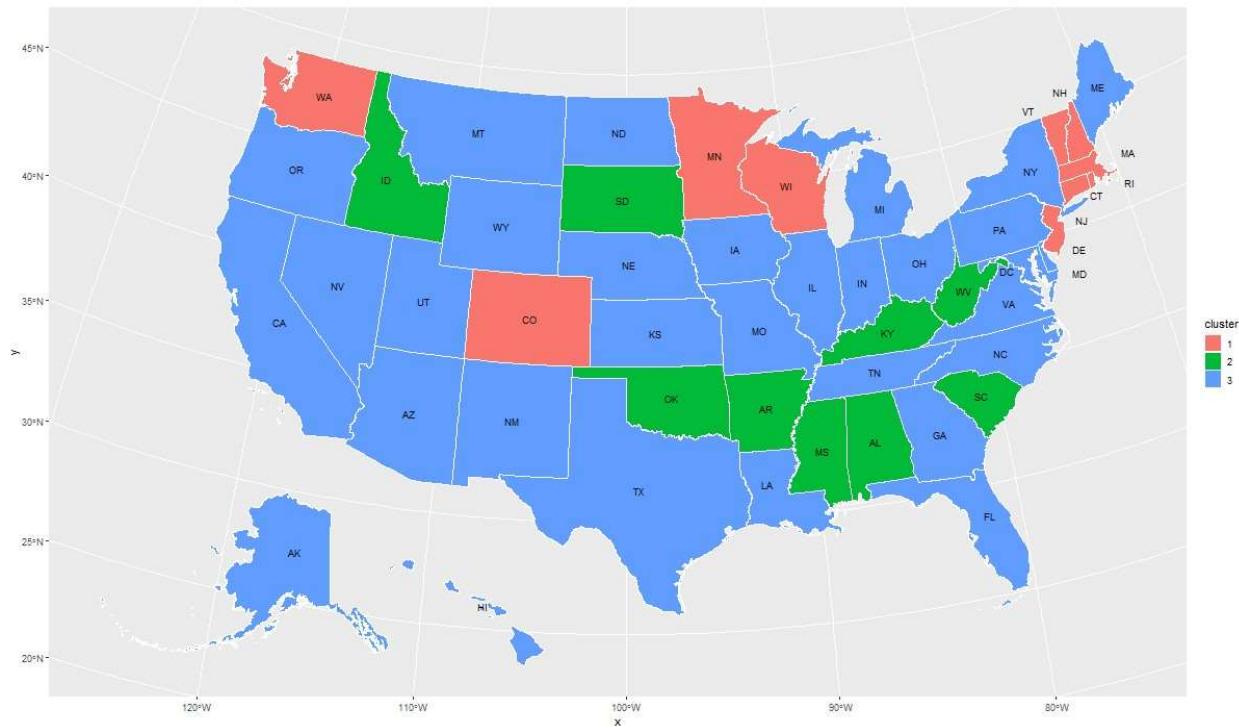


```
[<class 'statsmodels.iolib.summary.Summary'>
"""
        OLS Regression Results
=====
Dep. Variable:      University    R-squared (uncentered):      0.791
Model:                 OLS    Adj. R-squared (uncentered):      0.768
Method:                Least Squares    F-statistic:            34.04
Date:          Sat, 29 Jan 2022    Prob (F-statistic):      3.19e-14
Time:          04:50:57    Log-Likelihood:           -31.826
No. Observations:      50    AIC:                  73.65
Df Residuals:         45    BIC:                  83.21
Df Model:                   5
Covariance Type:    nonrobust
=====
              coef      std err          t      P>|t|      [0.025      0.975]
-----
Poverty      -0.3249      0.068     -4.764      0.000     -0.462     -0.188
Infant Mort   -0.2959      0.068     -4.340      0.000     -0.433     -0.159
Doctors       0.4157      0.068      6.097      0.000      0.278      0.553
Traf Deaths   -0.4166      0.068     -6.109      0.000     -0.554     -0.279
Income        0.5015      0.068      7.352      0.000      0.364      0.639
=====
Omnibus:             12.690    Durbin-Watson:           1.651
Prob(Omnibus):      0.002    Jarque-Bera (JB):        16.952
Skew:                 0.840    Prob(JB):            0.000208
Kurtosis:               5.305    Cond. No.                 1.00
=====

Notes:
[1] R2 is computed without centering (uncentered) since the model does not contain a constant.
[2] Standard Errors assume that the covariance matrix of the errors is correctly specified.
"""]
<function __main__.return_model_subset(x, y, autoremove)>
```

## Bifurcation



Prediction:

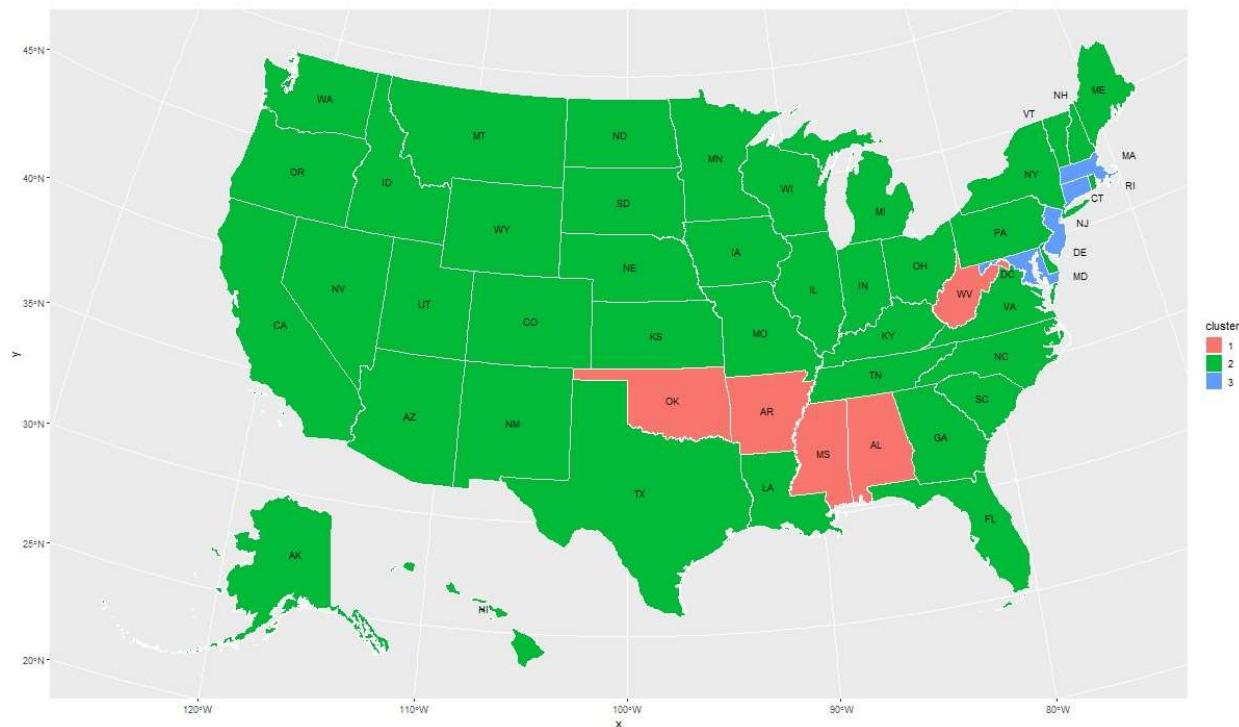
Key:

Red: ingroup

Blue: Neither

Green: outgroup

## Prediction



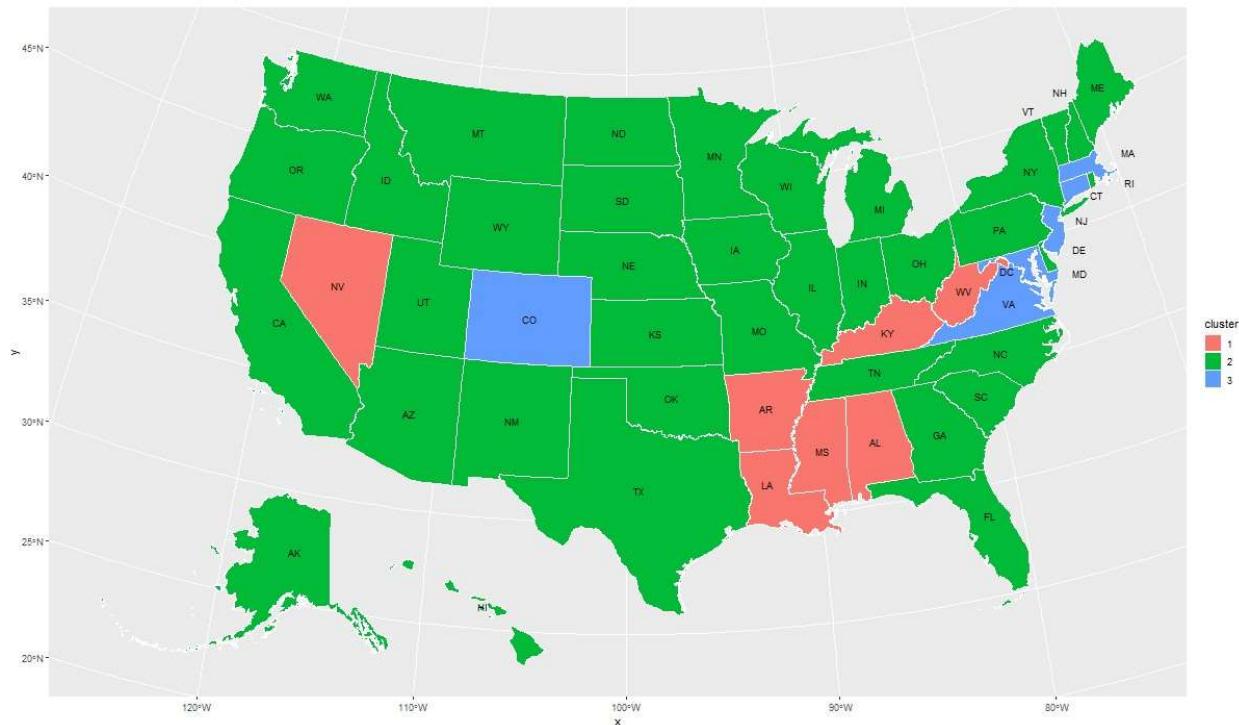
Key:

Blue: ingroup

Green: Neither

Red: outgroup

Raw



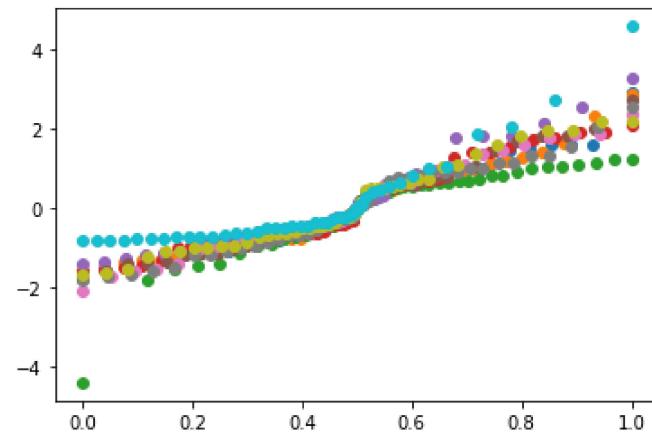
Key:

- Blue: ingroup
- Green: Neither
- Red: outgroup

 BokehJS 2.4.2 successfully loaded.

```
[1] "C:/Users/User/Documents/R/R-4.1.2/library"
```

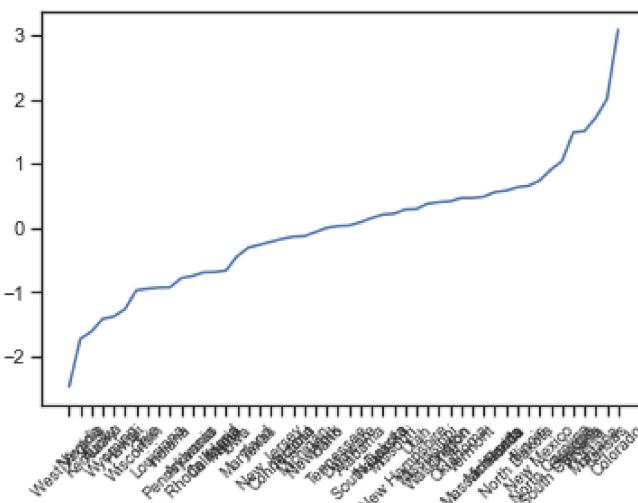
scatterplot of transformed values w Z scores



pipeline: scaled, ZCA whitened values

sort

- Doctors
- Traf Deaths
- University
- Unemployed
- Income
- Population



	<b>University</b>	<b>Poverty</b>	<b>Infant Mort</b>	<b>White</b>	<b>Crime</b>	<b>Doctors</b>	<b>Traf Deaths</b>	<b>Unemployed</b>	<b>Income</b>	<b>Population</b>
<b>States</b>										
<b>West Virginia</b>	-2.464108	1.015957	-0.133917	0.588819	-0.693026	0.686412	1.296697	-1.087705	-1.580612	-0.636997
<b>Nevada</b>	-1.723541	-0.113237	-1.394778	0.937433	2.176421	-1.515017	0.186311	1.095350	0.596124	-0.523295
<b>Kentucky</b>	-1.608081	1.602271	0.061767	0.303419	-0.674430	0.330002	0.504781	0.792642	-1.205564	-0.266845
<b>Alaska</b>	-1.4111863	0.300784	-0.007635	0.179136	1.843353	-1.751833	1.415150	1.389799	2.066252	-0.809263
<b>Wyoming</b>	-1.377051	-0.961728	1.035741	0.785960	-0.720319	-1.532057	0.647762	-1.238679	0.255954	-0.832699
<b>Hawaii</b>	-1.258312	-1.167563	-2.491776	-5.059779	-0.522487	-0.130071	-0.157273	-0.377731	1.893629	-0.719797
<b>Wisconsin</b>	-0.968181	-1.465075	0.060976	0.412929	-0.642592	-0.050910	-0.002281	-0.156479	0.020015	-0.062853
<b>Ohio</b>	-0.943624	-0.913742	1.038928	0.013134	-0.675208	0.356646	-0.972051	0.842876	-0.581625	0.834267
<b>Louisiana</b>	-0.925729	0.749221	1.109469	-0.943471	1.844401	0.946428	0.763014	-1.690401	-0.946633	-0.248879
<b>Indiana</b>	-0.922692	-0.399021	1.265282	0.314024	-0.495786	-0.534826	-1.145513	0.605080	-0.480699	0.049897
<b>Pennsylvania</b>	-0.779749	-1.399898	1.106165	0.353376	-0.240316	0.911470	0.687318	-0.325185	-0.279511	0.985607
<b>Arkansas</b>	-0.746244	0.536989	0.131710	-0.171518	0.707425	0.116207	-0.114578	-0.524137	-1.498579	-0.480991
<b>Rhode Island</b>	-0.689101	0.267132	-0.236259	0.347590	-0.715562	1.946175	-0.726731	2.543805	0.526048	-0.751424
<b>California</b>	-0.685357	0.375798	-0.730942	0.152010	-0.703964	-1.023655	1.086812	0.196875	0.496377	4.573321
<b>Maine</b>	-0.661032	-0.745936	-0.067692	0.449059	-1.475835	0.759927	-0.186687	0.808459	-0.556119	-0.712428
<b>Iowa</b>	-0.437760	-0.653202	-1.548244	0.681849	-0.540677	-1.126421	-0.386532	-0.387392	-0.293999	-0.460213
<b>Maryland</b>	-0.304960	-0.219278	1.798294	-0.439129	1.598273	1.740713	0.521411	-1.598101	2.202286	-0.059330
<b>Texas</b>	-0.261321	1.199412	-0.349179	0.324600	-0.289737	-0.981764	-0.724900	-1.586913	-0.567063	2.699642
<b>New Jersey</b>	-0.214739	1.135158	0.193931	-0.078443	-0.403350	-0.521668	0.188607	0.186527	2.131385	0.396012
<b>Connecticut</b>	-0.168817	1.808623	1.211287	0.577190	-0.550880	0.852610	0.227165	0.327106	2.012875	-0.383549
<b>Arizona</b>	-0.134998	1.760283	-0.562348	0.681681	0.401464	-0.873452	0.425296	-0.072290	-0.123040	0.052177
<b>Michigan</b>	-0.126311	-0.296585	-0.113543	0.122322	0.515278	0.073468	-1.851747	2.466376	-0.478893	0.611732
<b>New York</b>	-0.061606	0.191989	-0.848955	-0.642185	-0.520686	2.096145	-0.291602	-0.938703	0.212733	2.031769
<b>Idaho</b>	0.003717	0.014039	0.333823	0.620003	-0.825221	-1.428660	0.294770	0.423358	-0.431063	-0.684764
<b>Tennessee</b>	0.031446	-0.504828	0.440815	0.478651	1.935165	0.933782	-0.068629	0.239599	-0.995415	0.023888
<b>Delaware</b>	0.039526	-0.809506	1.102024	0.171588	1.930032	-0.456774	-1.395290	-0.599227	0.815472	-0.780956
<b>Alabama</b>	0.090285	-0.413933	0.940381	-1.271928	0.165594	-0.006757	-0.006746	-0.284068	-1.077969	-0.209337

	University	Poverty	Infant Mort	White	Crime	Doctors	Traf Deaths	Unemployed	Income	Population
States										
South Dakota	0.156348	-0.631247	0.317741	-0.266106	-1.202828	-0.335429	0.384131	-1.274029	-0.606509	-0.791281
Nebraska	0.209464	-1.195716	-0.938566	0.432851	-0.410757	-0.075149	-0.374962	-1.153871	-0.191091	-0.643825
Missouri	0.223655	-0.898183	0.037970	0.316547	0.529742	0.194031	-0.298430	0.718903	-0.604506	-0.016643
New Hampshire	0.288248	0.273177	1.516050	1.054574	-1.205960	-0.750486	0.000084	-0.581699	1.483292	-0.712644
Utah	0.295012	-0.025450	-0.598846	0.689946	-0.797975	-1.440850	-0.957653	-0.945238	0.619731	-0.508406
Mississippi	0.379824	2.678095	1.949133	-2.671772	-0.773891	-0.469259	-0.292032	1.388014	-1.622226	-0.469027
Washington	0.402708	0.653457	-1.529951	0.178392	-0.386178	-0.377164	-0.970947	0.264822	0.714257	0.067802
Oregon	0.416174	0.694762	-1.192793	0.388963	-0.578467	0.393409	0.131741	1.373757	-0.174127	-0.346397
Oklahoma	0.467203	0.650671	0.148648	-0.456922	0.522401	-0.861623	-1.880873	-1.486598	-1.035237	-0.364770
Vermont	0.468077	-0.803662	-0.280002	0.610321	-1.301900	2.154863	-0.388628	0.196311	0.105468	-0.817939
Massachusetts	0.486743	1.024399	-0.725086	1.002464	0.365712	2.960879	0.241185	-0.580724	1.568744	0.073036
Minnesota	0.558251	-0.858631	-0.750000	0.438878	-0.566169	0.145265	-0.773653	0.647794	0.642071	-0.125143
Florida	0.580028	-2.179827	-0.180251	0.338653	1.211412	0.055569	0.665924	0.099051	-0.731928	1.856455
North Dakota	0.634372	-1.095794	-0.735288	-0.127326	-1.331954	0.167158	0.040127	-0.902336	-0.647404	-0.815223
Illinois	0.656108	-0.180933	0.793247	0.195528	0.451508	-0.034008	-0.292567	0.639560	0.374862	1.024631
New Mexico	0.738665	1.961543	-2.424759	0.554802	1.624593	0.554582	-1.763566	-1.591861	-0.926184	-0.613768
North Carolina	0.908115	-0.787254	0.542914	-0.872037	0.121689	0.288663	0.618099	0.877997	-0.704104	0.459684
South Carolina	1.042817	-0.637010	-0.508081	-0.640111	2.188887	0.205717	1.440241	1.185241	-0.839226	-0.242287
Georgia	1.487456	0.257275	0.565958	-1.477802	0.257566	-0.809192	-0.587350	0.770644	-0.197497	0.532181
Virginia	1.507033	0.078261	1.411670	-0.934280	-0.813500	-0.626214	0.515031	-0.777812	1.063881	0.255916
Montana	1.715433	0.315600	-1.298249	0.137613	-0.526767	-0.089058	4.506735	0.180084	-0.891502	-0.766744
Kansas	2.002955	-1.046625	0.512159	0.560873	0.411855	-0.552783	-0.171183	-0.268552	-0.150022	-0.491492
Colorado	3.085515	0.858967	0.021056	0.657632	-0.216347	-0.515040	-0.005987	0.169699	0.616895	-0.178809

plot ZCA

```
<function __main__.plot_ZCA(yesNo)>
```

```
"\noutput_figure = widgets.Output()\n\n# Create the default figure\nfig = [] # Storing the figure in a singular list is a bit of a\n          # hack. We need it to properly mutate the current\n          # figure in our callbacks.\np = create_figure(\n#    iris['feature_names'][0],\n#    ir\nis['feature_names'][1],\n#    data)\n#fig.append(p)\nwith output_figure:\n    interact(derive_xnames,y=y)\n    #interact(return_model_vars,x=x_,y=\ny,autoremove=autoremove)\n    #show(fig)\n    \napp_layout = widgets.Layout(display='flex',\n                                flex_flow='row nowrap',\n                                align_items='center',\n                                border='none',\n                                width='100%',\n                                margin='5px 5px 5px 5px')\n\n\n# The final app\n# just a box\napp=widgets.Box([y, output_figure], layout=app_layout)\n\n# Display the app\ndisplay(app)\n"
```

y

- Doctors
- Traf Deaths
- University**
- Unemployed
- Income

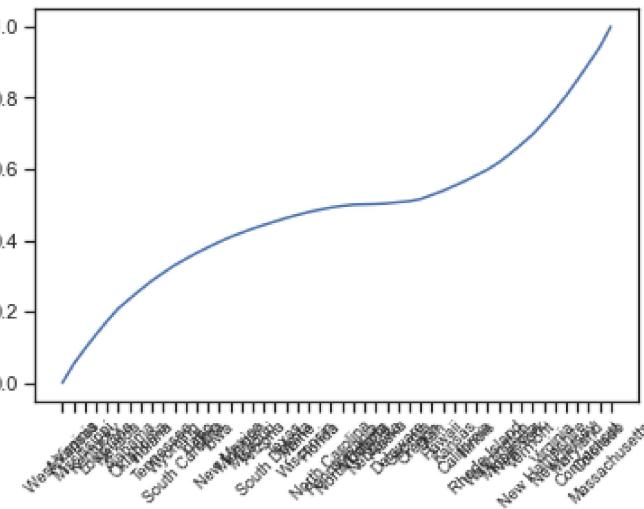
x

- Poverty
- Infant Mort
- White
- Crime
- Doctors

y

autoremove

```
['University',  
 'Poverty',  
 'Infant Mort',  
 'White',  
 'Crime',  
 'Doctors',  
 'Traf Deaths',  
 'Unemployed',  
 'Income',  
 'Population',  
 'const']  
'transformed data'
```



	University	Poverty	Infant Mort	White	Crime	Doctors	Traf Deaths	Unemployed	Income	Population	const
West Virginia	0.000000	0.777960	0.542831	0.874598	0.318382	0.431658	0.881911	0.357959	0.040883	0.297624	1.000000
Arkansas	0.052130	0.890938	0.802541	0.493198	0.613438	0.208246	0.750417	0.496651	0.081193	0.381546	1.000000
Mississippi	0.095253	1.000000	1.000000	0.119047	0.381769	0.077341	0.791858	0.850473	0.000000	0.396104	1.000000
Kentucky	0.135198	0.852721	0.575681	0.685069	0.411911	0.443883	0.687748	0.681442	0.119123	0.457337	1.000000
Louisiana	0.173554	0.929155	0.931579	0.209989	0.861617	0.501052	0.931828	0.426517	0.274960	0.465416	1.000000
Nevada	0.208731	0.411452	0.483848	0.495845	0.906062	0.146004	0.624061	0.758077	0.551378	0.335474	1.000000
Alabama	0.235431	0.665250	0.875862	0.342899	0.510490	0.334921	0.714193	0.491332	0.149212	0.480282	1.000000
Oklahoma	0.261602	0.742253	0.628494	0.469399	0.556758	0.039690	0.537763	0.232861	0.176051	0.435818	1.000000
Indiana	0.286713	0.503079	0.670962	0.571252	0.474455	0.297497	0.459889	0.541371	0.425991	0.502225	1.000000
Tennessee	0.308116	0.640419	0.836479	0.489640	0.950767	0.502494	0.661955	0.636919	0.226856	0.500718	1.000000
Wyoming	0.329519	0.210762	0.505626	0.818161	0.219999	0.113082	0.550516	0.044720	0.504175	0.000000	1.000000
South Carolina	0.347213	0.690081	0.772232	0.286808	1.000000	0.418435	0.836559	0.818361	0.298727	0.472949	1.000000
Idaho	0.364378	0.498896	0.499456	0.903386	0.241797	0.000000	0.563269	0.476753	0.401175	0.257429	1.000000
Ohio	0.379953	0.517335	0.607260	0.522756	0.483962	0.505281	0.363342	0.705674	0.437566	0.601551	1.000000
Iowa	0.394999	0.458537	0.108711	0.846038	0.426464	0.177450	0.502034	0.313830	0.458853	0.410301	1.000000
New Mexico	0.408985	0.814504	0.360980	0.505640	0.742641	0.456021	0.516169	0.336879	0.202442	0.316902	1.000000
Michigan	0.420852	0.551402	0.563521	0.498264	0.646307	0.488164	0.299890	1.000000	0.449078	0.576316	1.000000

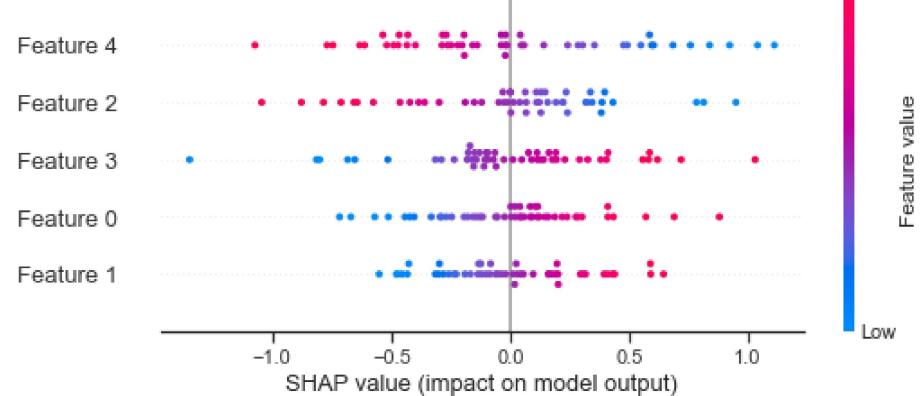
	University	Poverty	Infant Mort	White	Crime	Doctors	Traf Deaths	Unemployed	Income	Population	const
<b>Missouri</b>	0.432719	0.522923	0.553176	0.529676	0.569375	0.476600	0.503703	0.557723	0.386435	0.499494	1.000000
<b>Arizona</b>	0.442996	0.583495	0.491652	0.557498	0.533723	0.255562	0.642682	0.515957	0.497042	0.503803	1.000000
<b>South Dakota</b>	0.452744	0.496955	0.501270	0.585462	0.143476	0.353177	0.577326	0.000000	0.338069	0.099068	1.000000
<b>Texas</b>	0.462492	0.715749	0.443557	0.500998	0.582769	0.277506	0.496818	0.484043	0.474109	0.861649	1.000000
<b>Maine</b>	0.471180	0.493340	0.466425	1.000000	0.000000	0.539707	0.426429	0.503743	0.370871	0.214323	1.000000
<b>Wisconsin</b>	0.479339	0.357941	0.476044	0.649361	0.396840	0.499240	0.469304	0.439716	0.500314	0.495809	1.000000
<b>Florida</b>	0.485908	0.506994	0.523956	0.484715	0.819888	0.482794	0.526314	0.594366	0.413874	0.718520	1.000000
<b>North Carolina</b>	0.491947	0.567030	0.717060	0.407787	0.523951	0.496604	0.591383	0.614657	0.355214	0.541714	1.000000
<b>Pennsylvania</b>	0.496398	0.483602	0.589655	0.537508	0.502075	0.582173	0.494575	0.511426	0.490141	0.631365	1.000000
<b>North Dakota</b>	0.499788	0.477478	0.379673	0.766052	0.109127	0.463257	0.501017	0.087470	0.319924	0.049933	1.000000
<b>Montana</b>	0.500848	0.617261	0.398367	0.723055	0.335523	0.371043	1.000000	0.411348	0.250966	0.146629	1.000000
<b>Nebraska</b>	0.501695	0.395288	0.273503	0.744554	0.441017	0.470145	0.484222	0.128251	0.467508	0.278147	1.000000
<b>Alaska</b>	0.503602	0.081688	0.502541	0.317018	0.709451	0.404648	0.606092	0.786249	0.845736	0.074598	1.000000
<b>Delaware</b>	0.506569	0.313901	0.743739	0.426151	0.779065	0.492535	0.438452	0.450946	0.611752	0.123009	1.000000
<b>Georgia</b>	0.509536	0.599960	0.694011	0.249082	0.544787	0.316318	0.507328	0.576044	0.493804	0.557813	1.000000
<b>Oregon</b>	0.515681	0.530185	0.225227	0.703606	0.350981	0.519327	0.478067	0.659180	0.479703	0.446857	1.000000
<b>Utah</b>	0.527124	0.238639	0.140109	0.790968	0.197682	0.232923	0.344148	0.167061	0.564765	0.351300	1.000000
<b>Hawaii</b>	0.538567	0.151663	0.318149	0.000000	0.300982	0.631092	0.489725	0.261820	0.798287	0.192558	1.000000
<b>Kansas</b>	0.552659	0.423432	0.510526	0.615703	0.516380	0.388257	0.498409	0.377069	0.484933	0.366678	1.000000
<b>California</b>	0.566751	0.511746	0.075499	0.457185	0.597716	0.508936	0.413754	0.888495	0.655324	1.000000	1.000000
<b>Illinois</b>	0.582433	0.488890	0.532486	0.478196	0.629679	0.548352	0.397820	0.729905	0.538776	0.662363	1.000000
<b>Rhode Island</b>	0.598644	0.468844	0.417060	0.600354	0.174331	0.730299	0.042014	0.938337	0.514877	0.169829	1.000000
<b>Washington</b>	0.618563	0.435413	0.000000	0.516291	0.464818	0.513155	0.273524	0.500591	0.629300	0.505858	1.000000
<b>Minnesota</b>	0.642721	0.264842	0.171506	0.631735	0.366440	0.562637	0.152410	0.508865	0.594461	0.492026	1.000000
<b>New York</b>	0.668998	0.537447	0.295826	0.388283	0.500844	0.839529	0.245201	0.506304	0.526536	0.779985	1.000000
<b>Vermont</b>	0.696334	0.377451	0.249365	0.967112	0.037454	0.680305	0.116915	0.460205	0.500656	0.025189	1.000000
<b>New Hampshire</b>	0.730028	0.000000	0.430309	0.934224	0.074132	0.531844	0.216227	0.203901	0.715788	0.235878	1.000000
<b>Virginia</b>	0.765840	0.336758	0.515426	0.367869	0.283195	0.525499	0.449823	0.288810	0.681959	0.515822	1.000000

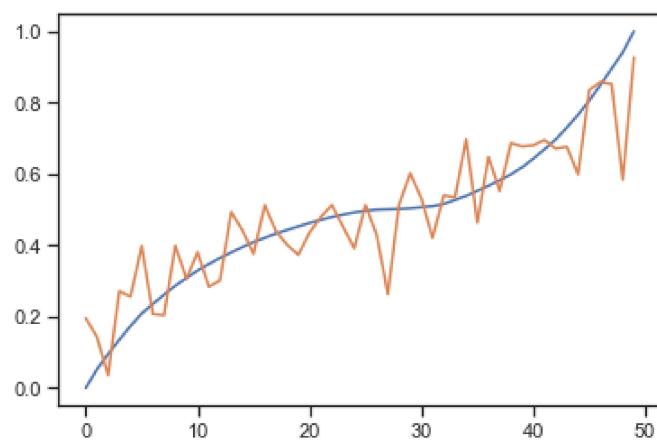
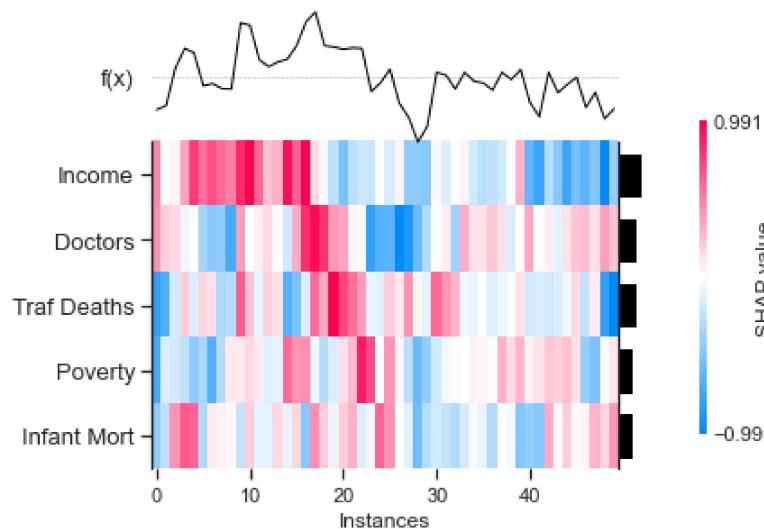
	University	Poverty	Infant Mort	White	Crime	Doctors	Traf Deaths	Unemployed	Income	Population	const
New Jersey	0.805361	0.117931	0.201089	0.443604	0.454664	0.606481	0.186600	0.520489	0.946546	0.527812	1.000000
Maryland	0.849121	0.042936	0.649728	0.167707	0.676650	0.909438	0.323649	0.394208	1.000000	0.497710	1.000000
Connecticut	0.894999	0.182049	0.454991	0.510966	0.263596	0.780683	0.081421	0.528960	0.893573	0.424225	1.000000
Colorado	0.940877	0.447393	0.340472	0.666987	0.492304	0.499750	0.380581	0.469464	0.579188	0.486620	1.000000
Massachusetts	1.000000	0.291045	0.038657	0.547161	0.505248	1.000000	0.000000	0.501182	0.754427	0.508075	1.000000

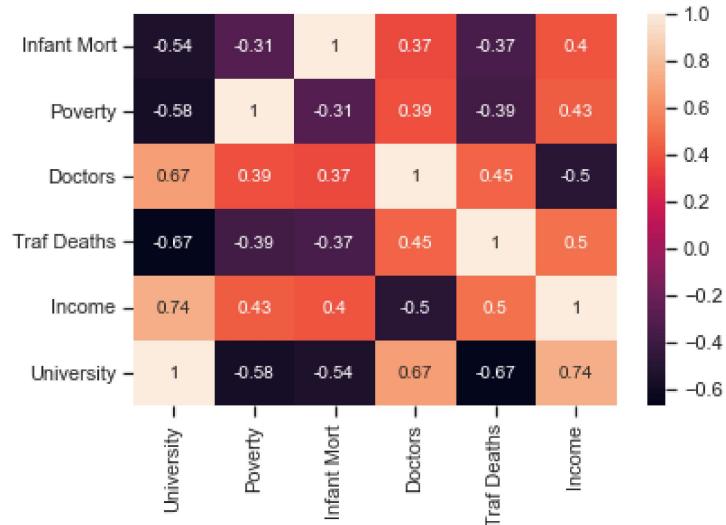
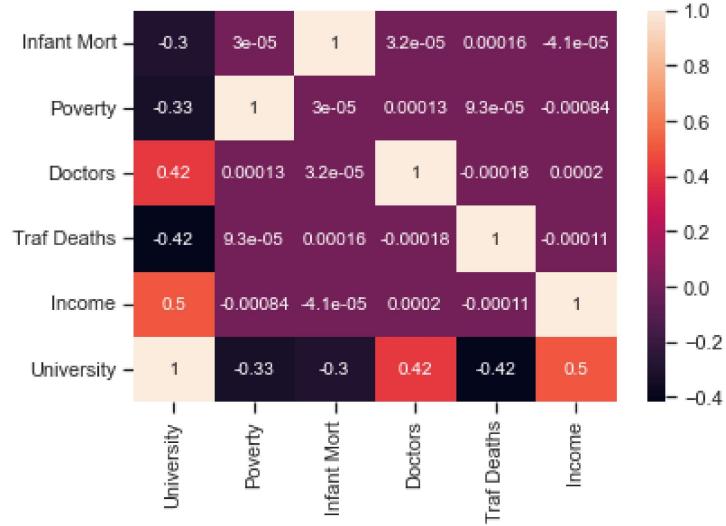


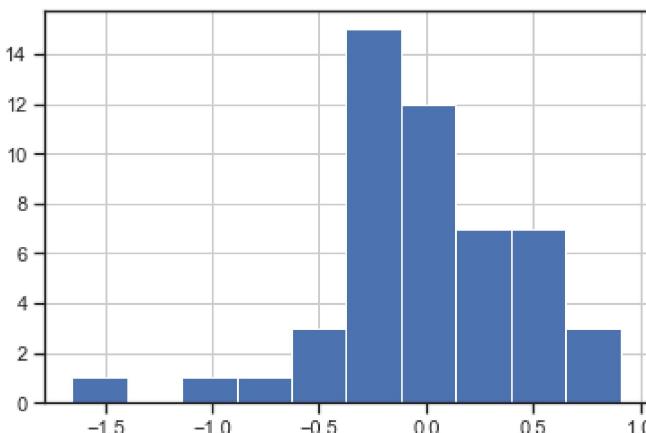
```
divide by zero encountered in true_divide
invalid value encountered in matmul
```

```
Index(['Poverty', 'Infant Mort', 'White', 'Crime', 'Doctors', 'Traf Deaths',
       'Unemployed', 'Income', 'Population', 'const'],
      dtype='object')
Index(['Poverty', 'Infant Mort', 'White', 'Crime', 'Doctors', 'Traf Deaths',
       'Unemployed', 'Income', 'Population'],
      dtype='object')
Index(['Poverty', 'Infant Mort', 'Crime', 'Doctors', 'Traf Deaths',
       'Unemployed', 'Income', 'Population'],
      dtype='object')
Index(['Poverty', 'Infant Mort', 'Crime', 'Doctors', 'Traf Deaths', 'Income',
       'Population'],
      dtype='object')
Index(['Poverty', 'Infant Mort', 'Crime', 'Doctors', 'Traf Deaths', 'Income'],
      dtype='object')
Index(['Poverty', 'Infant Mort', 'Doctors', 'Traf Deaths', 'Income'],
      dtype='object')
Index(['Poverty', 'Infant Mort', 'Doctors', 'Traf Deaths', 'Income'],
      dtype='object')
```



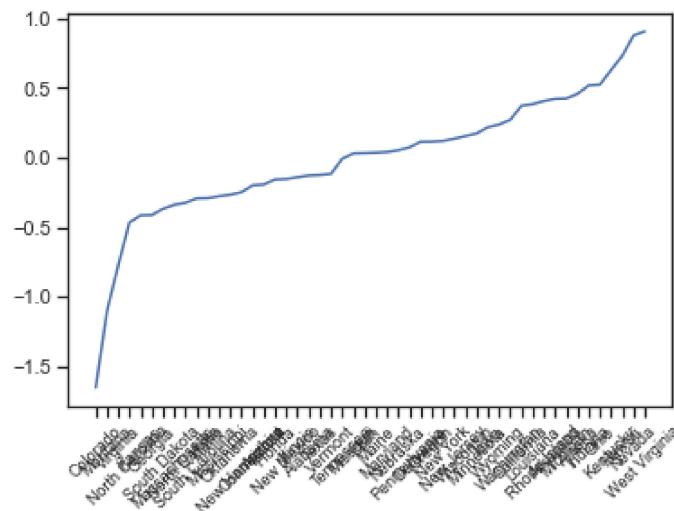






sort

- predict
- actual
- residual



	residual	predict	actual
Colorado	-1.655060	0.470214	2.125274
Montana	-1.104868	-1.020698	0.084170
Virginia	-0.776489	0.536865	1.313354
North Carolina	-0.466949	-0.424063	0.042886
Kansas	-0.415334	-0.090831	0.324503

	residual	predict	actual
<b>Georgia</b>	-0.413336	-0.288865	0.124471
<b>South Dakota</b>	-0.368687	-0.507647	-0.138960
<b>Massachusetts</b>	-0.339179	2.060338	2.399518
<b>North Dakota</b>	-0.325509	-0.246254	0.079256
<b>South Carolina</b>	-0.293523	-0.921994	-0.628471
<b>Idaho</b>	-0.291697	-0.840548	-0.548852
<b>Mississippi</b>	-0.278184	-2.075387	-1.797203
<b>Oklahoma</b>	-0.267202	-1.292786	-1.025584
<b>New Hampshire</b>	-0.249039	0.898195	1.147235
<b>Connecticut</b>	-0.199805	1.712659	1.912464
<b>Arizona</b>	-0.193633	-0.377809	-0.184176
<b>Florida</b>	-0.157624	-0.142752	0.014872
<b>New Mexico</b>	-0.153919	-0.495859	-0.341940
<b>Illinois</b>	-0.141499	0.321109	0.462608
<b>Alabama</b>	-0.128945	-1.275925	-1.146979
<b>Texas</b>	-0.125093	-0.218837	-0.093744
<b>Vermont</b>	-0.116971	0.873974	0.990945
<b>Tennessee</b>	-0.007832	-0.817658	-0.809826
<b>Missouri</b>	0.030501	-0.201349	-0.231849
<b>Utah</b>	0.032657	0.238713	0.206057
<b>Maine</b>	0.035378	-0.018065	-0.053443
<b>Maryland</b>	0.040196	1.739851	1.699655
<b>Nebraska</b>	0.053281	0.141383	0.088102
<b>Pennsylvania</b>	0.073463	0.136991	0.063528
<b>Delaware</b>	0.113741	0.224451	0.110710
<b>Oregon</b>	0.114927	0.267904	0.152977
<b>New York</b>	0.120192	0.984336	0.864144
<b>New Jersey</b>	0.135870	1.632545	1.496675

	residual	predict	actual
Wisconsin	0.154972	0.139372	-0.015599
Minnesota	0.173590	0.915848	0.742258
Iowa	0.218504	-0.188311	-0.406815
Wyoming	0.238169	-0.472379	-0.710548
Washington	0.271878	0.902079	0.630201
California	0.373099	0.762968	0.389869
Louisiana	0.384348	-1.049654	-1.434002
Rhode Island	0.406375	0.944178	0.537803
Arkansas	0.422192	-1.575042	-1.997234
Michigan	0.425707	0.138812	-0.286895
Alaska	0.457910	0.554859	0.096949
Indiana	0.519278	-0.389827	-0.909104
Ohio	0.525114	0.048509	-0.476605
Kentucky	0.630172	-0.981745	-1.611916
Hawaii	0.732969	0.992105	0.259136
Nevada	0.878008	-0.392823	-1.270831
West Virginia	0.907889	-1.331152	-2.239041

mape: 166.41612627335581

Pass the following variables as keyword args: x, y. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.

marker is redundantly defined by the 'marker' keyword argument and the fmt string "bo" (-> marker='o'). The keyword argument will take precedence.

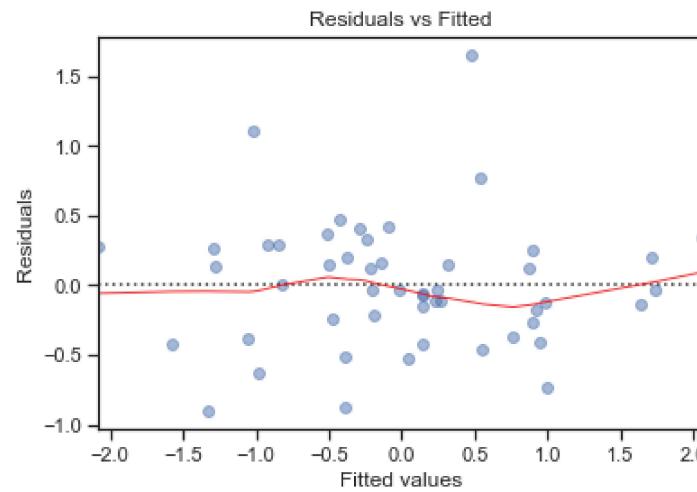
color is redundantly defined by the 'color' keyword argument and the fmt string "bo" (-> color='b'). The keyword argument will take precedence.

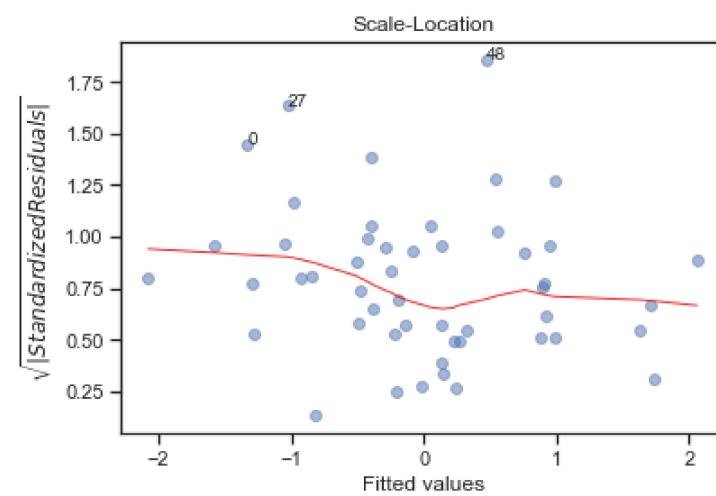
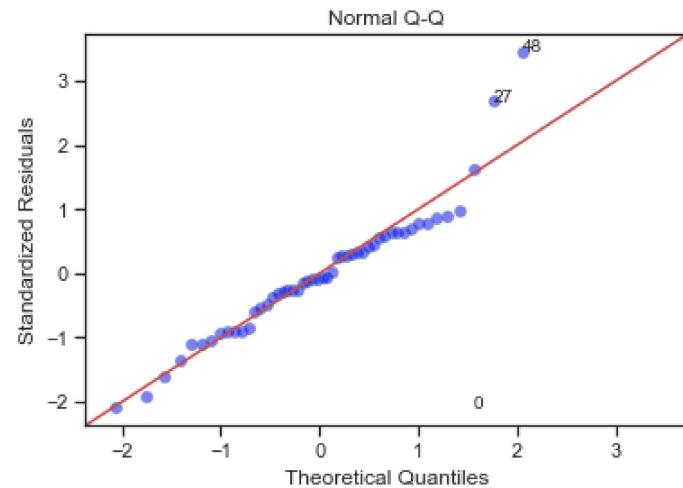
Pass the following variables as keyword args: x, y. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.

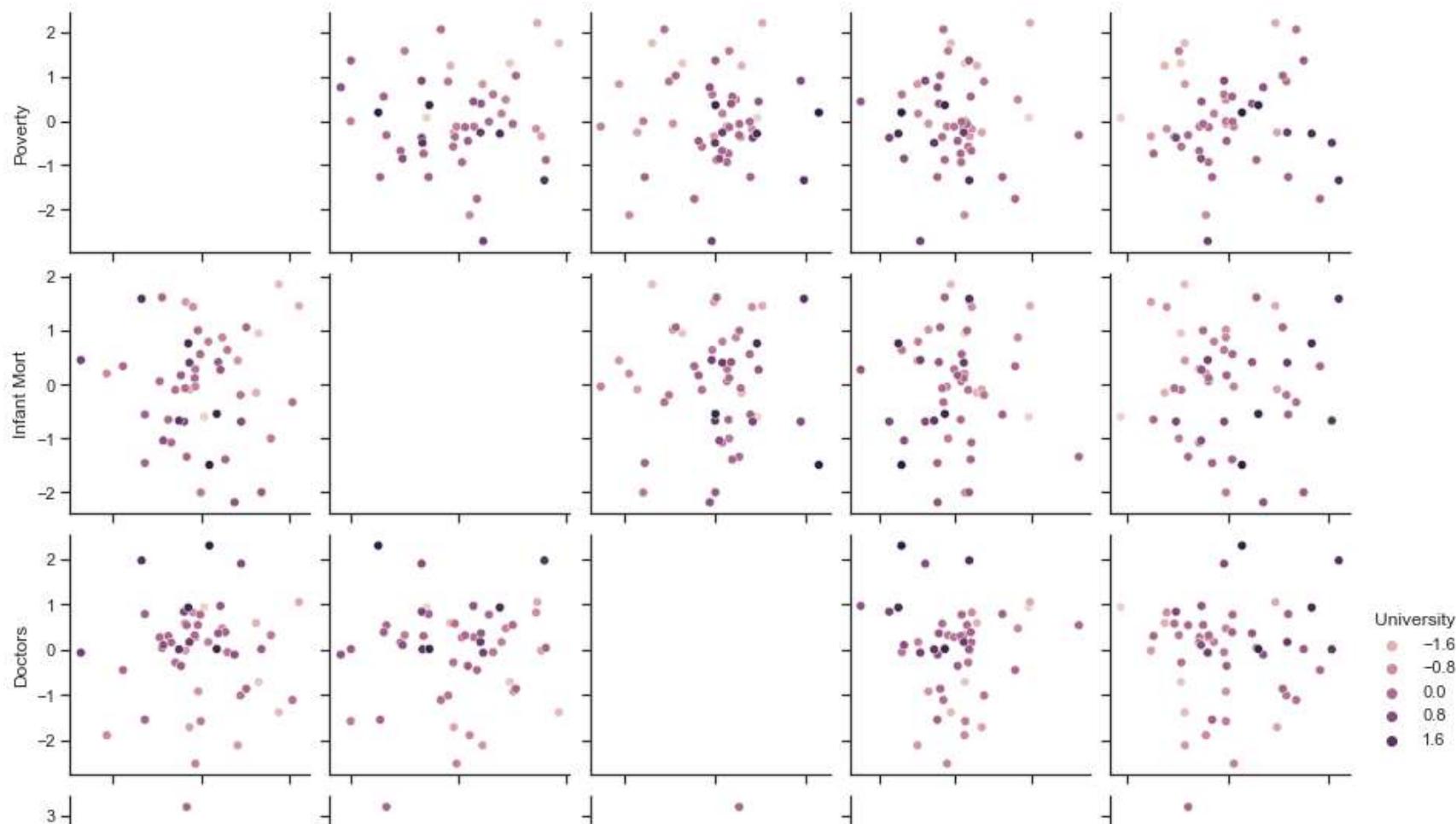
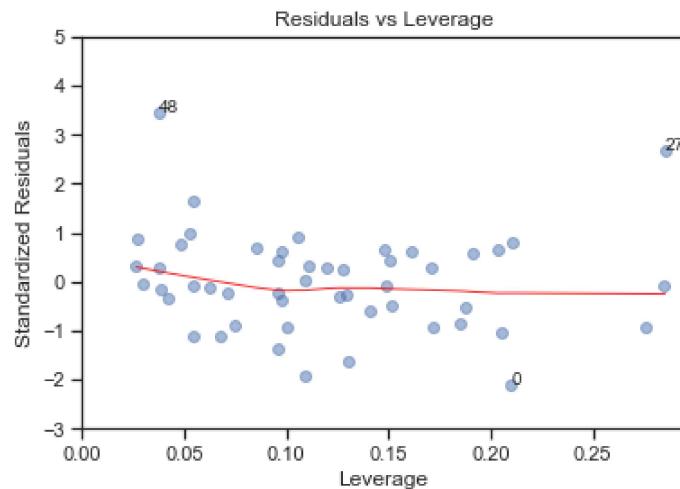
Pass the following variables as keyword args: x, y. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.

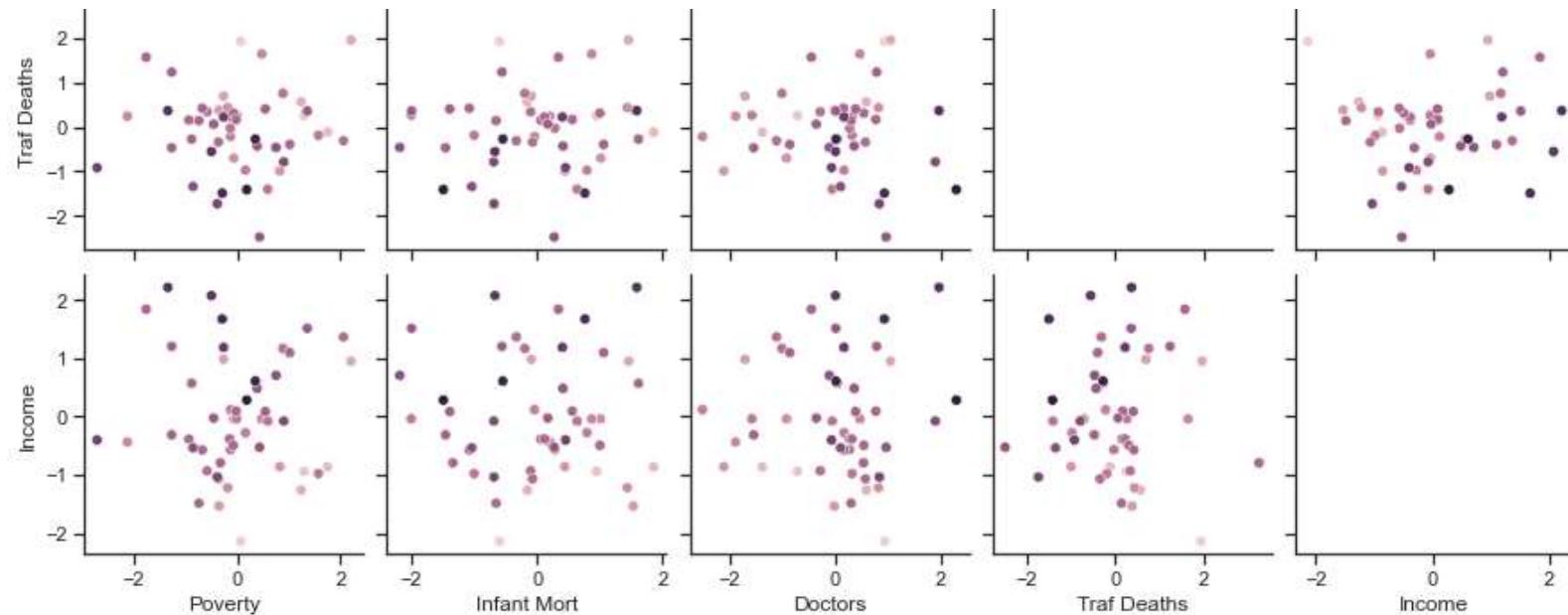
### Diagnostic Tests of Regression

```
:{"Non_Linearity_Test": [[{"F value": NaN, "p value": NaN}], "Heteroskedasticity_Test": [[{"Lagrange multiplier statistic": 4.389154801590733, "p-value": 0.4948496770580655}, {"f-value": 0.8468284699829578, "f p-value": 0.52413924479983}], "Residual_Normality_Test": [[{"Jarque-Bera": 1.6951864847665163}, {"Chi^2 two-tail prob.": 0.00020842476444549613}, {"Skew": 0.8399927659289977}, {"Kurtosis": 5.305329421064826}], "MultiCollinearity_Test": [{"condition no": 1.0009685497936813}], "Residual_AutoCorrelation_Test": [{"p value": 1.6513278417081578}]}]
Index(['Poverty', 'Infant Mort', 'Doctors', 'Traf Deaths', 'Income'], dtype='object')
'used in bifurcation, i.e. class filter designations using means based on [significant] variables'
```









AboveCenter

- Poverty
- Infant Mort
- White
- Crime
- Doctors

BelowCenter

- University
- Poverty
- Infant Mort
- White
- Crime

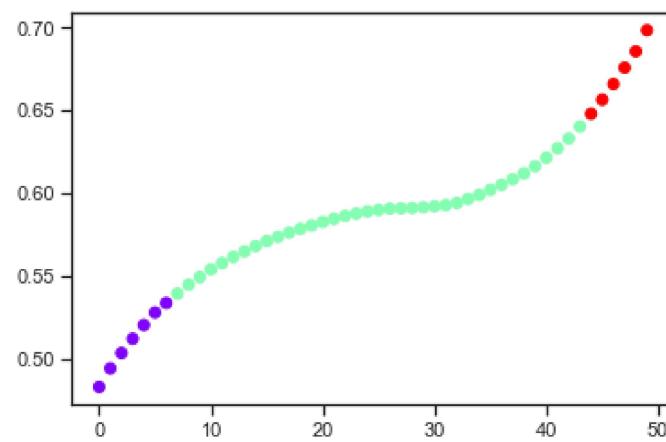
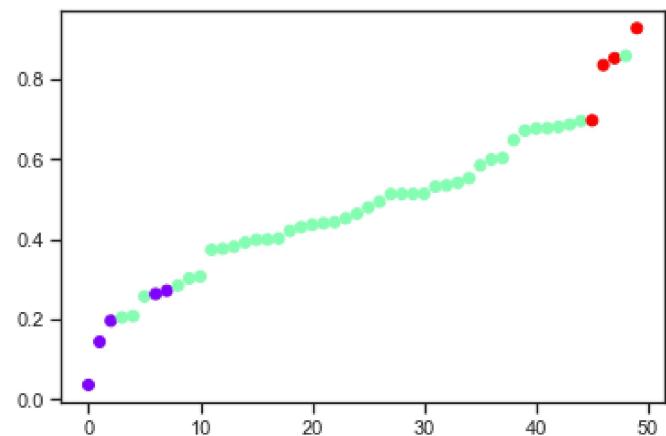
Center: [Checked: Mean, Unchecked: Median]

Threshold:  0.250000

0.25

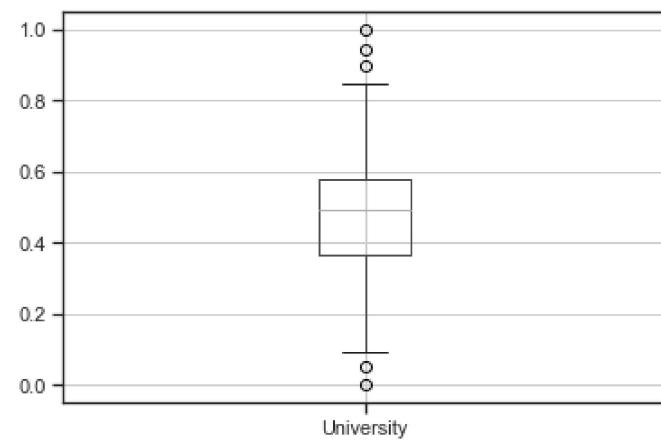
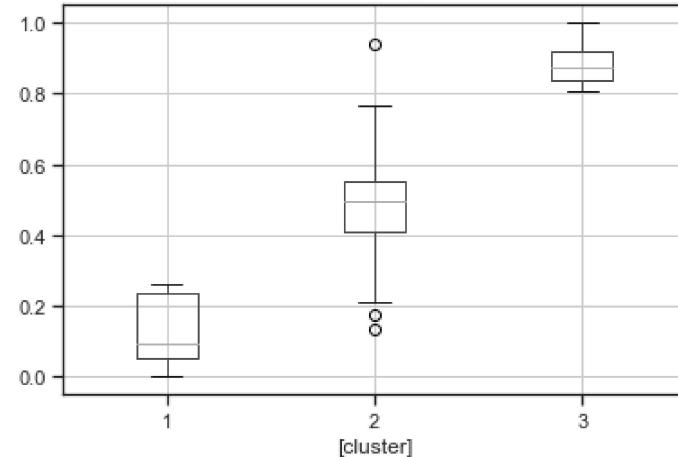
0.25

'color = predicted quantile'

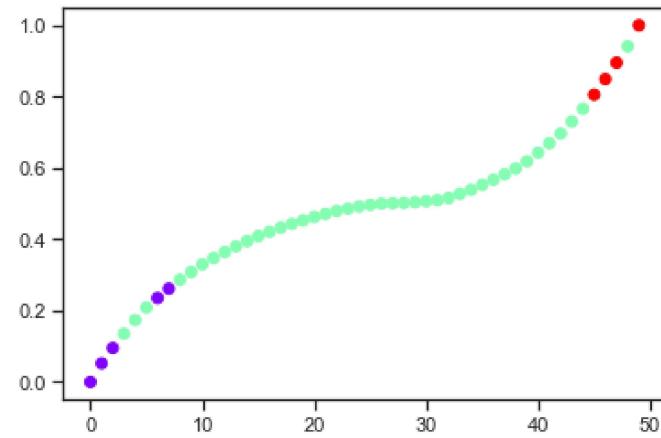


```
> bifurcation  
prediction  
raw
```

prediction

Boxplot grouped by cluster  
University

'red: in, yellow: out, purple: neither'



lower

	Poverty	Infant Mort	White	Crime	Doctors	Traf Deaths	University	Unemployed	Income	Population
<b>count</b>	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000e+00
<b>mean</b>	17.420000	8.700000	77.000000	408.600000	201.020000	1.898000	19.900000	5.020000	40016.400000	3.163405e+06
<b>std</b>	2.221936	1.216553	12.518586	118.407348	25.291639	0.208375	2.179449	1.17771	2520.036766	1.042752e+06
<b>min</b>	15.700000	7.400000	60.600000	275.000000	173.500000	1.580000	17.100000	3.80000	37790.000000	1.812295e+06
<b>25%</b>	15.900000	8.000000	71.000000	291.000000	177.900000	1.810000	18.800000	4.30000	37989.000000	2.841595e+06
<b>50%</b>	17.000000	8.500000	78.100000	448.000000	203.400000	1.960000	19.400000	5.00000	38815.000000	2.920312e+06
<b>75%</b>	17.300000	9.000000	80.800000	500.000000	218.200000	2.040000	22.000000	5.10000	42666.000000	3.608759e+06
<b>max</b>	21.200000	10.600000	94.500000	529.000000	232.100000	2.100000	22.200000	6.90000	42822.000000	4.634063e+06

Poverty	Infant Mort	White	Crime	Doctors	Traf Deaths	University	Unemployed	Income	Population
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<b>West Virginia</b>	17.0	7.4	94.5	275	232.1	2.10	17.1	4.3	37989	1812295
<b>Arkansas</b>	17.3	8.5	80.8	529	203.4	1.96	18.8	5.1	38815	2841595
<b>Mississippi</b>	21.2	10.6	60.6	291	177.9	2.04	19.4	6.9	37790	2920312
<b>Alabama</b>	15.7	9.0	71.0	448	218.2	1.81	22.0	5.0	42666	4634063
<b>Oklahoma</b>	15.9	8.0	78.1	500	173.5	1.58	22.2	3.8	42822	3608759

neither

	Poverty	Infant Mort	White	Crime	Doctors	Traf Deaths	University	Unemployed	Income	Population
<b>count</b>	41.000000	41.000000	41.000000	41.000000	41.000000	41.000000	41.000000	41.000000	41.000000	4.100000e+01
<b>mean</b>	12.521951	6.670732	83.004878	406.634146	254.282927	1.391951	26.931707	5.304878	51811.073171	6.359632e+06
<b>std</b>	2.423067	1.180306	12.070687	194.391712	48.798580	0.350216	3.607384	1.324189	6588.470993	7.267044e+06
<b>min</b>	7.600000	4.700000	29.700000	118.000000	168.800000	0.800000	19.700000	3.000000	41538.000000	5.232260e+05
<b>25%</b>	10.800000	5.700000	79.100000	273.000000	220.600000	1.160000	24.700000	4.400000	46867.000000	1.316496e+06
<b>50%</b>	12.300000	6.400000	85.400000	343.000000	250.200000	1.370000	26.300000	5.400000	50177.000000	4.373448e+06
<b>75%</b>	14.400000	7.400000	90.100000	523.000000	274.500000	1.600000	29.600000	6.400000	56361.000000	7.705466e+06
<b>max</b>	17.300000	9.900000	96.400000	788.000000	395.900000	2.450000	35.600000	8.400000	68460.000000	3.618591e+07

Poverty	Infant Mort	White	Crime	Doctors	Traf Deaths	University	Unemployed	Income	Population
---------	-------------	-------	-------	---------	-------------	------------	------------	--------	------------

<b>Kentucky</b>	17.3	7.5	89.9	295	232.3	1.80	19.7	6.4	41538	4254513
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	Poverty	Infant Mort	White	Crime	Doctors	Traf Deaths	University	Unemployed	Income	Population
<b>Louisiana</b>	17.3	9.9	64.8	730	262.7	2.17	20.3	4.6	43733	4373448
<b>Nevada</b>	11.3	6.4	80.9	751	187.8	1.68	21.9	6.7	56361	2564816
<b>Tennessee</b>	15.5	8.7	80.4	753	263.6	1.70	22.9	6.4	43614	6172788
<b>Indiana</b>	13.1	8.0	88.0	334	216.9	1.26	22.9	5.9	47966	6344771
<b>Wyoming</b>	9.4	7.0	93.9	239	184.4	1.60	23.6	3.1	53207	523226
<b>South Carolina</b>	15.7	8.4	68.7	788	229.8	2.09	23.7	6.9	44625	4417059
<b>Idaho</b>	12.6	6.8	94.6	239	168.8	1.60	24.0	4.9	47576	1498390
<b>Ohio</b>	13.4	7.8	84.8	343	266.7	1.14	24.1	6.5	47988	11518989
<b>Iowa</b>	11.5	5.1	94.2	295	189.3	1.42	24.3	4.1	48980	2979867
<b>New Mexico</b>	17.1	5.8	84.0	664	243.6	1.54	24.7	4.2	43508	1966357
<b>Michigan</b>	14.4	7.4	81.2	536	250.2	1.04	24.7	8.4	48591	10051145
<b>Missouri</b>	13.4	7.4	85.0	505	246.0	1.43	25.0	6.1	46867	5905750
<b>Arizona</b>	14.7	6.4	86.5	483	209.7	1.69	25.1	5.5	50958	6360238
<b>South Dakota</b>	12.5	6.9	88.2	169	219.1	1.62	25.1	3.0	46032	795521
<b>Texas</b>	15.8	6.2	82.4	511	214.2	1.38	25.3	4.9	50043	23824518
<b>Maine</b>	12.3	6.3	96.4	118	278.4	1.22	25.4	5.4	46581	1315749
<b>Wisconsin</b>	10.4	6.4	89.7	291	259.1	1.27	25.7	4.7	52094	5601508
<b>Florida</b>	13.2	7.3	79.8	723	247.9	1.56	25.8	6.2	47778	18262096
<b>North Carolina</b>	14.6	8.1	73.9	466	254.2	1.62	26.1	6.3	46549	9047856
<b>Pennsylvania</b>	12.1	7.6	85.4	417	305.3	1.37	26.3	5.4	50713	12517701
<b>North Dakota</b>	12.0	5.8	91.4	142	244.4	1.42	26.9	3.2	45685	637534
<b>Montana</b>	14.8	5.8	90.5	288	220.6	2.45	27.1	4.5	43654	957123
<b>Nebraska</b>	10.8	5.6	91.4	302	245.4	1.32	27.1	3.3	49693	1768745
<b>Alaska</b>	8.4	6.9	70.6	661	228.5	1.63	27.3	6.7	68460	679893
<b>Georgia</b>	14.7	8.1	65.4	493	217.4	1.46	27.5	6.2	50861	9526642
<b>Delaware</b>	10.0	8.3	74.3	689	250.9	1.23	27.5	4.8	57989	865314
<b>Oregon</b>	13.6	5.5	90.1	288	274.5	1.31	28.1	6.4	50169	3730833
<b>Utah</b>	9.6	5.1	92.9	235	208.1	1.11	29.1	3.4	56633	2662908

	Poverty	Infant Mort	White	Crime	Doctors	Traf Deaths	University	Unemployed	Income	Population
Hawaii	9.1	5.6	29.7	273	317.0	1.33	29.1	3.9	67214	1269796
California	13.3	5.0	76.6	523	268.7	1.21	29.6	7.2	61021	36185908
Kansas	11.3	7.1	88.7	453	222.5	1.38	29.6	4.4	50177	2773740
Illinois	12.2	7.3	79.1	533	280.2	1.16	29.9	6.5	56235	12775864
Rhode Island	11.7	6.1	88.5	227	375.5	0.80	30.0	7.8	55701	1059706
Washington	11.3	4.7	84.3	333	270.0	1.00	30.7	5.3	58078	6464167
Minnesota	9.6	5.2	89.0	289	293.2	0.88	31.5	5.4	57288	5191267
New York	13.6	5.6	73.4	414	395.9	0.97	31.9	5.4	56033	19419540
Vermont	10.6	5.5	96.4	124	373.7	0.86	32.1	4.8	52104	620438
New Hampshire	7.6	6.1	95.5	137	274.9	0.96	33.3	3.8	63731	1316496
Virginia	10.2	7.1	73.0	270	274.5	1.25	33.7	4.0	61233	7705466
Colorado	11.4	5.7	89.7	348	259.7	1.14	35.6	4.9	56993	4837229

upper

	Poverty	Infant Mort	White	Crime	Doctors	Traf Deaths	University	Unemployed	Income	Population
count	4.000000	4.000000	4.000000	4.000000	4.000000	4.000000	4.000000	4.000000	4.000000	4.000000e+00
mean	9.025000	6.12500	77.475000	414.750000	395.775000	0.915000	35.825000	5.22500	68729.750000	6.061444e+06
std	0.813941	1.37447	10.376054	167.824065	65.090213	0.140119	1.596611	0.57373	2388.206771	2.129509e+06
min	8.100000	4.80000	63.400000	256.000000	316.300000	0.760000	34.400000	4.40000	65401.000000	3.488084e+06
25%	8.550000	5.32500	72.850000	310.750000	361.375000	0.835000	35.000000	5.07500	67796.500000	5.092429e+06
50%	9.000000	5.85000	80.150000	380.500000	398.900000	0.905000	35.400000	5.40000	69486.500000	6.063442e+06
75%	9.475000	6.65000	84.775000	484.500000	433.300000	0.985000	36.225000	5.55000	70419.750000	7.032456e+06
max	10.000000	8.00000	86.200000	642.000000	469.000000	1.090000	38.100000	5.70000	70545.000000	8.630810e+06

	Poverty	Infant Mort	White	Crime	Doctors	Traf Deaths	University	Unemployed	Income	Population
New Jersey	8.7	5.5	76.0	329	316.3	0.95	34.4	5.5	70378	8630810
Maryland	8.1	8.0	63.4	642	421.4	1.09	35.2	4.4	70545	5627211
Connecticut	9.3	6.2	84.3	256	376.4	0.86	35.6	5.7	68595	3488084
Massachusetts	10.0	4.8	86.2	432	469.0	0.76	38.1	5.3	65401	6499672