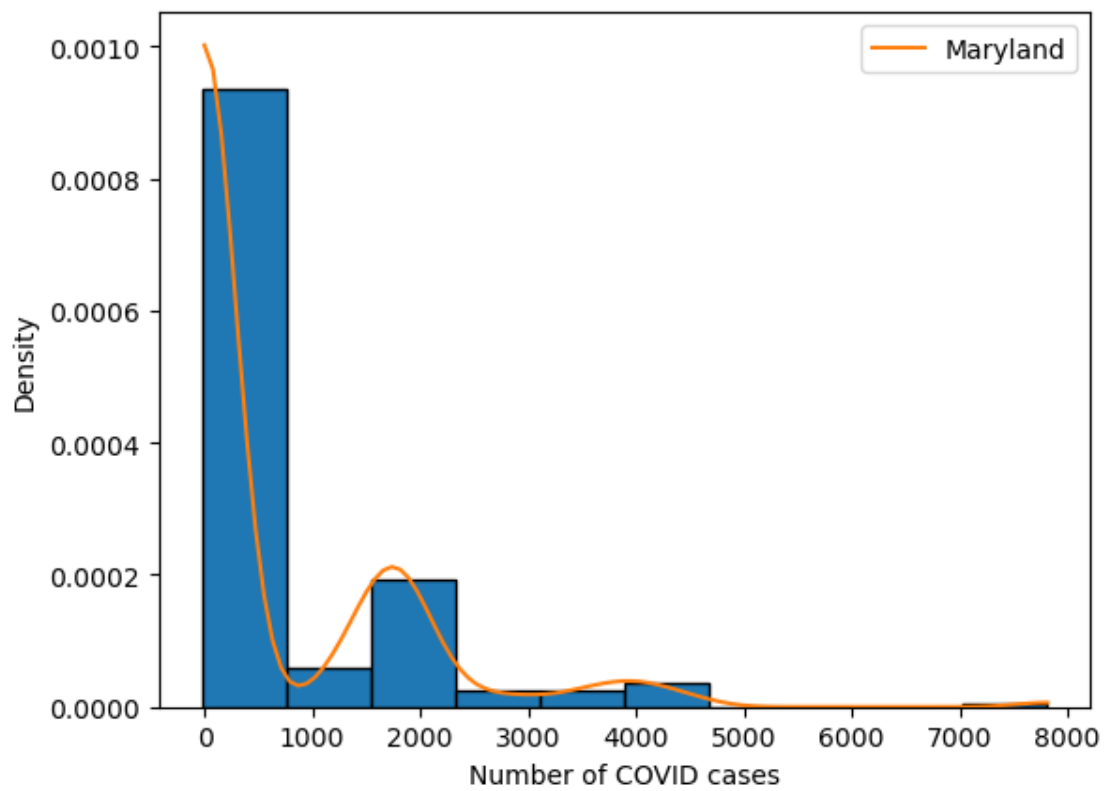
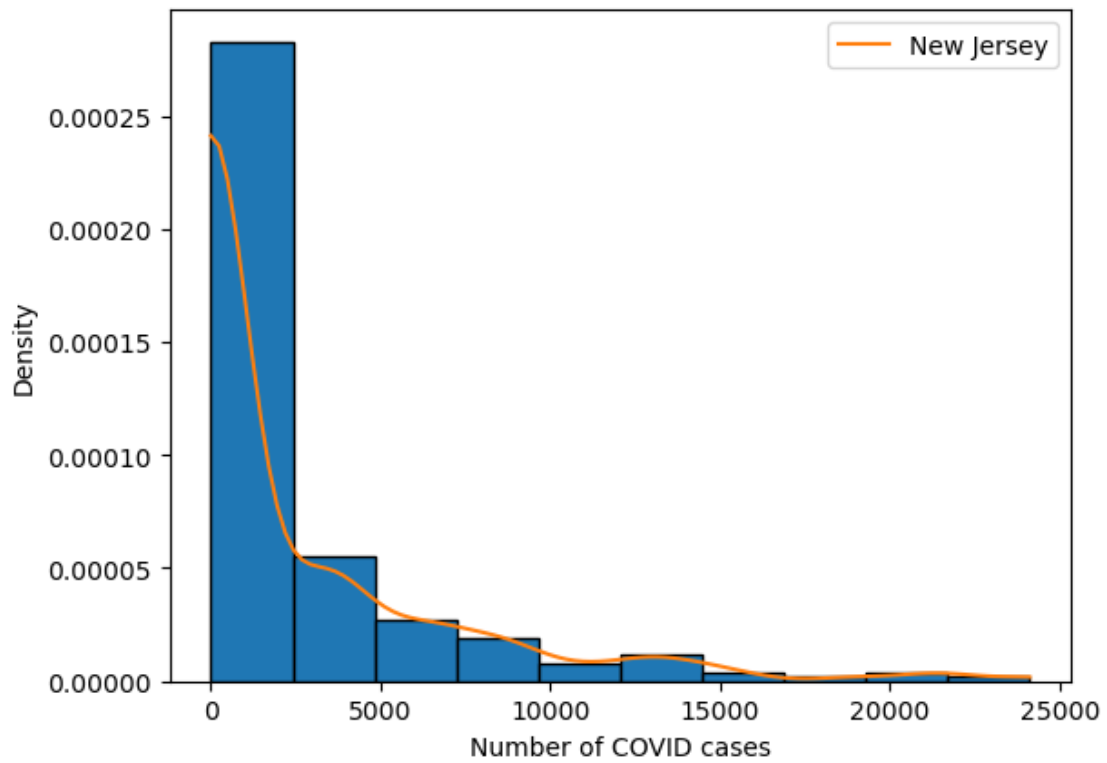
```

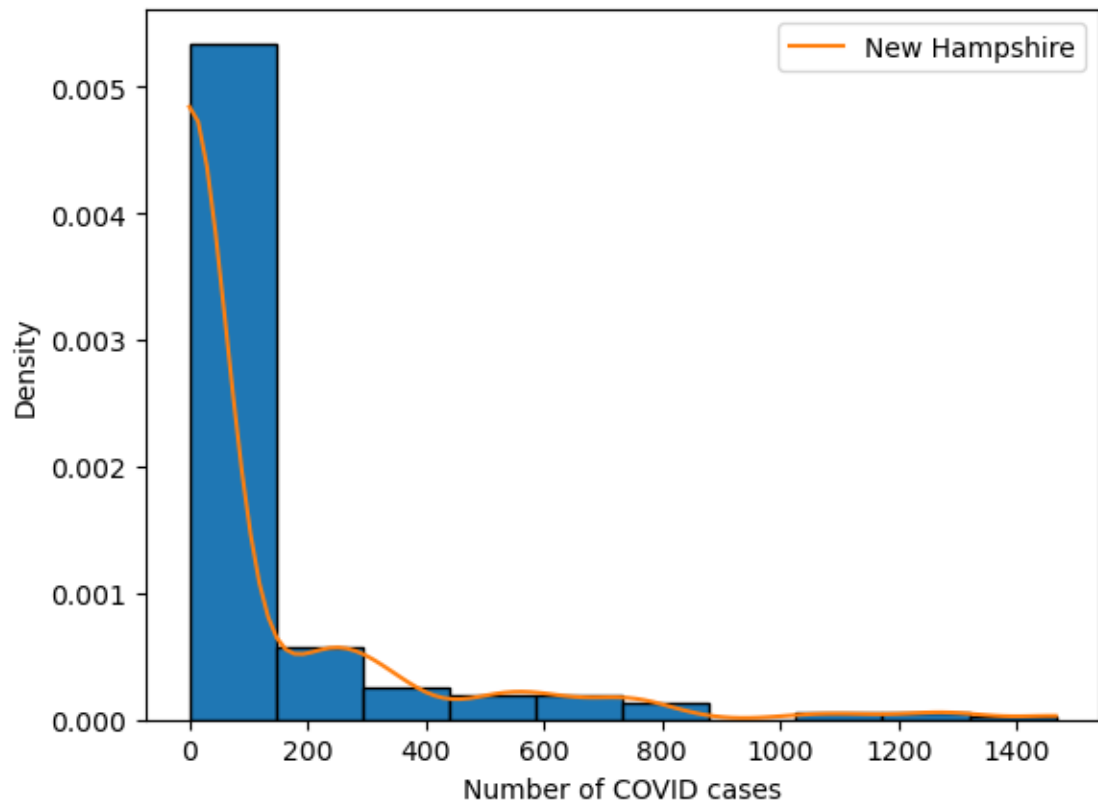
plt.legend()
plt.xlabel('Number of COVID cases')
plt.ylabel('Density')
# Show the plot
plt.show()

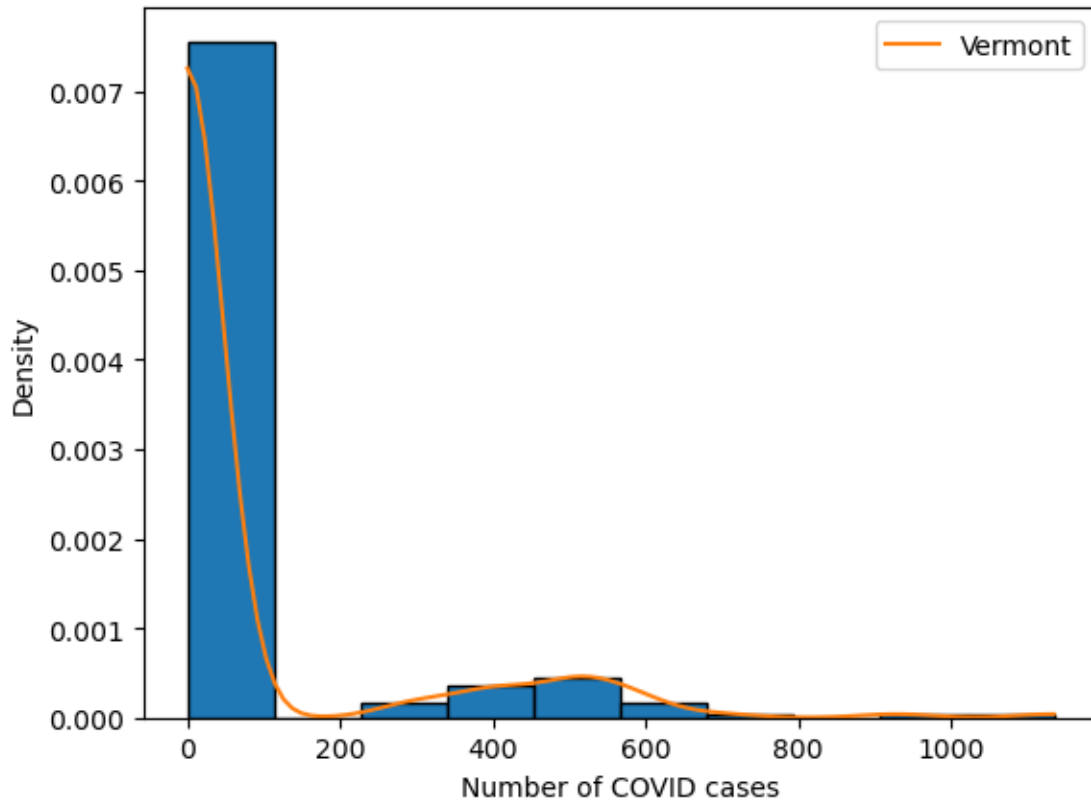
#New Hampshire
kde = gaussian_kde(ccnhSum, bw_method = 0.25)
# Plot histogram and KDE
n_bins = 10
plt.hist(ccnhSum, bins=n_bins, ec='black', density=True)
x = np.linspace(0, ccnhSum.max(), 100)
plt.plot(x, kde(x), label = 'New Hampshire')
# Add a legend and labels
plt.legend()
plt.xlabel('Number of COVID cases')
plt.ylabel('Density')
# Show the plot
plt.show()

#Vermont
kde = gaussian_kde(ccvtSum, bw_method = 0.25)
# Plot histogram and KDE
n_bins = 10
plt.hist(ccvtSum, bins=n_bins, ec='black', density=True)
x = np.linspace(0, ccvtSum.max(), 100)
plt.plot(x, kde(x), label = 'Vermont')
# Add a legend and labels
plt.legend()
plt.xlabel('Number of COVID cases')
plt.ylabel('Density')
# Show the plot
plt.show()

```







```
[9]: # Calculate the statistics for each state
states = ['New Jersey', 'Maryland', 'New Hampshire', 'Vermont']
data = [ccnjSum, ccmdSum, ccnhSum, ccvtSum]

for i, state in enumerate(states):
    print(f'State: {state}')
    print(f'Center (Mean): {np.mean(data[i]):.2f}')
    print(f'Variance: {np.var(data[i]):.2f}')
    print(f'Skewness: {data[i].skew():.2f}')
    print(f'Kurtosis: {data[i].kurtosis():.2f}\n')
```

```
State: New Jersey
Center (Mean): 2391.29
Variance: 19546527.49
Skewness: 2.38
Kurtosis: 6.14
```

```
State: Maryland
Center (Mean): 604.43
Variance: 1355914.36
Skewness: 2.42
```

Kurtosis: 7.72

State: New Hampshire
Center (Mean): 110.03
Variance: 63232.17
Skewness: 2.92
Kurtosis: 9.28

State: Vermont
Center (Mean): 71.98
Variance: 35362.76
Skewness: 2.73
Kurtosis: 7.59

Based on the comparison of the distributions of COVID cases in four different states, we can see that the shapes of the distributions are somewhat similar, with a peak at the left of the range of values and a gradually decreasing density towards the right end. However, there are some differences in the tails of the distributions, with some states having longer tails towards the higher end of the range, indicating a higher number of extreme values in those states.

The differences in the distributions can imply several things. - First, it could suggest that the spread of the virus varies across different states, with some states experiencing more extreme outbreaks than others. - Second, it could imply that the public health measures and policies implemented by different states have varying effectiveness in controlling the spread of the virus. - Third, the differences could also reflect variations in testing and reporting practices across different states, which could affect the accuracy and completeness of the data.

Overall, comparing the distributions and their statistics across different states can provide insights into the relative severity of the outbreak in different regions and the effectiveness of various measures in mitigating the spread of the virus.

[]:

0.1.1 TASK 2:

Based on the results in Stage I, perform correlation between Enrichment data variables and COVID-19 cases to observe any patterns.

- You can compare either within your chosen specific state or among different states with the different enrichment variables. Within the state you can compare the county based covid data to enrichment data for correlation. Between states you would need to aggregate to state level data and then perform correlation. Both covid and enrichment data will need to be normalized for population. For number of covid cases you can use a measure of center value (median or mean) to compare the number of cases.

```
[16]: #getting the new modified file for the enrichment data
housingEnrichment = pd.read_csv("../...\\Member\\AshritaD\\STAGE_
↳1\\housingEnrichmentnew1.csv")
#housingEnrichment
```

```

[11]: #reading the data for the population of number of people and displaying them
population = pd.read_csv(r"..\..\DATASETS\COVID_
↳DATASETS\covid_county_population_usafacts.csv")

#Extracting data from the given set of population for that county
populationNJ = population[population["State"] == "NJ"] #NEW JERSEY
populationNJ = populationNJ[populationNJ['County Name'] != 'Statewide_
↳Unallocated']

#finding the normalized factor for each state per 10000
normFactorNJ = 1000000 / populationNJ.sum()['population']
#multiplying the normalizing factor with the for the number of cases
normValueNJ = confirmedCasesNJ_integral.loc[:, '2022-05-30':'2023-01-01']_
↳*normFactorNJ

normValueNJSumNewCases = normValueNJ.sum(axis=1)
# Delete columns outside the date range of June 1st to December 31st
confirmendCasesNJNew1 = confirmedCasesNJ.iloc[:, :3]
confirmedCasesNJnew2 = normValueNJSumNewCases
confirmedCasesNJnew2
confirmendCasesNJNew = pd.concat([confirmendCasesNJNew1, confirmedCasesNJnew2],_
↳axis=1).rename(columns={0: 'New Cases'})
#confirmendCasesNJNew

[12]: housingEnrichmentNew1 = housingEnrichment.iloc[:, 2:].fillna(0)
housingEnrichmentNew1 = housingEnrichmentNew1.replace('N', 0)
housingEnrichmentNew1 = housingEnrichmentNew1.astype(float)

housingEnrichmentNorm = housingEnrichmentNew1*normFactorNJ
housingEnrichmentNorm

housingEnrichment2 = housingEnrichmentNorm
housingEnrichment1 = housingEnrichment.iloc[:, :2]
housingEnrichmentNew = pd.concat([housingEnrichment1, housingEnrichment2],_
↳axis=1)

[13]: #getting the last 5 digits to match the countyfips in New cases
housingEnrichmentNew['countyFIPS'] = housingEnrichmentNew['GEO_ID'].str[-5:]
#print(housingEnrichmentnew1['countyFIPS'])
housingEnrichmentNew['countyFIPS'] = pd.
↳to_numeric(housingEnrichmentNew['countyFIPS'])

# using merge function by setting
output1 = pd.merge(confirmendCasesNJNew, housingEnrichmentNew,
on= ('countyFIPS')
)

```

```
output1['countyFIPS'] = output1['countyFIPS'].astype(str)
#deleting all the columns that end with _M
output1 = output1.drop(output1.filter(regex='M$').columns, axis=1)
```

```
[14]: #Renaming the column names for better understanding
output1 = output1.rename(columns={
    'New Cases': 'New Cases',
    'DP04_0001E': 'HOUSING OCCUPANCY: Total Housing Units',
    'DP04_0002E': 'Occupied Houseing Units',
    'DP04_0003E': 'Vacant Housing Units',
    'DP04_0004E': 'Homeowner Vacancy Rate',
    'DP04_0005E': 'Rental Vacanct Rate',
    'DP04_0006E': 'UNITS IN STRUCTURE: Total Housing Units',
    'DP04_0007E': 'Total housing units: 1-unit, detached',
    'DP04_0008E': 'Total housing units:1-unit, attached',
    'DP04_0009E': 'Total housing units:2 units',
    'DP04_0010E': 'Total housing units:3 or 4 units',
    'DP04_0011E': 'Total housing units:5 or 9 units',
    'DP04_0012E': 'Total housing units:10 or 19 units',
    'DP04_0013E': 'Total housing units:20 or more units',
    'DP04_0014E': 'Total housing units:Mobile Structures',
    'DP04_0015E': 'Total housing units:Boats, RV and Vans',
    'DP04_0027E': 'ROOMS:Total housing units',
    'DP04_0028E': 'Total Housing units:1 Room',
    'DP04_0029E': 'Total Housing units:2 Room',
    'DP04_0030E': 'Total Housing units:3 Room',
    'DP04_0031E': 'Total Housing units:4 Room',
    'DP04_0032E': 'Total Housing units:5 Room',
    'DP04_0033E': 'Total Housing units:6 Room',
    'DP04_0034E': 'Total Housing units:7 Room',
    'DP04_0035E': 'Total Housing units:8 Room',
    'DP04_0036E': 'Total Housing units:9 or more Room',
    'DP04_0037E': 'Total Housing units:Median Rooms',
    'DP04_0038E': 'BEDROOMS: Total Housing Units',
    'DP04_0039E': 'Total Housing Units: No Bedroom',
    'DP04_0040E': 'Total Housing Units: 1 Bedroom',
    'DP04_0041E': 'Total Housing Units: 2 Bedroom',
    'DP04_0042E': 'Total Housing Units: 3 Bedroom',
    'DP04_0043E': 'Total Housing Units: 4 Bedroom',
    'DP04_0044E': 'Total Housing Units: 5 or more Bedroom',
    'DP04_0045E': 'HOUSING TENURE: Total Housing Units',
    'DP04_0046E': 'Occupied Housing units: Owner-Occupied',
    'DP04_0047E': 'Occupied Housing units: Renter-Occupied',
    'DP04_0048E': 'Occupied housing units: Average household size of owner-occupied_
    ↪unit',
    'DP04_0049E': 'Occupied housing units:Average household size of renter-occupied_
    ↪unit',
```

```

'DP04_0050E': 'YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied housing units',
'DP04_0051E': 'Occupied housing units: Moved in 2019 or later',
'DP04_0052E': 'Occupied housing units: Moved in 2015 to 2018',
'DP04_0053E': 'Occupied housing units: Moved in 2010 to 2014',
'DP04_0054E': 'Occupied housing units: Moved in 2000 to 2009',
'DP04_0055E': 'Occupied housing units: Moved in 1990 to 1999',
'DP04_0056E': 'Occupied housing units: Moved in 1989 and earlier',
'DP04_0057E': 'VEHICLES AVAILABLE: Occupied housing units',
'DP04_0058E': 'Occupied housing units: No vehicles available',
'DP04_0059E': 'Occupied housing units: 1 vehicles available',
'DP04_0060E': 'Occupied housing units: 2 vehicles available',
'DP04_0061E': 'Occupied housing units: 3 or more vehicles available',
'DP04_0076E': 'OCCUPANTS PER ROOM: Occupied housing units',
'DP04_0077E': 'Occupied housing units: 1.00 or less',
'DP04_0078E': 'Occupied housing units: 1.01 to 1.50',
'DP04_0079E': 'Occupied housing units: 1.51 or more'
})

```

output1

```

[14]:  countyFIPS      County Name State   New Cases      GEO_ID \
0      34001      Atlantic County   NJ    1646.215629  0500000US34001
1      34003      Bergen County     NJ    6899.762333  0500000US34003
2      34005      Burlington County NJ    2704.513189  0500000US34005
3      34007      Camden County    NJ    3069.738432  0500000US34007
4      34009      Cape May County  NJ     571.480682  0500000US34009
5      34011      Cumberland County NJ     949.653182  0500000US34011
6      34013      Essex County     NJ    5660.991265  0500000US34013
7      34015      Gloucester County NJ    1538.697101  0500000US34015
8      34017      Hudson County    NJ    4887.308198  0500000US34017
9      34019      Hunterdon County NJ     677.985947  0500000US34019
10     34021      Mercer County    NJ    2383.196036  0500000US34021
11     34023      Middlesex County NJ    5719.197630  0500000US34023
12     34025      Monmouth County  NJ    4011.285505  0500000US34025
13     34027      Morris County    NJ    3158.793045  0500000US34027
14     34029      Ocean County     NJ    3736.803649  0500000US34029
15     34031      Passaic County   NJ    3444.308217  0500000US34031
16     34033      Salem County    NJ     303.303577  0500000US34033
17     34035      Somerset County  NJ    2023.825205  0500000US34035
18     34037      Sussex County    NJ     796.762960  0500000US34037
19     34039      Union County     NJ    3656.530653  0500000US34039
20     34041      Warren County    NJ     580.937809  0500000US34041

      NAME HOUSING OCCUPANCY: Total Housing Units \
0      Atlantic County, New Jersey      14885.292929
1      Bergen County, New Jersey        41566.438007
2      Burlington County, New Jersey    20957.669223

```

3	Camden County, New Jersey	24034.050161
4	Cape May County, New Jersey	11172.132098
5	Cumberland County, New Jersey	6440.303574
6	Essex County, New Jersey	37859.694512
7	Gloucester County, New Jersey	13255.064348
8	Hudson County, New Jersey	35694.913079
9	Hunterdon County, New Jersey	5843.603886
10	Mercer County, New Jersey	16961.470088
11	Middlesex County, New Jersey	35700.880076
12	Monmouth County, New Jersey	30384.736197
13	Morris County, New Jersey	22374.887274
14	Ocean County, New Jersey	33278.391928
15	Passaic County, New Jersey	20883.813564
16	Salem County, New Jersey	3122.653310
17	Somerset County, New Jersey	15002.718924
18	Sussex County, New Jersey	7077.646391
19	Union County, New Jersey	23763.396189
20	Warren County, New Jersey	5264.917774

	Occupied Housing Units	Vacant Housing Units	Homeowner Vacancy Rate \
0	12643.165706	2242.127223	0.157619
1	39633.243603	1933.194404	0.101326
2	19799.058566	1158.610658	0.101326
3	22647.342604	1386.707557	0.101326
4	5500.895612	5671.236486	0.123843
5	6066.409298	373.894276	0.112585
6	36303.321591	1556.372922	0.056292
7	12666.020430	589.043918	0.022517
8	32874.775252	2820.137826	0.067551
9	5774.701960	68.901926	0.011258
10	16208.840387	752.629701	0.022517
11	34657.105961	1043.774114	0.022517
12	28229.299306	2155.436891	0.090068
13	21711.649942	663.237332	0.078809
14	27103.225668	6175.166260	0.090068
15	19934.610721	949.202843	0.112585
16	2811.581378	311.071932	0.033775
17	14741.747249	260.971675	0.022517
18	6616.273689	461.372702	0.191394
19	22673.687458	1089.708732	0.067551
20	5218.645402	46.272372	0.033775

...	Occupied housing units: Moved in 1989 and earlier \
0	1590.711300
1	5619.109702
2	2469.773783
3	3436.202108

4	...	761.636488
5	...	841.121390
6	...	3396.234487
7	...	1769.045697
8	...	2593.391945
9	...	893.135589
10	...	2239.650356
11	...	4076.584716
12	...	3221.165051
13	...	3214.747714
14	...	2617.034763
15	...	2032.606823
16	...	594.785745
17	...	1398.191212
18	...	1038.595211
19	...	2778.368848
20	...	693.184901

VEHICLES AVAILABLE: Occupied housing units \

0	12643.165706
1	39633.243603
2	19799.058566
3	22647.342604
4	5500.895612
5	6066.409298
6	36303.321591
7	12666.020430
8	32874.775252
9	5774.701960
10	16208.840387
11	34657.105961
12	28229.299306
13	21711.649942
14	27103.225668
15	19934.610721
16	2811.581378
17	14741.747249
18	6616.273689
19	22673.687458
20	5218.645402

Occupied housing units: No vehicles available \

0	1792.801100
1	3203.714399
2	911.486919
3	2286.710822
4	148.837167

5	568.891231
6	7738.969781
7	650.965584
8	10994.698380
9	179.235076
10	1819.483708
11	2622.213666
12	1681.116932
13	1016.753751
14	1624.261584
15	2657.002383
16	305.667859
17	757.808604
18	268.965199
19	2595.643642
20	342.032764

Occupied housing units: 1 vehicles available \

0	4500.466664
1	13718.576162
2	6395.382220
3	7908.747730
4	2053.660190
5	1862.153365
6	14983.241746
7	3590.781102
8	14708.534719
9	1469.907759
10	5619.334871
11	11773.447765
12	9050.358076
13	6430.508692
14	9356.476274
15	7318.915718
16	738.106255
17	4508.572773
18	1606.248009
19	8059.161085
20	1520.796110

Occupied housing units: 2 vehicles available \

0	4228.686844
1	15212.126739
2	7762.612599
3	8500.831439
4	2428.455145
5	2085.521701

6	9950.699096
7	5117.319040
8	5431.318177
9	2194.166078
10	5658.289228
11	13751.563522
12	10941.107993
13	8935.296363
14	10626.208176
15	6473.290934
16	1084.529829
17	5910.817039
18	2832.634744
19	8317.543309
20	2002.434084

Occupied housing units: 3 or more vehicles available \

0	2121.211098
1	7498.826303
2	4729.576827
3	3951.052612
4	869.943111
5	1549.843000
6	3630.410968
7	3306.954704
8	1740.223976
9	1931.393046
10	3111.732579
11	6509.881009
12	6556.716305
13	5329.091136
14	5496.279634
15	3485.401686
16	683.277435
17	3564.548833
18	1908.425737
19	3701.339422
20	1353.382443

OCCUPANTS PER ROOM: Occupied housing units \

0	12643.165706
1	39633.243603
2	19799.058566
3	22647.342604
4	5500.895612
5	6066.409298
6	36303.321591

7	12666.020430
8	32874.775252
9	0.000000
10	16208.840387
11	34657.105961
12	28229.299306
13	21711.649942
14	27103.225668
15	19934.610721
16	0.000000
17	14741.747249
18	6616.273689
19	22673.687458
20	0.000000

Occupied housing units: 1.00 or less \

0	12319.371686
1	38156.355583
2	19453.648256
3	22037.357904
4	5418.258335
5	5811.517205
6	34563.547954
7	12515.269320
8	30496.758119
9	0.000000
10	15641.975684
11	32776.038342
12	27793.258194
13	21354.418223
14	26438.074394
15	18257.884598
16	0.000000
17	14324.507807
18	6506.053124
19	21587.806611
20	0.000000

Occupied housing units: 1.01 to 1.50 Occupied housing units: 1.51 or more

0	197.136067	126.657953
1	818.604421	658.283599
2	273.130838	72.279472
3	435.365602	174.619097
4	82.637278	0.000000
5	129.359989	125.532104
6	1037.131608	702.642029
7	131.048762	19.702348

8	1473.172720	904.844413
9	0.000000	0.000000
10	348.337516	218.527188
11	1312.288974	568.778646
12	279.548174	156.492937
13	256.918620	100.313098
14	441.332599	223.818675
15	1087.344450	589.381673
16	0.000000	0.000000
17	212.109851	205.129591
18	95.021611	15.198954
19	653.329866	432.550981
20	0.000000	0.000000

[21 rows x 60 columns]

```
[15]: #Finding the Correlation matrix to get the correlation values of the merged
      ↪ dataset
corr_matrix = output1.corr().fillna(0)
corr_matrix
```

```
[15]:
New Cases \
New Cases 1.000000
HOUSING OCCUPANCY: Total Housing Units 0.973764
Occupied Houseing Units 0.989492
Vacant Housing Units 0.208750
Homeowner Vacancy Rate -0.056988
Rental Vacanct Rate -0.234539
UNITS IN STRUCTURE: Total Housing Units 0.973764
Total housing units: 1-unit, detached 0.705823
Total housing units:1-unit, attached 0.599415
Total housing units:2 units 0.767885
Total housing units:3 or 4 units 0.739220
Total housing units:5 or 9 units 0.801142
Total housing units:10 or 19 units 0.832662
Total housing units:20 or more units 0.755115
Total housing units:Mobile Structures 0.182483
Total housing units:Boats, RV and Vans 0.234102
ROOMS:Total housing units 0.973764
Total Housing units:1 Room 0.785726
Total Housing units:2 Room 0.775402
Total Housing units:3 Room 0.832934
Total Housing units:4 Room 0.880953
Total Housing units:5 Room 0.872315
Total Housing units:6 Room 0.896166
Total Housing units:7 Room 0.806792
Total Housing units:8 Room 0.746932
```

Total Housing units:9 or more Room	0.720776
Total Housing units:Median Rooms	-0.511475
BEDROOMS: Total Housing Units	0.973764
Total Housing Units: No Bedroom	0.796548
Total Housing Units: 1 Bedroom	0.861109
Total Housing Units: 2 Bedroom	0.891471
Total Housing Units: 3 Bedroom	0.927548
Total Housing Units: 4 Bedroom	0.740247
Total Housing Units: 5 or more Bedroom	0.756869
HOUSING TENURE: Total Housing Units	0.989492
Occupied Housing units: Owner-Occupied	0.870770
Occupied Housing units: Renter-Occupied	0.856702
Occupied housing units: Average household size ...	0.616142
Occupied housing units:Average household size o...	0.371579
YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...	0.989492
Occupied housing units: Moved in 2019 or later	0.930944
Occupied housing units: Moved in 2015 to 2018	0.973007
Occupied housing units: Moved in 2010 to 2014	0.983109
Occupied housing units: Moved in 2000 to 2009	0.965980
Occupied housing units: Moved in 1990 to 1999	0.914130
Occupied housing units: Moved in 1989 and earlier	0.930999
VEHICLES AVAILABLE: Occupied housing units	0.989492
Occupied housing units: No vehicles available	0.662312
Occupied housing units: 1 vehicles available	0.967568
Occupied housing units: 2 vehicles available	0.909991
Occupied housing units: 3 or more vehicles avai...	0.772155
OCCUPANTS PER ROOM: Occupied housing units	0.979638
Occupied housing units: 1.00 or less	0.975807
Occupied housing units: 1.01 to 1.50	0.831580
Occupied housing units: 1.51 or more	0.844934

HOUSING OCCUPANCY: Total

Housing Units \
 New Cases
 0.973764
 HOUSING OCCUPANCY: Total Housing Units
 1.000000
 Occupied Houseing Units
 0.990995
 Vacant Housing Units
 0.387566
 Homeowner Vacancy Rate
 -0.008964
 Rental Vacanct Rate
 -0.169728
 UNITS IN STRUCTURE: Total Housing Units
 1.000000

Total housing units: 1-unit, detached
 0.753442
 Total housing units:1-unit, attached
 0.674659
 Total housing units:2 units
 0.718768
 Total housing units:3 or 4 units
 0.725513
 Total housing units:5 or 9 units
 0.813192
 Total housing units:10 or 19 units
 0.827333
 Total housing units:20 or more units
 0.755929
 Total housing units:Mobile Structures
 0.323712
 Total housing units:Boats, RV and Vans
 0.227847
 ROOMS:Total housing units
 1.000000
 Total Housing units:1 Room
 0.755136
 Total Housing units:2 Room
 0.782873
 Total Housing units:3 Room
 0.821400
 Total Housing units:4 Room
 0.903494
 Total Housing units:5 Room
 0.932572
 Total Housing units:6 Room
 0.938071
 Total Housing units:7 Room
 0.843369
 Total Housing units:8 Room
 0.758835
 Total Housing units:9 or more Room
 0.742598
 Total Housing units:Median Rooms
 -0.516810
 BEDROOMS: Total Housing Units
 1.000000
 Total Housing Units: No Bedroom
 0.764686
 Total Housing Units: 1 Bedroom
 0.853453
 Total Housing Units: 2 Bedroom

0.932372
 Total Housing Units: 3 Bedroom
 0.957227
 Total Housing Units: 4 Bedroom
 0.770417
 Total Housing Units: 5 or more Bedroom
 0.794825
 HOUSING TENURE: Total Housing Units
 0.990995
 Occupied Housing units: Owner-Occupied
 0.889155
 Occupied Housing units: Renter-Occupied
 0.838641
 Occupied housing units: Average household size ...
 0.498449
 Occupied housing units: Average household size o...
 0.347539
 YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...
 0.990995
 Occupied housing units: Moved in 2019 or later
 0.945073
 Occupied housing units: Moved in 2015 to 2018
 0.978814
 Occupied housing units: Moved in 2010 to 2014
 0.980740
 Occupied housing units: Moved in 2000 to 2009
 0.967254
 Occupied housing units: Moved in 1990 to 1999
 0.911006
 Occupied housing units: Moved in 1989 and earlier
 0.902700
 VEHICLES AVAILABLE: Occupied housing units
 0.990995
 Occupied housing units: No vehicles available
 0.675669
 Occupied housing units: 1 vehicles available
 0.975423
 Occupied housing units: 2 vehicles available
 0.901931
 Occupied housing units: 3 or more vehicles avai...
 0.761256
 OCCUPANTS PER ROOM: Occupied housing units
 0.987672
 Occupied housing units: 1.00 or less
 0.986964
 Occupied housing units: 1.01 to 1.50
 0.792248

Occupied housing units: 1.51 or more
0.792549

	Occupied Housing Units \
New Cases	0.989492
HOUSING OCCUPANCY: Total Housing Units	0.990995
Occupied Housing Units	1.000000
Vacant Housing Units	0.260641
Homeowner Vacancy Rate	-0.057092
Rental Vacant Rate	-0.243727
UNITS IN STRUCTURE: Total Housing Units	0.990995
Total housing units: 1-unit, detached	0.731084
Total housing units:1-unit, attached	0.644765
Total housing units:2 units	0.730132
Total housing units:3 or 4 units	0.739414
Total housing units:5 or 9 units	0.821505
Total housing units:10 or 19 units	0.844073
Total housing units:20 or more units	0.763735
Total housing units:Mobile Structures	0.245083
Total housing units:Boats, RV and Vans	0.230978
ROOMS:Total housing units	0.990995
Total Housing units:1 Room	0.773991
Total Housing units:2 Room	0.784170
Total Housing units:3 Room	0.831719
Total Housing units:4 Room	0.895421
Total Housing units:5 Room	0.898042
Total Housing units:6 Room	0.913858
Total Housing units:7 Room	0.822465
Total Housing units:8 Room	0.763314
Total Housing units:9 or more Room	0.747380
Total Housing units:Median Rooms	-0.496640
BEDROOMS: Total Housing Units	0.990995
Total Housing Units: No Bedroom	0.784254
Total Housing Units: 1 Bedroom	0.865940
Total Housing Units: 2 Bedroom	0.914085
Total Housing Units: 3 Bedroom	0.942974
Total Housing Units: 4 Bedroom	0.762175
Total Housing Units: 5 or more Bedroom	0.773039
HOUSING TENURE: Total Housing Units	1.000000
Occupied Housing units: Owner-Occupied	0.889483
Occupied Housing units: Renter-Occupied	0.855059
Occupied housing units: Average household size ...	0.584160
Occupied housing units:Average household size o...	0.349709
YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...	1.000000
Occupied housing units: Moved in 2019 or later	0.949909
Occupied housing units: Moved in 2015 to 2018	0.985229
Occupied housing units: Moved in 2010 to 2014	0.987469

Occupied housing units: Moved in 2000 to 2009	0.974357
Occupied housing units: Moved in 1990 to 1999	0.925592
Occupied housing units: Moved in 1989 and earlier	0.924450
VEHICLES AVAILABLE: Occupied housing units	1.000000
Occupied housing units: No vehicles available	0.680195
Occupied housing units: 1 vehicles available	0.979273
Occupied housing units: 2 vehicles available	0.911663
Occupied housing units: 3 or more vehicles avai...	0.778722
OCCUPANTS PER ROOM: Occupied housing units	0.992469
Occupied housing units: 1.00 or less	0.991004
Occupied housing units: 1.01 to 1.50	0.807212
Occupied housing units: 1.51 or more	0.810396

	Vacant Housing Units \
New Cases	0.208750
HOUSING OCCUPANCY: Total Housing Units	0.387566
Occupied Houseing Units	0.260641
Vacant Housing Units	1.000000
Homeowner Vacancy Rate	0.328421
Rental Vacanct Rate	0.454188
UNITS IN STRUCTURE: Total Housing Units	0.387566
Total housing units: 1-unit, detached	0.399228
Total housing units:1-unit, attached	0.425456
Total housing units:2 units	0.155774
Total housing units:3 or 4 units	0.140505
Total housing units:5 or 9 units	0.207515
Total housing units:10 or 19 units	0.154106
Total housing units:20 or more units	0.192365
Total housing units:Mobile Structures	0.646716
Total housing units:Boats, RV and Vans	0.052628
ROOMS:Total housing units	0.387566
Total Housing units:1 Room	0.116041
Total Housing units:2 Room	0.245950
Total Housing units:3 Room	0.196380
Total Housing units:4 Room	0.349729
Total Housing units:5 Room	0.541341
Total Housing units:6 Room	0.472106
Total Housing units:7 Room	0.418490
Total Housing units:8 Room	0.216222
Total Housing units:9 or more Room	0.208840
Total Housing units:Median Rooms	-0.307122
BEDROOMS: Total Housing Units	0.387566
Total Housing Units: No Bedroom	0.114243
Total Housing Units: 1 Bedroom	0.191893
Total Housing Units: 2 Bedroom	0.429453
Total Housing Units: 3 Bedroom	0.409772
Total Housing Units: 4 Bedroom	0.307567

Total Housing Units: 5 or more Bedroom	0.408763
HOUSING TENURE: Total Housing Units	0.260641
Occupied Housing units: Owner-Occupied	0.287226
Occupied Housing units: Renter-Occupied	0.160010
Occupied housing units: Average household size ...	-0.427806
Occupied housing units:Average household size o...	0.098206
YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...	0.260641
Occupied housing units: Moved in 2019 or later	0.274396
Occupied housing units: Moved in 2015 to 2018	0.274513
Occupied housing units: Moved in 2010 to 2014	0.272972
Occupied housing units: Moved in 2000 to 2009	0.266008
Occupied housing units: Moved in 1990 to 1999	0.196171
Occupied housing units: Moved in 1989 and earlier	0.144148
VEHICLES AVAILABLE: Occupied housing units	0.260641
Occupied housing units: No vehicles available	0.188821
Occupied housing units: 1 vehicles available	0.291058
Occupied housing units: 2 vehicles available	0.226643
Occupied housing units: 3 or more vehicles avai...	0.127600
OCCUPANTS PER ROOM: Occupied housing units	0.288531
Occupied housing units: 1.00 or less	0.293509
Occupied housing units: 1.01 to 1.50	0.154912
Occupied housing units: 1.51 or more	0.135161

	Homeowner Vacancy Rate \
New Cases	-0.056988
HOUSING OCCUPANCY: Total Housing Units	-0.008964
Occupied Houseing Units	-0.057092
Vacant Housing Units	0.328421
Homeowner Vacancy Rate	1.000000
Rental Vacanct Rate	0.353689
UNITS IN STRUCTURE: Total Housing Units	-0.008964
Total housing units: 1-unit, detached	0.060633
Total housing units:1-unit, attached	-0.036309
Total housing units:2 units	-0.006594
Total housing units:3 or 4 units	-0.055011
Total housing units:5 or 9 units	-0.096781
Total housing units:10 or 19 units	-0.194831
Total housing units:20 or more units	-0.052711
Total housing units:Mobile Structures	0.220017
Total housing units:Boats, RV and Vans	0.271059
ROOMS:Total housing units	-0.008964
Total Housing units:1 Room	-0.083919
Total Housing units:2 Room	-0.030492
Total Housing units:3 Room	-0.060133
Total Housing units:4 Room	-0.038935
Total Housing units:5 Room	0.017084
Total Housing units:6 Room	0.060793

Total Housing units:7 Room	0.047113
Total Housing units:8 Room	0.016142
Total Housing units:9 or more Room	-0.023357
Total Housing units:Median Rooms	-0.174365
BEDROOMS: Total Housing Units	-0.008964
Total Housing Units: No Bedroom	-0.081969
Total Housing Units: 1 Bedroom	-0.060502
Total Housing Units: 2 Bedroom	-0.025928
Total Housing Units: 3 Bedroom	0.055583
Total Housing Units: 4 Bedroom	0.013924
Total Housing Units: 5 or more Bedroom	-0.015659
HOUSING TENURE: Total Housing Units	-0.057092
Occupied Housing units: Owner-Occupied	-0.018569
Occupied Housing units: Renter-Occupied	-0.085371
Occupied housing units: Average household size ...	-0.245450
Occupied housing units:Average household size o...	0.013268
YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...	-0.057092
Occupied housing units: Moved in 2019 or later	-0.080273
Occupied housing units: Moved in 2015 to 2018	-0.056747
Occupied housing units: Moved in 2010 to 2014	-0.064067
Occupied housing units: Moved in 2000 to 2009	-0.056923
Occupied housing units: Moved in 1990 to 1999	-0.017771
Occupied housing units: Moved in 1989 and earlier	-0.011244
VEHICLES AVAILABLE: Occupied housing units	-0.057092
Occupied housing units: No vehicles available	-0.061807
Occupied housing units: 1 vehicles available	-0.053393
Occupied housing units: 2 vehicles available	-0.039580
Occupied housing units: 3 or more vehicles avai...	-0.044656
OCCUPANTS PER ROOM: Occupied housing units	0.008432
Occupied housing units: 1.00 or less	0.013285
Occupied housing units: 1.01 to 1.50	-0.072826
Occupied housing units: 1.51 or more	-0.070690

	Rental Vacanct Rate \
New Cases	-0.234539
HOUSING OCCUPANCY: Total Housing Units	-0.169728
Occupied Houseing Units	-0.243727
Vacant Housing Units	0.454188
Homeowner Vacancy Rate	0.353689
Rental Vacanct Rate	1.000000
UNITS IN STRUCTURE: Total Housing Units	-0.169728
Total housing units: 1-unit, detached	-0.262939
Total housing units:1-unit, attached	0.010727
Total housing units:2 units	-0.028307
Total housing units:3 or 4 units	-0.071581
Total housing units:5 or 9 units	-0.086585
Total housing units:10 or 19 units	-0.102650

Total housing units:20 or more units	0.002472
Total housing units:Mobile Structures	0.047052
Total housing units:Boats, RV and Vans	-0.170078
ROOMS:Total housing units	-0.169728
Total Housing units:1 Room	-0.043704
Total Housing units:2 Room	0.049637
Total Housing units:3 Room	-0.041908
Total Housing units:4 Room	-0.070381
Total Housing units:5 Room	-0.120294
Total Housing units:6 Room	-0.214276
Total Housing units:7 Room	-0.191056
Total Housing units:8 Room	-0.256824
Total Housing units:9 or more Room	-0.281988
Total Housing units:Median Rooms	-0.152372
BEDROOMS: Total Housing Units	-0.169728
Total Housing Units: No Bedroom	-0.050458
Total Housing Units: 1 Bedroom	-0.047892
Total Housing Units: 2 Bedroom	-0.182919
Total Housing Units: 3 Bedroom	-0.174649
Total Housing Units: 4 Bedroom	-0.194365
Total Housing Units: 5 or more Bedroom	-0.159722
HOUSING TENURE: Total Housing Units	-0.243727
Occupied Housing units: Owner-Occupied	-0.296797
Occupied Housing units: Renter-Occupied	-0.117617
Occupied housing units: Average household size ...	-0.661535
Occupied housing units:Average household size o...	-0.407291
YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...	-0.243727
Occupied housing units: Moved in 2019 or later	-0.135391
Occupied housing units: Moved in 2015 to 2018	-0.245291
Occupied housing units: Moved in 2010 to 2014	-0.269326
Occupied housing units: Moved in 2000 to 2009	-0.298676
Occupied housing units: Moved in 1990 to 1999	-0.323352
Occupied housing units: Moved in 1989 and earlier	-0.217768
VEHICLES AVAILABLE: Occupied housing units	-0.243727
Occupied housing units: No vehicles available	-0.038966
Occupied housing units: 1 vehicles available	-0.187774
Occupied housing units: 2 vehicles available	-0.282255
Occupied housing units: 3 or more vehicles avai...	-0.355161
OCCUPANTS PER ROOM: Occupied housing units	-0.200792
Occupied housing units: 1.00 or less	-0.202630
Occupied housing units: 1.01 to 1.50	-0.125304
Occupied housing units: 1.51 or more	-0.134904

UNITS IN STRUCTURE: Total

Housing Units \

New Cases

0.973764

HOUSING OCCUPANCY: Total Housing Units
 1.000000
 Occupied Houseing Units
 0.990995
 Vacant Housing Units
 0.387566
 Homeowner Vacancy Rate
 -0.008964
 Rental Vacanct Rate
 -0.169728
 UNITS IN STRUCTURE: Total Housing Units
 1.000000
 Total housing units: 1-unit, detached
 0.753442
 Total housing units:1-unit, attached
 0.674659
 Total housing units:2 units
 0.718768
 Total housing units:3 or 4 units
 0.725513
 Total housing units:5 or 9 units
 0.813192
 Total housing units:10 or 19 units
 0.827333
 Total housing units:20 or more units
 0.755929
 Total housing units:Mobile Structures
 0.323712
 Total housing units:Boats, RV and Vans
 0.227847
 ROOMS:Total housing units
 1.000000
 Total Housing units:1 Room
 0.755136
 Total Housing units:2 Room
 0.782873
 Total Housing units:3 Room
 0.821400
 Total Housing units:4 Room
 0.903494
 Total Housing units:5 Room
 0.932572
 Total Housing units:6 Room
 0.938071
 Total Housing units:7 Room
 0.843369
 Total Housing units:8 Room

0.758835
 Total Housing units:9 or more Room
 0.742598
 Total Housing units:Median Rooms
 -0.516810
 BEDROOMS: Total Housing Units
 1.000000
 Total Housing Units: No Bedroom
 0.764686
 Total Housing Units: 1 Bedroom
 0.853453
 Total Housing Units: 2 Bedroom
 0.932372
 Total Housing Units: 3 Bedroom
 0.957227
 Total Housing Units: 4 Bedroom
 0.770417
 Total Housing Units: 5 or more Bedroom
 0.794825
 HOUSING TENURE: Total Housing Units
 0.990995
 Occupied Housing units: Owner-Occupied
 0.889155
 Occupied Housing units: Renter-Occupied
 0.838641
 Occupied housing units: Average household size ...
 0.498449
 Occupied housing units:Average household size o...
 0.347539
 YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...
 0.990995
 Occupied housing units: Moved in 2019 or later
 0.945073
 Occupied housing units: Moved in 2015 to 2018
 0.978814
 Occupied housing units: Moved in 2010 to 2014
 0.980740
 Occupied housing units: Moved in 2000 to 2009
 0.967254
 Occupied housing units: Moved in 1990 to 1999
 0.911006
 Occupied housing units: Moved in 1989 and earlier
 0.902700
 VEHICLES AVAILABLE: Occupied housing units
 0.990995
 Occupied housing units: No vehicles available
 0.675669

Occupied housing units: 1 vehicles available
 0.975423
 Occupied housing units: 2 vehicles available
 0.901931
 Occupied housing units: 3 or more vehicles avai...
 0.761256
 OCCUPANTS PER ROOM: Occupied housing units
 0.987672
 Occupied housing units: 1.00 or less
 0.986964
 Occupied housing units: 1.01 to 1.50
 0.792248
 Occupied housing units: 1.51 or more
 0.792549

Total housing units: 1-unit,

detached \
 New Cases
 0.705823
 HOUSING OCCUPANCY: Total Housing Units
 0.753442
 Occupied Houseing Units
 0.731084
 Vacant Housing Units
 0.399228
 Homeowner Vacancy Rate
 0.060633
 Rental Vacanct Rate
 -0.262939
 UNITS IN STRUCTURE: Total Housing Units
 0.753442
 Total housing units: 1-unit, detached
 1.000000
 Total housing units:1-unit, attached
 0.617336
 Total housing units:2 units
 0.168194
 Total housing units:3 or 4 units
 0.151859
 Total housing units:5 or 9 units
 0.274357
 Total housing units:10 or 19 units
 0.350569
 Total housing units:20 or more units
 0.166529
 Total housing units:Mobile Structures
 0.617802

Total housing units:Boats, RV and Vans
 -0.136334
 ROOMS:Total housing units
 0.753442
 Total Housing units:1 Room
 0.160934
 Total Housing units:2 Room
 0.229519
 Total Housing units:3 Room
 0.254736
 Total Housing units:4 Room
 0.427299
 Total Housing units:5 Room
 0.624182
 Total Housing units:6 Room
 0.888729
 Total Housing units:7 Room
 0.962114
 Total Housing units:8 Room
 0.946788
 Total Housing units:9 or more Room
 0.920836
 Total Housing units:Median Rooms
 0.052924
 BEDROOMS: Total Housing Units
 0.753442
 Total Housing Units: No Bedroom
 0.178282
 Total Housing Units: 1 Bedroom
 0.320709
 Total Housing Units: 2 Bedroom
 0.568536
 Total Housing Units: 3 Bedroom
 0.830650
 Total Housing Units: 4 Bedroom
 0.960453
 Total Housing Units: 5 or more Bedroom
 0.901098
 HOUSING TENURE: Total Housing Units
 0.731084
 Occupied Housing units: Owner-Occupied
 0.948441
 Occupied Housing units: Renter-Occupied
 0.286798
 Occupied housing units: Average household size ...
 0.435503
 Occupied housing units:Average household size o...

0.344545
 YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...
 0.731084
 Occupied housing units: Moved in 2019 or later
 0.522121
 Occupied housing units: Moved in 2015 to 2018
 0.667036
 Occupied housing units: Moved in 2010 to 2014
 0.710439
 Occupied housing units: Moved in 2000 to 2009
 0.839473
 Occupied housing units: Moved in 1990 to 1999
 0.894318
 Occupied housing units: Moved in 1989 and earlier
 0.797265
 VEHICLES AVAILABLE: Occupied housing units
 0.731084
 Occupied housing units: No vehicles available
 0.047448
 Occupied housing units: 1 vehicles available
 0.601401
 Occupied housing units: 2 vehicles available
 0.913229
 Occupied housing units: 3 or more vehicles avai...
 0.935900
 OCCUPANTS PER ROOM: Occupied housing units
 0.737406
 Occupied housing units: 1.00 or less
 0.755489
 Occupied housing units: 1.01 to 1.50
 0.303050
 Occupied housing units: 1.51 or more
 0.268221

Total housing units:1-unit,

attached \
 New Cases
 0.599415
 HOUSING OCCUPANCY: Total Housing Units
 0.674659
 Occupied Houseing Units
 0.644765
 Vacant Housing Units
 0.425456
 Homeowner Vacancy Rate
 -0.036309
 Rental Vacanct Rate

0.010727
 UNITS IN STRUCTURE: Total Housing Units
 0.674659
 Total housing units: 1-unit, detached
 0.617336
 Total housing units:1-unit, attached
 1.000000
 Total housing units:2 units
 0.218169
 Total housing units:3 or 4 units
 0.286388
 Total housing units:5 or 9 units
 0.458192
 Total housing units:10 or 19 units
 0.589539
 Total housing units:20 or more units
 0.334268
 Total housing units:Mobile Structures
 0.386248
 Total housing units:Boats, RV and Vans
 0.029022
 ROOMS:Total housing units
 0.674659
 Total Housing units:1 Room
 0.334508
 Total Housing units:2 Room
 0.380906
 Total Housing units:3 Room
 0.401578
 Total Housing units:4 Room
 0.520308
 Total Housing units:5 Room
 0.611510
 Total Housing units:6 Room
 0.725926
 Total Housing units:7 Room
 0.722165
 Total Housing units:8 Room
 0.659347
 Total Housing units:9 or more Room
 0.597372
 Total Housing units:Median Rooms
 -0.233345
 BEDROOMS: Total Housing Units
 0.674659
 Total Housing Units: No Bedroom
 0.350937

Total Housing Units: 1 Bedroom
 0.445783
 Total Housing Units: 2 Bedroom
 0.567344
 Total Housing Units: 3 Bedroom
 0.720442
 Total Housing Units: 4 Bedroom
 0.678073
 Total Housing Units: 5 or more Bedroom
 0.575298
 HOUSING TENURE: Total Housing Units
 0.644765
 Occupied Housing units: Owner-Occupied
 0.680714
 Occupied Housing units: Renter-Occupied
 0.429662
 Occupied housing units: Average household size ...
 0.138666
 Occupied housing units: Average household size o...
 0.061925
 YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...
 0.644765
 Occupied housing units: Moved in 2019 or later
 0.579782
 Occupied housing units: Moved in 2015 to 2018
 0.613230
 Occupied housing units: Moved in 2010 to 2014
 0.603812
 Occupied housing units: Moved in 2000 to 2009
 0.675301
 Occupied housing units: Moved in 1990 to 1999
 0.628023
 Occupied housing units: Moved in 1989 and earlier
 0.649953
 VEHICLES AVAILABLE: Occupied housing units
 0.644765
 Occupied housing units: No vehicles available
 0.274856
 Occupied housing units: 1 vehicles available
 0.605527
 Occupied housing units: 2 vehicles available
 0.679458
 Occupied housing units: 3 or more vehicles avai...
 0.595470
 OCCUPANTS PER ROOM: Occupied housing units
 0.662199
 Occupied housing units: 1.00 or less

0.670141
 Occupied housing units: 1.01 to 1.50
 0.426214
 Occupied housing units: 1.51 or more
 0.343564

Total housing units:2 units

\	
New Cases	0.767885
HOUSING OCCUPANCY: Total Housing Units	0.718768
Occupied Houseing Units	0.730132
Vacant Housing Units	0.155774
Homeowner Vacancy Rate	-0.006594
Rental Vacanct Rate	-0.028307
UNITS IN STRUCTURE: Total Housing Units	0.718768
Total housing units: 1-unit, detached	0.168194
Total housing units:1-unit, attached	0.218169
Total housing units:2 units	1.000000
Total housing units:3 or 4 units	0.909588
Total housing units:5 or 9 units	0.828808
Total housing units:10 or 19 units	0.733223
Total housing units:20 or more units	0.875780
Total housing units:Mobile Structures	-0.207156
Total housing units:Boats, RV and Vans	0.493440
ROOMS:Total housing units	0.718768
Total Housing units:1 Room	0.932810
Total Housing units:2 Room	0.853048
Total Housing units:3 Room	0.909931
Total Housing units:4 Room	0.865523
Total Housing units:5 Room	0.750712
Total Housing units:6 Room	0.526168
Total Housing units:7 Room	0.339222
Total Housing units:8 Room	0.187596
Total Housing units:9 or more Room	0.204799
Total Housing units:Median Rooms	-0.814141
BEDROOMS: Total Housing Units	0.718768
Total Housing Units: No Bedroom	0.929498
Total Housing Units: 1 Bedroom	0.878877
Total Housing Units: 2 Bedroom	0.783508
Total Housing Units: 3 Bedroom	0.617578
Total Housing Units: 4 Bedroom	0.199498
Total Housing Units: 5 or more Bedroom	0.312934
HOUSING TENURE: Total Housing Units	0.730132
Occupied Housing units: Owner-Occupied	0.385129
Occupied Housing units: Renter-Occupied	0.924223
Occupied housing units: Average household size ...	0.445441
Occupied housing units:Average household size o...	0.338223

YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...	0.730132
Occupied housing units: Moved in 2019 or later	0.818121
Occupied housing units: Moved in 2015 to 2018	0.776526
Occupied housing units: Moved in 2010 to 2014	0.760861
Occupied housing units: Moved in 2000 to 2009	0.604209
Occupied housing units: Moved in 1990 to 1999	0.485299
Occupied housing units: Moved in 1989 and earlier	0.566952
VEHICLES AVAILABLE: Occupied housing units	0.730132
Occupied housing units: No vehicles available	0.870009
Occupied housing units: 1 vehicles available	0.821925
Occupied housing units: 2 vehicles available	0.461921
Occupied housing units: 3 or more vehicles avai...	0.234880
OCCUPANTS PER ROOM: Occupied housing units	0.716729
Occupied housing units: 1.00 or less	0.695559
Occupied housing units: 1.01 to 1.50	0.880607
Occupied housing units: 1.51 or more	0.957734

New Cases	...
HOUSING OCCUPANCY: Total Housing Units	...
Occupied Houseing Units	...
Vacant Housing Units	...
Homeowner Vacancy Rate	...
Rental Vacanct Rate	...
UNITS IN STRUCTURE: Total Housing Units	...
Total housing units: 1-unit, detached	...
Total housing units:1-unit, attached	...
Total housing units:2 units	...
Total housing units:3 or 4 units	...
Total housing units:5 or 9 units	...
Total housing units:10 or 19 units	...
Total housing units:20 or more units	...
Total housing units:Mobile Structures	...
Total housing units:Boats, RV and Vans	...
ROOMS:Total housing units	...
Total Housing units:1 Room	...
Total Housing units:2 Room	...
Total Housing units:3 Room	...
Total Housing units:4 Room	...
Total Housing units:5 Room	...
Total Housing units:6 Room	...
Total Housing units:7 Room	...
Total Housing units:8 Room	...
Total Housing units:9 or more Room	...
Total Housing units:Median Rooms	...
BEDROOMS: Total Housing Units	...
Total Housing Units: No Bedroom	...

Total Housing Units: 1 Bedroom ...
 Total Housing Units: 2 Bedroom ...
 Total Housing Units: 3 Bedroom ...
 Total Housing Units: 4 Bedroom ...
 Total Housing Units: 5 or more Bedroom ...
 HOUSING TENURE: Total Housing Units ...
 Occupied Housing units: Owner-Occupied ...
 Occupied Housing units: Renter-Occupied ...
 Occupied housing units: Average household size
 Occupied housing units: Average household size o... ..
 YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous... ..
 Occupied housing units: Moved in 2019 or later ...
 Occupied housing units: Moved in 2015 to 2018 ...
 Occupied housing units: Moved in 2010 to 2014 ...
 Occupied housing units: Moved in 2000 to 2009 ...
 Occupied housing units: Moved in 1990 to 1999 ...
 Occupied housing units: Moved in 1989 and earlier ...
 VEHICLES AVAILABLE: Occupied housing units ...
 Occupied housing units: No vehicles available ...
 Occupied housing units: 1 vehicles available ...
 Occupied housing units: 2 vehicles available ...
 Occupied housing units: 3 or more vehicles avai... ..
 OCCUPANTS PER ROOM: Occupied housing units ...
 Occupied housing units: 1.00 or less ...
 Occupied housing units: 1.01 to 1.50 ...
 Occupied housing units: 1.51 or more ...

Occupied housing units:

Moved in 1989 and earlier \
 New Cases
 0.930999
 HOUSING OCCUPANCY: Total Housing Units
 0.902700
 Occupied Houseing Units
 0.924450
 Vacant Housing Units
 0.144148
 Homeowner Vacancy Rate
 -0.011244
 Rental Vacanct Rate
 -0.217768
 UNITS IN STRUCTURE: Total Housing Units
 0.902700
 Total housing units: 1-unit, detached
 0.797265
 Total housing units: 1-unit, attached
 0.649953

Total housing units:2 units
 0.566952
 Total housing units:3 or 4 units
 0.513186
 Total housing units:5 or 9 units
 0.610161
 Total housing units:10 or 19 units
 0.694689
 Total housing units:20 or more units
 0.585278
 Total housing units:Mobile Structures
 0.204863
 Total housing units:Boats, RV and Vans
 0.051410
 ROOMS:Total housing units
 0.902700
 Total Housing units:1 Room
 0.607588
 Total Housing units:2 Room
 0.629731
 Total Housing units:3 Room
 0.648927
 Total Housing units:4 Room
 0.709506
 Total Housing units:5 Room
 0.712538
 Total Housing units:6 Room
 0.877923
 Total Housing units:7 Room
 0.875058
 Total Housing units:8 Room
 0.869710
 Total Housing units:9 or more Room
 0.833741
 Total Housing units:Median Rooms
 -0.273112
 BEDROOMS: Total Housing Units
 0.902700
 Total Housing Units: No Bedroom
 0.626361
 Total Housing Units: 1 Bedroom
 0.715422
 Total Housing Units: 2 Bedroom
 0.715923
 Total Housing Units: 3 Bedroom
 0.916208
 Total Housing Units: 4 Bedroom

0.858311
 Total Housing Units: 5 or more Bedroom
 0.779751
 HOUSING TENURE: Total Housing Units
 0.924450
 Occupied Housing units: Owner-Occupied
 0.922689
 Occupied Housing units: Renter-Occupied
 0.676526
 Occupied housing units: Average household size ...
 0.605977
 Occupied housing units: Average household size o...
 0.248897
 YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...
 0.924450
 Occupied housing units: Moved in 2019 or later
 0.807668
 Occupied housing units: Moved in 2015 to 2018
 0.866519
 Occupied housing units: Moved in 2010 to 2014
 0.893326
 Occupied housing units: Moved in 2000 to 2009
 0.935148
 Occupied housing units: Moved in 1990 to 1999
 0.940910
 Occupied housing units: Moved in 1989 and earlier
 1.000000
 VEHICLES AVAILABLE: Occupied housing units
 0.924450
 Occupied housing units: No vehicles available
 0.440082
 Occupied housing units: 1 vehicles available
 0.851637
 Occupied housing units: 2 vehicles available
 0.953541
 Occupied housing units: 3 or more vehicles avai...
 0.871808
 OCCUPANTS PER ROOM: Occupied housing units
 0.918889
 Occupied housing units: 1.00 or less
 0.924554
 Occupied housing units: 1.01 to 1.50
 0.633955
 Occupied housing units: 1.51 or more
 0.635747

VEHICLES AVAILABLE: Occupied

housing units \
 New Cases
 0.989492
 HOUSING OCCUPANCY: Total Housing Units
 0.990995
 Occupied Houseing Units
 1.000000
 Vacant Housing Units
 0.260641
 Homeowner Vacancy Rate
 -0.057092
 Rental Vacanct Rate
 -0.243727
 UNITS IN STRUCTURE: Total Housing Units
 0.990995
 Total housing units: 1-unit, detached
 0.731084
 Total housing units:1-unit, attached
 0.644765
 Total housing units:2 units
 0.730132
 Total housing units:3 or 4 units
 0.739414
 Total housing units:5 or 9 units
 0.821505
 Total housing units:10 or 19 units
 0.844073
 Total housing units:20 or more units
 0.763735
 Total housing units:Mobile Structures
 0.245083
 Total housing units:Boats, RV and Vans
 0.230978
 ROOMS:Total housing units
 0.990995
 Total Housing units:1 Room
 0.773991
 Total Housing units:2 Room
 0.784170
 Total Housing units:3 Room
 0.831719
 Total Housing units:4 Room
 0.895421
 Total Housing units:5 Room
 0.898042
 Total Housing units:6 Room
 0.913858

Total Housing units:7 Room
 0.822465
 Total Housing units:8 Room
 0.763314
 Total Housing units:9 or more Room
 0.747380
 Total Housing units:Median Rooms
 -0.496640
 BEDROOMS: Total Housing Units
 0.990995
 Total Housing Units: No Bedroom
 0.784254
 Total Housing Units: 1 Bedroom
 0.865940
 Total Housing Units: 2 Bedroom
 0.914085
 Total Housing Units: 3 Bedroom
 0.942974
 Total Housing Units: 4 Bedroom
 0.762175
 Total Housing Units: 5 or more Bedroom
 0.773039
 HOUSING TENURE: Total Housing Units
 1.000000
 Occupied Housing units: Owner-Occupied
 0.889483
 Occupied Housing units: Renter-Occupied
 0.855059
 Occupied housing units: Average household size ...
 0.584160
 Occupied housing units:Average household size o...
 0.349709
 YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...
 1.000000
 Occupied housing units: Moved in 2019 or later
 0.949909
 Occupied housing units: Moved in 2015 to 2018
 0.985229
 Occupied housing units: Moved in 2010 to 2014
 0.987469
 Occupied housing units: Moved in 2000 to 2009
 0.974357
 Occupied housing units: Moved in 1990 to 1999
 0.925592
 Occupied housing units: Moved in 1989 and earlier
 0.924450
 VEHICLES AVAILABLE: Occupied housing units

1.000000
 Occupied housing units: No vehicles available
 0.680195
 Occupied housing units: 1 vehicles available
 0.979273
 Occupied housing units: 2 vehicles available
 0.911663
 Occupied housing units: 3 or more vehicles avai...
 0.778722
 OCCUPANTS PER ROOM: Occupied housing units
 0.992469
 Occupied housing units: 1.00 or less
 0.991004
 Occupied housing units: 1.01 to 1.50
 0.807212
 Occupied housing units: 1.51 or more
 0.810396

Occupied housing units: No

vehicles available \
 New Cases
 0.662312
 HOUSING OCCUPANCY: Total Housing Units
 0.675669
 Occupied Houseing Units
 0.680195
 Vacant Housing Units
 0.188821
 Homeowner Vacancy Rate
 -0.061807
 Rental Vacanct Rate
 -0.038966
 UNITS IN STRUCTURE: Total Housing Units
 0.675669
 Total housing units: 1-unit, detached
 0.047448
 Total housing units:1-unit, attached
 0.274856
 Total housing units:2 units
 0.870009
 Total housing units:3 or 4 units
 0.935295
 Total housing units:5 or 9 units
 0.922736
 Total housing units:10 or 19 units
 0.829699
 Total housing units:20 or more units

0.964885
 Total housing units:Mobile Structures
 -0.107770
 Total housing units:Boats, RV and Vans
 0.521229
 ROOMS:Total housing units
 0.675669
 Total Housing units:1 Room
 0.950721
 Total Housing units:2 Room
 0.925105
 Total Housing units:3 Room
 0.945825
 Total Housing units:4 Room
 0.894440
 Total Housing units:5 Room
 0.750534
 Total Housing units:6 Room
 0.438358
 Total Housing units:7 Room
 0.197405
 Total Housing units:8 Room
 0.072574
 Total Housing units:9 or more Room
 0.102314
 Total Housing units:Median Rooms
 -0.830996
 BEDROOMS: Total Housing Units
 0.675669
 Total Housing Units: No Bedroom
 0.944057
 Total Housing Units: 1 Bedroom
 0.924968
 Total Housing Units: 2 Bedroom
 0.805132
 Total Housing Units: 3 Bedroom
 0.522564
 Total Housing Units: 4 Bedroom
 0.075596
 Total Housing Units: 5 or more Bedroom
 0.208569
 HOUSING TENURE: Total Housing Units
 0.680195
 Occupied Housing units: Owner-Occupied
 0.286639
 Occupied Housing units: Renter-Occupied
 0.942881

Occupied housing units: Average household size ...
 0.272077
 Occupied housing units: Average household size o...
 0.200338
 YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...
 0.680195
 Occupied housing units: Moved in 2019 or later
 0.848266
 Occupied housing units: Moved in 2015 to 2018
 0.745411
 Occupied housing units: Moved in 2010 to 2014
 0.692902
 Occupied housing units: Moved in 2000 to 2009
 0.520652
 Occupied housing units: Moved in 1990 to 1999
 0.373669
 Occupied housing units: Moved in 1989 and earlier
 0.440082
 VEHICLES AVAILABLE: Occupied housing units
 0.680195
 Occupied housing units: No vehicles available
 1.000000
 Occupied housing units: 1 vehicles available
 0.808168
 Occupied housing units: 2 vehicles available
 0.321065
 Occupied housing units: 3 or more vehicles avai...
 0.088505
 OCCUPANTS PER ROOM: Occupied housing units
 0.667774
 Occupied housing units: 1.00 or less
 0.648636
 Occupied housing units: 1.01 to 1.50
 0.820255
 Occupied housing units: 1.51 or more
 0.867673

Occupied housing units: 1

vehicles available \
 New Cases
 0.967568
 HOUSING OCCUPANCY: Total Housing Units
 0.975423
 Occupied Housing Units
 0.979273
 Vacant Housing Units
 0.291058

Homeowner Vacancy Rate
 -0.053393
 Rental Vacanct Rate
 -0.187774
 UNITS IN STRUCTURE: Total Housing Units
 0.975423
 Total housing units: 1-unit, detached
 0.601401
 Total housing units:1-unit, attached
 0.605527
 Total housing units:2 units
 0.821925
 Total housing units:3 or 4 units
 0.844528
 Total housing units:5 or 9 units
 0.896033
 Total housing units:10 or 19 units
 0.888102
 Total housing units:20 or more units
 0.860595
 Total housing units:Mobile Structures
 0.184868
 Total housing units:Boats, RV and Vans
 0.334059
 ROOMS:Total housing units
 0.975423
 Total Housing units:1 Room
 0.873125
 Total Housing units:2 Room
 0.865761
 Total Housing units:3 Room
 0.913113
 Total Housing units:4 Room
 0.953973
 Total Housing units:5 Room
 0.931859
 Total Housing units:6 Room
 0.859519
 Total Housing units:7 Room
 0.722097
 Total Housing units:8 Room
 0.624984
 Total Housing units:9 or more Room
 0.620024
 Total Housing units:Median Rooms
 -0.631402
 BEDROOMS: Total Housing Units

0.975423
 Total Housing Units: No Bedroom
 0.879682
 Total Housing Units: 1 Bedroom
 0.932630
 Total Housing Units: 2 Bedroom
 0.950078
 Total Housing Units: 3 Bedroom
 0.903810
 Total Housing Units: 4 Bedroom
 0.627696
 Total Housing Units: 5 or more Bedroom
 0.678497
 HOUSING TENURE: Total Housing Units
 0.979273
 Occupied Housing units: Owner-Occupied
 0.784869
 Occupied Housing units: Renter-Occupied
 0.935123
 Occupied housing units: Average household size ...
 0.524788
 Occupied housing units: Average household size o...
 0.343146
 YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...
 0.979273
 Occupied housing units: Moved in 2019 or later
 0.981103
 Occupied housing units: Moved in 2015 to 2018
 0.989346
 Occupied housing units: Moved in 2010 to 2014
 0.974227
 Occupied housing units: Moved in 2000 to 2009
 0.918280
 Occupied housing units: Moved in 1990 to 1999
 0.833671
 Occupied housing units: Moved in 1989 and earlier
 0.851637
 VEHICLES AVAILABLE: Occupied housing units
 0.979273
 Occupied housing units: No vehicles available
 0.808168
 Occupied housing units: 1 vehicles available
 1.000000
 Occupied housing units: 2 vehicles available
 0.814026
 Occupied housing units: 3 or more vehicles avai...
 0.637333

OCCUPANTS PER ROOM: Occupied housing units
 0.969988
 Occupied housing units: 1.00 or less
 0.963478
 Occupied housing units: 1.01 to 1.50
 0.866253
 Occupied housing units: 1.51 or more
 0.882570

Occupied housing units: 2

vehicles available \

New Cases
 0.909991

HOUSING OCCUPANCY: Total Housing Units
 0.901931

Occupied Houseing Units
 0.911663

Vacant Housing Units
 0.226643

Homeowner Vacancy Rate
 -0.039580

Rental Vacanct Rate
 -0.282255

UNITS IN STRUCTURE: Total Housing Units
 0.901931

Total housing units: 1-unit, detached
 0.913229

Total housing units:1-unit, attached
 0.679458

Total housing units:2 units
 0.461921

Total housing units:3 or 4 units
 0.435565

Total housing units:5 or 9 units
 0.544751

Total housing units:10 or 19 units
 0.630912

Total housing units:20 or more units
 0.449664

Total housing units:Mobile Structures
 0.368172

Total housing units:Boats, RV and Vans
 0.004869

ROOMS:Total housing units
 0.901931

Total Housing units:1 Room
 0.476126

Total Housing units:2 Room
 0.496160
 Total Housing units:3 Room
 0.548981
 Total Housing units:4 Room
 0.657034
 Total Housing units:5 Room
 0.740267
 Total Housing units:6 Room
 0.936294
 Total Housing units:7 Room
 0.952992
 Total Housing units:8 Room
 0.942222
 Total Housing units:9 or more Room
 0.899487
 Total Housing units:Median Rooms
 -0.184305
 BEDROOMS: Total Housing Units
 0.901931
 Total Housing Units: No Bedroom
 0.493535
 Total Housing Units: 1 Bedroom
 0.603903
 Total Housing Units: 2 Bedroom
 0.727152
 Total Housing Units: 3 Bedroom
 0.930035
 Total Housing Units: 4 Bedroom
 0.937089
 Total Housing Units: 5 or more Bedroom
 0.876315
 HOUSING TENURE: Total Housing Units
 0.911663
 Occupied Housing units: Owner-Occupied
 0.984776
 Occupied Housing units: Renter-Occupied
 0.582234
 Occupied housing units: Average household size ...
 0.602783
 Occupied housing units:Average household size o...
 0.339980
 YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...
 0.911663
 Occupied housing units: Moved in 2019 or later
 0.754441
 Occupied housing units: Moved in 2015 to 2018

0.856933
 Occupied housing units: Moved in 2010 to 2014
 0.886114
 Occupied housing units: Moved in 2000 to 2009
 0.965414
 Occupied housing units: Moved in 1990 to 1999
 0.982498
 Occupied housing units: Moved in 1989 and earlier
 0.953541
 VEHICLES AVAILABLE: Occupied housing units
 0.911663
 Occupied housing units: No vehicles available
 0.321065
 Occupied housing units: 1 vehicles available
 0.814026
 Occupied housing units: 2 vehicles available
 1.000000
 Occupied housing units: 3 or more vehicles avai...
 0.949741
 OCCUPANTS PER ROOM: Occupied housing units
 0.909450
 Occupied housing units: 1.00 or less
 0.917962
 Occupied housing units: 1.01 to 1.50
 0.590178
 Occupied housing units: 1.51 or more
 0.566077

Occupied housing units: 3 or

more vehicles available \
 New Cases
 0.772155
 HOUSING OCCUPANCY: Total Housing Units
 0.761256
 Occupied Houseing Units
 0.778722
 Vacant Housing Units
 0.127600
 Homeowner Vacancy Rate
 -0.044656
 Rental Vacanct Rate
 -0.355161
 UNITS IN STRUCTURE: Total Housing Units
 0.761256
 Total housing units: 1-unit, detached
 0.935900
 Total housing units:1-unit, attached

0.595470
 Total housing units:2 units
 0.234880
 Total housing units:3 or 4 units
 0.202523
 Total housing units:5 or 9 units
 0.354947
 Total housing units:10 or 19 units
 0.453950
 Total housing units:20 or more units
 0.238092
 Total housing units:Mobile Structures
 0.392523
 Total housing units:Boats, RV and Vans
 -0.139460
 ROOMS:Total housing units
 0.761256
 Total Housing units:1 Room
 0.234037
 Total Housing units:2 Room
 0.303661
 Total Housing units:3 Room
 0.335263
 Total Housing units:4 Room
 0.460122
 Total Housing units:5 Room
 0.550517
 Total Housing units:6 Room
 0.829747
 Total Housing units:7 Room
 0.905817
 Total Housing units:8 Room
 0.975776
 Total Housing units:9 or more Room
 0.941697
 Total Housing units:Median Rooms
 0.064031
 BEDROOMS: Total Housing Units
 0.761256
 Total Housing Units: No Bedroom
 0.252033
 Total Housing Units: 1 Bedroom
 0.405188
 Total Housing Units: 2 Bedroom
 0.554858
 Total Housing Units: 3 Bedroom
 0.796230

Total Housing Units: 4 Bedroom
 0.969328
 Total Housing Units: 5 or more Bedroom
 0.860321
 HOUSING TENURE: Total Housing Units
 0.778722
 Occupied Housing units: Owner-Occupied
 0.965406
 Occupied Housing units: Renter-Occupied
 0.356362
 Occupied housing units: Average household size ...
 0.589151
 Occupied housing units: Average household size o...
 0.278248
 YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...
 0.778722
 Occupied housing units: Moved in 2019 or later
 0.577708
 Occupied housing units: Moved in 2015 to 2018
 0.693518
 Occupied housing units: Moved in 2010 to 2014
 0.752533
 Occupied housing units: Moved in 2000 to 2009
 0.875526
 Occupied housing units: Moved in 1990 to 1999
 0.950171
 Occupied housing units: Moved in 1989 and earlier
 0.871808
 VEHICLES AVAILABLE: Occupied housing units
 0.778722
 Occupied housing units: No vehicles available
 0.088505
 Occupied housing units: 1 vehicles available
 0.637333
 Occupied housing units: 2 vehicles available
 0.949741
 Occupied housing units: 3 or more vehicles avai...
 1.000000
 OCCUPANTS PER ROOM: Occupied housing units
 0.777602
 Occupied housing units: 1.00 or less
 0.792504
 Occupied housing units: 1.01 to 1.50
 0.386019
 Occupied housing units: 1.51 or more
 0.352213

OCCUPANTS PER ROOM: Occupied

housing units \
 New Cases
 0.979638
 HOUSING OCCUPANCY: Total Housing Units
 0.987672
 Occupied Houseing Units
 0.992469
 Vacant Housing Units
 0.288531
 Homeowner Vacancy Rate
 0.008432
 Rental Vacanct Rate
 -0.200792
 UNITS IN STRUCTURE: Total Housing Units
 0.987672
 Total housing units: 1-unit, detached
 0.737406
 Total housing units:1-unit, attached
 0.662199
 Total housing units:2 units
 0.716729
 Total housing units:3 or 4 units
 0.726077
 Total housing units:5 or 9 units
 0.810206
 Total housing units:10 or 19 units
 0.832191
 Total housing units:20 or more units
 0.749690
 Total housing units:Mobile Structures
 0.277357
 Total housing units:Boats, RV and Vans
 0.243703
 ROOMS:Total housing units
 0.987672
 Total Housing units:1 Room
 0.756821
 Total Housing units:2 Room
 0.767848
 Total Housing units:3 Room
 0.818822
 Total Housing units:4 Room
 0.890877
 Total Housing units:5 Room
 0.900868
 Total Housing units:6 Room

0.919145
 Total Housing units:7 Room
 0.825428
 Total Housing units:8 Room
 0.764614
 Total Housing units:9 or more Room
 0.746894
 Total Housing units:Median Rooms
 -0.525294
 BEDROOMS: Total Housing Units
 0.987672
 Total Housing Units: No Bedroom
 0.766832
 Total Housing Units: 1 Bedroom
 0.851170
 Total Housing Units: 2 Bedroom
 0.909970
 Total Housing Units: 3 Bedroom
 0.950210
 Total Housing Units: 4 Bedroom
 0.764388
 Total Housing Units: 5 or more Bedroom
 0.769716
 HOUSING TENURE: Total Housing Units
 0.992469
 Occupied Housing units: Owner-Occupied
 0.888087
 Occupied Housing units: Renter-Occupied
 0.842601
 Occupied housing units: Average household size ...
 0.581373
 Occupied housing units:Average household size o...
 0.366442
 YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...
 0.992469
 Occupied housing units: Moved in 2019 or later
 0.942467
 Occupied housing units: Moved in 2015 to 2018
 0.976006
 Occupied housing units: Moved in 2010 to 2014
 0.978831
 Occupied housing units: Moved in 2000 to 2009
 0.968166
 Occupied housing units: Moved in 1990 to 1999
 0.921421
 Occupied housing units: Moved in 1989 and earlier
 0.918889

VEHICLES AVAILABLE: Occupied housing units
 0.992469
 Occupied housing units: No vehicles available
 0.667774
 Occupied housing units: 1 vehicles available
 0.969988
 Occupied housing units: 2 vehicles available
 0.909450
 Occupied housing units: 3 or more vehicles avai...
 0.777602
 OCCUPANTS PER ROOM: Occupied housing units
 1.000000
 Occupied housing units: 1.00 or less
 0.999355
 Occupied housing units: 1.01 to 1.50
 0.801396
 Occupied housing units: 1.51 or more
 0.800582

Occupied housing units: 1.00

or less \
 New Cases
 0.975807
 HOUSING OCCUPANCY: Total Housing Units
 0.986964
 Occupied Houseing Units
 0.991004
 Vacant Housing Units
 0.293509
 Homeowner Vacancy Rate
 0.013285
 Rental Vacanct Rate
 -0.202630
 UNITS IN STRUCTURE: Total Housing Units
 0.986964
 Total housing units: 1-unit, detached
 0.755489
 Total housing units:1-unit, attached
 0.670141
 Total housing units:2 units
 0.695559
 Total housing units:3 or 4 units
 0.708748
 Total housing units:5 or 9 units
 0.793858
 Total housing units:10 or 19 units
 0.818502

Total housing units:20 or more units
 0.734126
 Total housing units:Mobile Structures
 0.293895
 Total housing units:Boats, RV and Vans
 0.227265
 ROOMS:Total housing units
 0.986964
 Total Housing units:1 Room
 0.739338
 Total Housing units:2 Room
 0.753800
 Total Housing units:3 Room
 0.801679
 Total Housing units:4 Room
 0.877640
 Total Housing units:5 Room
 0.893921
 Total Housing units:6 Room
 0.924399
 Total Housing units:7 Room
 0.839055
 Total Housing units:8 Room
 0.781901
 Total Housing units:9 or more Room
 0.767303
 Total Housing units:Median Rooms
 -0.501178
 BEDROOMS: Total Housing Units
 0.986964
 Total Housing Units: No Bedroom
 0.749856
 Total Housing Units: 1 Bedroom
 0.838179
 Total Housing Units: 2 Bedroom
 0.900027
 Total Housing Units: 3 Bedroom
 0.954258
 Total Housing Units: 4 Bedroom
 0.782512
 Total Housing Units: 5 or more Bedroom
 0.784524
 HOUSING TENURE: Total Housing Units
 0.991004
 Occupied Housing units: Owner-Occupied
 0.900040
 Occupied Housing units: Renter-Occupied

0.826308
 Occupied housing units: Average household size ...
 0.579486
 Occupied housing units: Average household size o...
 0.356442
 YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...
 0.991004
 Occupied housing units: Moved in 2019 or later
 0.934016
 Occupied housing units: Moved in 2015 to 2018
 0.971771
 Occupied housing units: Moved in 2010 to 2014
 0.975686
 Occupied housing units: Moved in 2000 to 2009
 0.971722
 Occupied housing units: Moved in 1990 to 1999
 0.930110
 Occupied housing units: Moved in 1989 and earlier
 0.924554
 VEHICLES AVAILABLE: Occupied housing units
 0.991004
 Occupied housing units: No vehicles available
 0.648636
 Occupied housing units: 1 vehicles available
 0.963478
 Occupied housing units: 2 vehicles available
 0.917962
 Occupied housing units: 3 or more vehicles avai...
 0.792504
 OCCUPANTS PER ROOM: Occupied housing units
 0.999355
 Occupied housing units: 1.00 or less
 1.000000
 Occupied housing units: 1.01 to 1.50
 0.779759
 Occupied housing units: 1.51 or more
 0.779509

Occupied housing units: 1.01

to 1.50 \

New Cases

0.831580

HOUSING OCCUPANCY: Total Housing Units

0.792248

Occupied Houseing Units

0.807212

Vacant Housing Units

0.154912
 Homeowner Vacancy Rate
 -0.072826
 Rental Vacanct Rate
 -0.125304
 UNITS IN STRUCTURE: Total Housing Units
 0.792248
 Total housing units: 1-unit, detached
 0.303050
 Total housing units:1-unit, attached
 0.426214
 Total housing units:2 units
 0.880607
 Total housing units:3 or 4 units
 0.834764
 Total housing units:5 or 9 units
 0.915393
 Total housing units:10 or 19 units
 0.898296
 Total housing units:20 or more units
 0.822080
 Total housing units:Mobile Structures
 -0.014381
 Total housing units:Boats, RV and Vans
 0.448646
 ROOMS:Total housing units
 0.792248
 Total Housing units:1 Room
 0.854857
 Total Housing units:2 Room
 0.816689
 Total Housing units:3 Room
 0.914820
 Total Housing units:4 Room
 0.918090
 Total Housing units:5 Room
 0.828881
 Total Housing units:6 Room
 0.653890
 Total Housing units:7 Room
 0.440460
 Total Housing units:8 Room
 0.341670
 Total Housing units:9 or more Room
 0.252986
 Total Housing units:Median Rooms
 -0.798145

BEDROOMS: Total Housing Units
 0.792248
 Total Housing Units: No Bedroom
 0.854745
 Total Housing Units: 1 Bedroom
 0.867986
 Total Housing Units: 2 Bedroom
 0.887392
 Total Housing Units: 3 Bedroom
 0.689687
 Total Housing Units: 4 Bedroom
 0.323369
 Total Housing Units: 5 or more Bedroom
 0.357484
 HOUSING TENURE: Total Housing Units
 0.807212
 Occupied Housing units: Owner-Occupied
 0.516951
 Occupied Housing units: Renter-Occupied
 0.918349
 Occupied housing units: Average household size ...
 0.479435
 Occupied housing units: Average household size o...
 0.466025
 YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...
 0.807212
 Occupied housing units: Moved in 2019 or later
 0.881302
 Occupied housing units: Moved in 2015 to 2018
 0.837569
 Occupied housing units: Moved in 2010 to 2014
 0.816225
 Occupied housing units: Moved in 2000 to 2009
 0.709748
 Occupied housing units: Moved in 1990 to 1999
 0.592821
 Occupied housing units: Moved in 1989 and earlier
 0.633955
 VEHICLES AVAILABLE: Occupied housing units
 0.807212
 Occupied housing units: No vehicles available
 0.820255
 Occupied housing units: 1 vehicles available
 0.866253
 Occupied housing units: 2 vehicles available
 0.590178
 Occupied housing units: 3 or more vehicles avai...

0.386019
 OCCUPANTS PER ROOM: Occupied housing units
 0.801396
 Occupied housing units: 1.00 or less
 0.779759
 Occupied housing units: 1.01 to 1.50
 1.000000
 Occupied housing units: 1.51 or more
 0.959084

Occupied housing units: 1.51

or more
 New Cases
 0.844934
 HOUSING OCCUPANCY: Total Housing Units
 0.792549
 Occupied Housing Units
 0.810396
 Vacant Housing Units
 0.135161
 Homeowner Vacancy Rate
 -0.070690
 Rental Vacant Rate
 -0.134904
 UNITS IN STRUCTURE: Total Housing Units
 0.792549
 Total housing units: 1-unit, detached
 0.268221
 Total housing units:1-unit, attached
 0.343564
 Total housing units:2 units
 0.957734
 Total housing units:3 or 4 units
 0.888105
 Total housing units:5 or 9 units
 0.889741
 Total housing units:10 or 19 units
 0.849917
 Total housing units:20 or more units
 0.882567
 Total housing units:Mobile Structures
 -0.105070
 Total housing units:Boats, RV and Vans
 0.476466
 ROOMS:Total housing units
 0.792549
 Total Housing units:1 Room

0.925818
 Total Housing units:2 Room
 0.864507
 Total Housing units:3 Room
 0.942512
 Total Housing units:4 Room
 0.920442
 Total Housing units:5 Room
 0.818396
 Total Housing units:6 Room
 0.621350
 Total Housing units:7 Room
 0.417315
 Total Housing units:8 Room
 0.295805
 Total Housing units:9 or more Room
 0.270412
 Total Housing units:Median Rooms
 -0.819663
 BEDROOMS: Total Housing Units
 0.792549
 Total Housing Units: No Bedroom
 0.925175
 Total Housing Units: 1 Bedroom
 0.909066
 Total Housing Units: 2 Bedroom
 0.869705
 Total Housing Units: 3 Bedroom
 0.679004
 Total Housing Units: 4 Bedroom
 0.289448
 Total Housing Units: 5 or more Bedroom
 0.386350
 HOUSING TENURE: Total Housing Units
 0.810396
 Occupied Housing units: Owner-Occupied
 0.494322
 Occupied Housing units: Renter-Occupied
 0.949962
 Occupied housing units: Average household size ...
 0.507850
 Occupied housing units:Average household size o...
 0.428784
 YEAR HOUSEHOLDER MOVED INTO UNIT: Occupied hous...
 0.810396
 Occupied housing units: Moved in 2019 or later
 0.883622

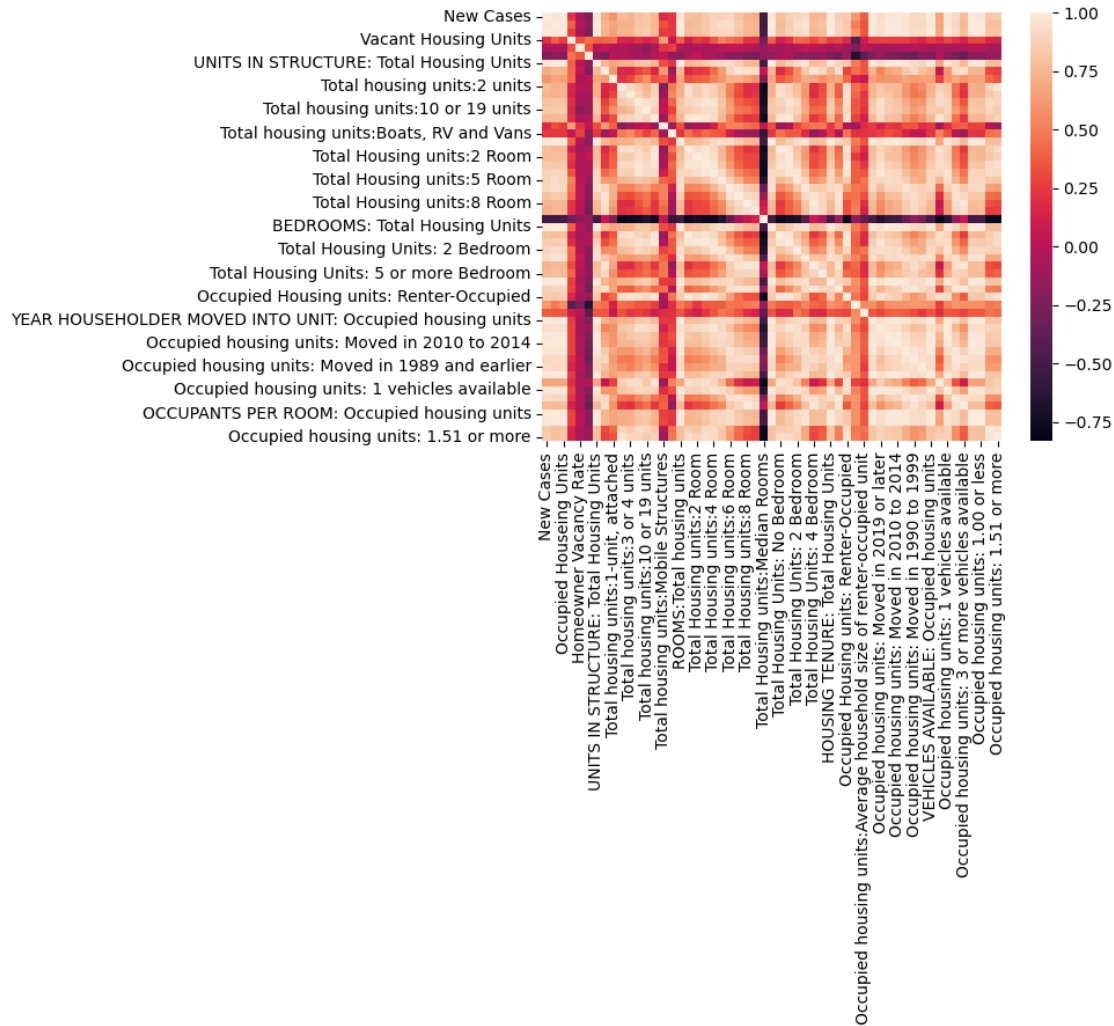
Occupied housing units: Moved in 2015 to 2018
 0.844832
 Occupied housing units: Moved in 2010 to 2014
 0.838977
 Occupied housing units: Moved in 2000 to 2009
 0.704620
 Occupied housing units: Moved in 1990 to 1999
 0.579119
 Occupied housing units: Moved in 1989 and earlier
 0.635747
 VEHICLES AVAILABLE: Occupied housing units
 0.810396
 Occupied housing units: No vehicles available
 0.867673
 Occupied housing units: 1 vehicles available
 0.882570
 Occupied housing units: 2 vehicles available
 0.566077
 Occupied housing units: 3 or more vehicles avai...
 0.352213
 OCCUPANTS PER ROOM: Occupied housing units
 0.800582
 Occupied housing units: 1.00 or less
 0.779509
 Occupied housing units: 1.01 to 1.50
 0.959084
 Occupied housing units: 1.51 or more
 1.000000

[55 rows x 55 columns]

- Since the above data isnt properly showing up in the PDF, I have added an extra heat map for better understanding of the code

```
[19]: import seaborn as sns

sns.heatmap(corr_matrix)#, cmap='coolwarm', annot=True)
plt.show()
```



0.1.2 TASK 3

Formulate hypothesis between Enrichment data and number of cases to be compared against states. Choose 3 different variables to compare against.

- There is a significant positive relation between the number of houses occupied and the number of new COVID cases, so the question can be: *Does higher the occupied houses indicate more number of COVID Cases reported in the state of New Jersey?*
- There is a significant rise in positive relation for the number of bedrooms and new cases and then slight decline as the bedrooms increase, so the question can be: *Does the higher the number of rooms in a house tell us the increase in COVID cases for the state of New Jersey, and why there may a decrease in cases for higher number of rooms?*
- There is a significant decrease in positive relation for the number of vehicles owned by the people in the houses and the new cases in the state of New Jersey, so this raises the question: *If a Household has more cars, then does that mean that if more people take different cars for*

travel, so that the transmission of the virus be minimum?

- There is a significant decrease in positive relation between the number of occupants per room in a house to the number of cases in the state, so this raises the question: *If more people are occupying the rooms in the house, then if one person gets the virus they isolate and all the other people of that house may isolate too, potentially decreasing the spread of the virus?*

[]: