GEOG 653: Lab 5 (Areal Analysis)

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Overview

For lab 5, we will explore Areal Analysis.

Question 1.

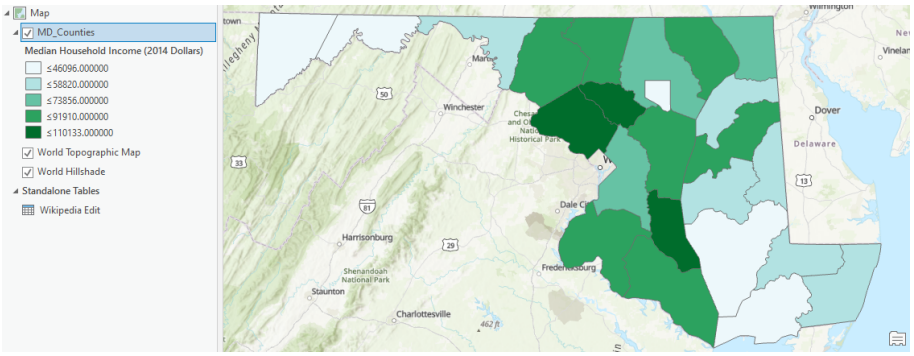

Figure 1: MD Counties layer with classes in Median Household Income (Natural Breaks).

Question 2.

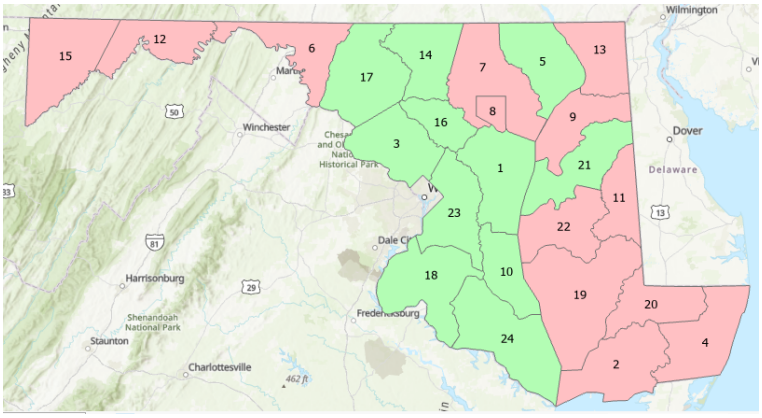

Figure 2: MD Counties highlighting Median Household Income's over or under $70,000 (Red: Under $70,000, Green: Over $70,000).

Question 3.

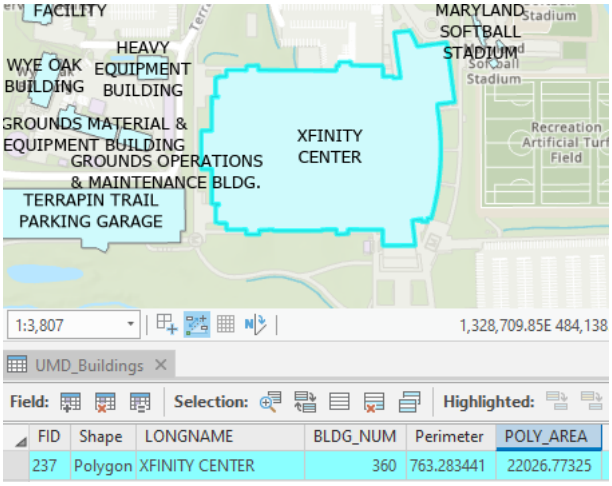

Figure 3: UMD Building with the largest area (Xfinity Center).

Question 4.

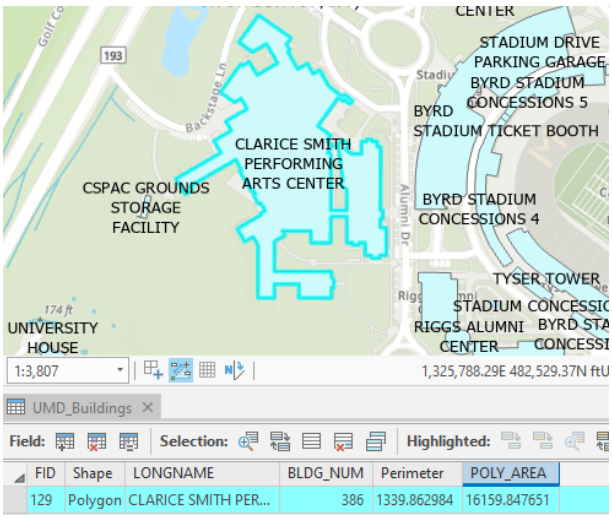

Figure 4: UMD Building with the largest perimeter (Clarice Smith Performing Arts Center).

Question 5.

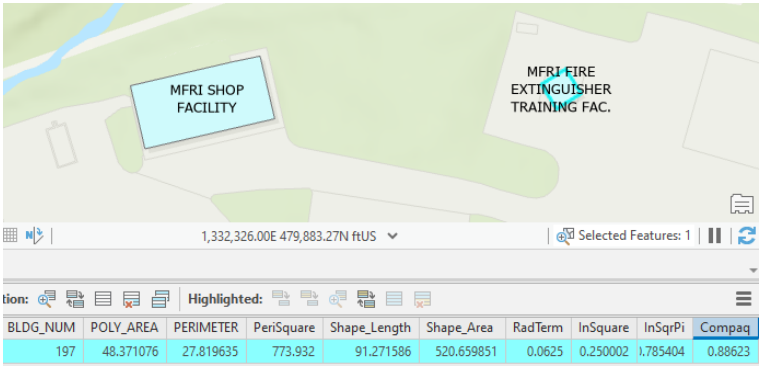

Figure 5: UMD Building with the largest Compactness Index (0.88623: MFRI Fire Extinguisher Training Fac).

Question 6.

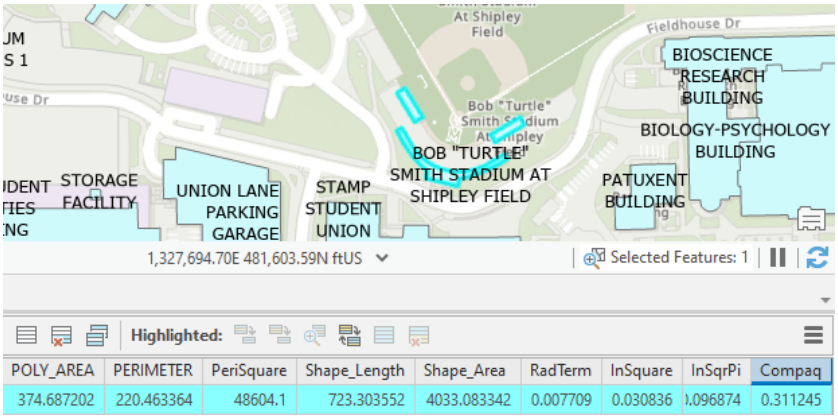

Figure 6: UMD Building with the smallest Compactness Index (0.311245: Bob "Turtle" Smith Stadium at Shipley Field).

Question 7.

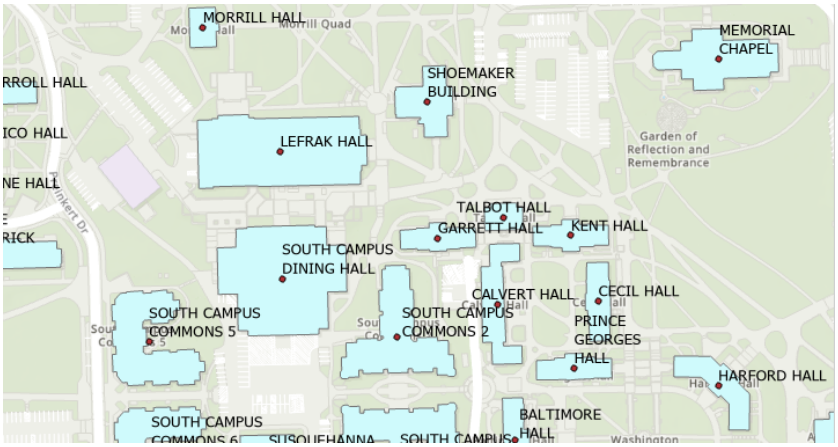

Figure 7: UMD Building centroids, calculated from the "Feature to Point" tool (Lefrak Hall).

Question 8.

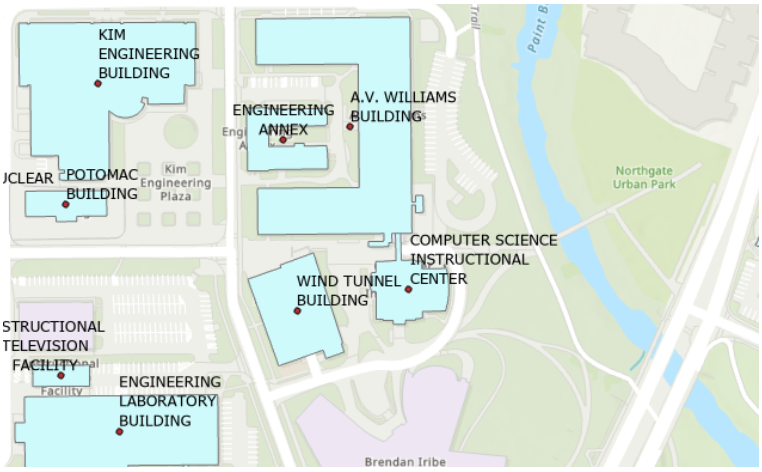

Figure 8: AV Williams Building, with centroid outside of feature.

Question 9.

Count of YY Joins	15
Count of YN Joins	10
Count of NN Joins	11
Total Count of All Joins	36
Expected Count of YN Joins	21.76087
Z-score	-5.1374

Table 1: Table for Join Count Analysis.

Question 10.

Based on a Z-score of -5.1374, well below a Z-score of 1.65, we cannot reject the null hypothesis that these polygons were randomly distributed. Given its highly negative value, we may be inclined to accept the possibility of higher dispersion throughout the layer.

Question 11.

Here we calculate the Moran's Index of which we have a value of **0.349005**.

i/j	x	x minus mean	x minus mean squared		x minus mean
1	89031	19585.20833	383580385.5		19585.20833
2	36716	-32729.79167	1071239263		-32729.79167
3	98704	29258.20833	856042754.9		29258.20833
4	58820	-10625.79167	112907448.5		-10625.79167
5	81016	11570.20833	133869720.9		11570.20833
6	56477	-12968.79167	168189557.3		-12968.79167
7	66940	-2505.791667	6278991.877		-2505.791667
8	41819	-27626.79167	763239617.8		-27626.79167
9	58201	-11244.79167	126445339.6		-11244.79167
10	95425	25979.20833	674919265.6		25979.20833
11	55605	-13840.79167	191567514		-13840.79167
12	39794	-29651.79167	879228749		-29651.79167
13	65124	-4321.791667	18677883.21		-4321.791667
14	85532	16086.20833	258766098.5		16086.20833
15	46096	-23349.79167	545212770.9		-23349.79167
16	110133	40687.20833	1655448922		40687.20833
17	84480	15034.20833	226027420.2		15034.20833
18	91910	22464.20833	504640656		22464.20833
19	45628	-23817.79167	567287199.9		-23817.79167
20	52301	-17144.79167	293943881.3		-17144.79167
21	86406	16960.20833	287648666.7		16960.20833
22	58495	-10950.79167	119919838.1		-10950.79167
23	73856	4410.208333	19449937.54		4410.208333
24	88190	18744.20833	351345346		18744.20833
Mean	**69445.79167**	square total:	**10215877228**		
n	24				
w_ij	13667336889	I =	0.349005		
weight	92				
squared sum	10215877228				

Figure 9: Using excel to calculate Global Moran's I.

Question 12.

From our results in ArcGIS, we can see our Index value matches our calculations from Question 11.

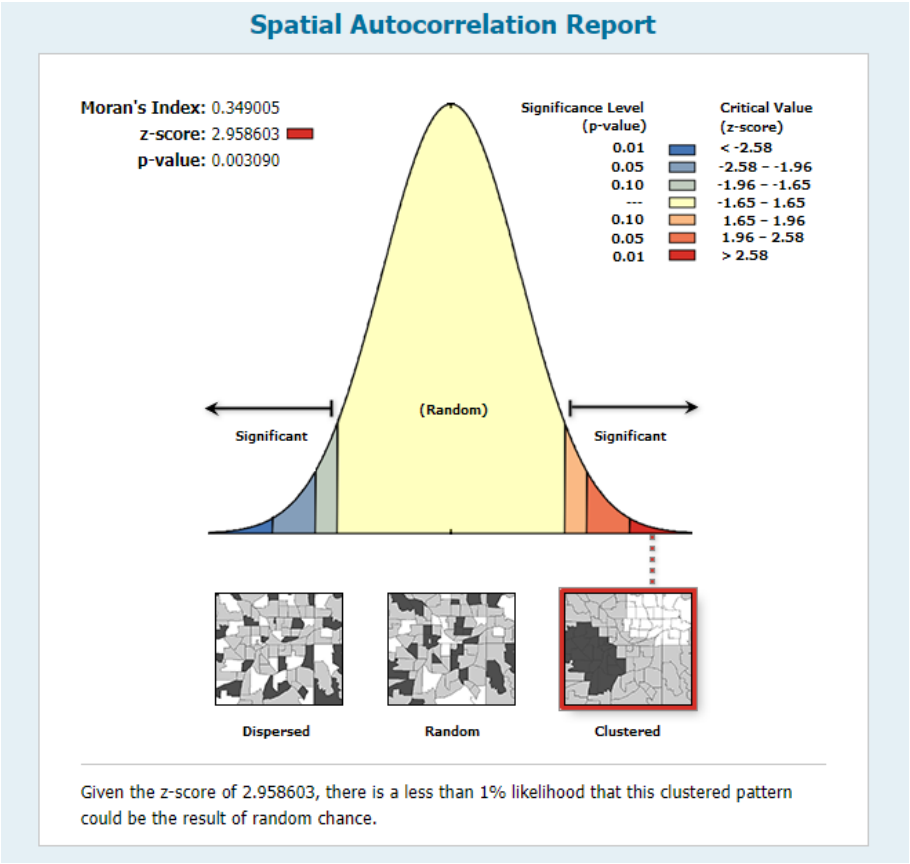

Figure 10: Using Global Moran's I to assess Spatial Autocorrelation.

Question 13.

Our results from the General G statistics seems to verify our results from the Moran's I calculation.

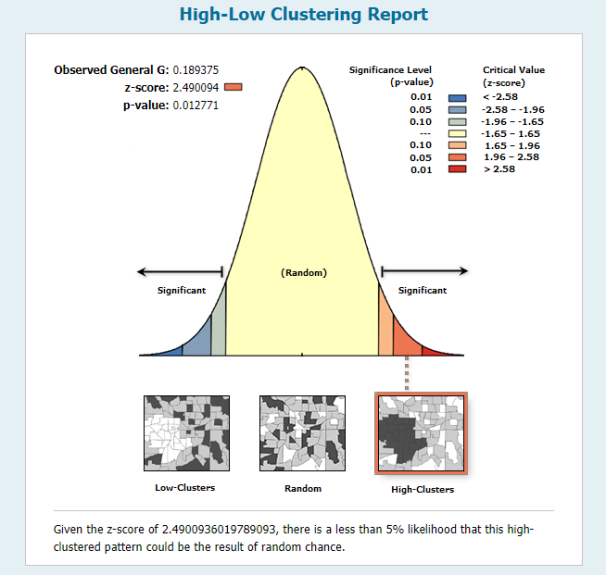

Figure 11: General G Statistic results

Question 14.

Our map from the local Moran's I seems to reflect the relative rhyme and reason of our choropleth from Pt I. Areas of high and low incomes match correspondingly to their general spatial location.

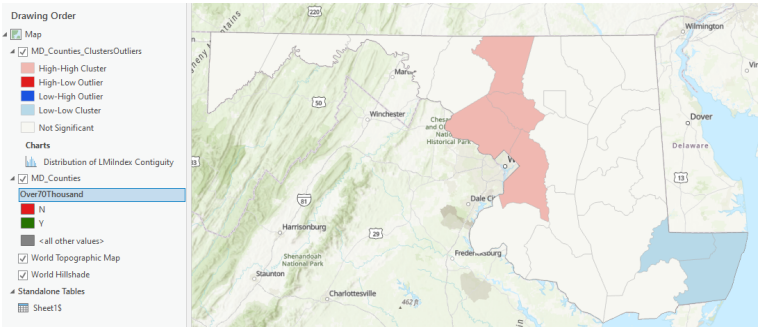

Figure 12: Results from local Moran's I.

Question 15.

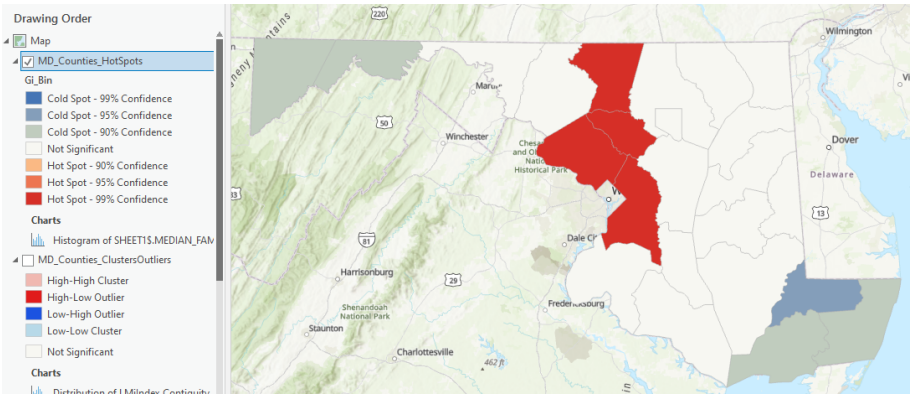

Figure 13: Results from Hot Spot Analysis (Getis-Ord Gi*).