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Lab 5 report

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Lab 5 Thoughts and Conclusions

A research question that one might answer with a model like this is how do residents reconcile proximity to major roads (an important consideration in development patterns that makes the location more convenient in terms of transportation (including to the service centers) but also detracts from its aesthetic qualities) with the aesthetic qualities of a cell. One would then need to modify the model by setting aside a certain number of cells for the roads, find a way to introduce them into the model such that they are located linearly, and perhaps make the grid finer, with more but smaller cells.

When I first ran the still-unmodified model, my hypotheses were as follows:

1. Increasing ***numtests*** would result in more symmetrical and more compact built-up areas with a less "ragged" edge;

2. As the importance of proximity to service areas goes up, sprawl would decrease, and

3. **Development_affects_landscape** would result in a more disjointed, less compact built-up area and generally lead to the built-up area becoming more sprawling.

I did not experiment with the radius of the circle, thinking that it is an arbitrary figure and would remain so if I changed it. The average amount of sprawl under my first experiment is 216.0667 cells outside the radius. The standard deviation is 87.76445. The least sprawl (156 cells outside the blue circle) occurred under the following settings: 1 for importance to proximity to services, development does **not** affect landscape, and the number of tests is 50. These results were broadly in line with my expectations, except that I believed that 1.5 for service proximity would produce the least sprawl. That said, sprawl did clearly tend to decrease as the importance of proximity to services increased. The most sprawl, with 377 cells outside the radius, occurred with proximity to services not very important (0.5), 75 tests, and development affecting landscape. Under this scenario, residents apparently value living close to nature above all else and spend a lot of time finding the perfect place to do so. If development affected landscape, sprawl was, on average, greater (259.81) than if it did not (176.14). This was not very surprising to me, although I am not sure how well this reflects the importance most people attach to scenic views versus proximity to civilization. I had run the experiment with three settings for ***numtests***: 25, 50, and 75. This variable's effect is hard to describe. With importance of proximity to services at 0.5 and development affecting landscape, sprawl increased with the number of tests; on the other hand, if development did not affect landscape, sprawl increased as tests rose from 25 to 50, but then decreased slightly with 75 tests. The same happened with importance of proximity at 1 and development affecting landscape. Under the same scenario as above but with development not influencing landscape, sprawl fell, then rose. When the importance to proximity was set to 1.5, sprawl always rose if development affected landscape and fell, then rose if it did not.

The code in Part 2 seems to me to make the importance of proximity to services vary as the model runs, resulting in the development taking the form of many smaller clusters rather than a few large ones. This, I think, is meant to more realistically mimic the growth of metropolitan areas.

When GIS data of an actual "world" were used as inputs, my hypotheses were the same, with the only difference being that all the trends would be a lot less pronounced. Here, there were few surprises, with the experiments' outputs largely in line with my expectations (see next page for a table detailing the experiments and their results). The most sprawl resulted when the importance of proximity to services was only 0.5; ***numtests*** was 15 and development, not surprisingly, **did** affect landscape. The least sprawl was accomplished, oddly, when the importance of proximity to services was the same; however, this time development did not affect landscape. Also, the number of tests was much higher, at 75. The same settings with ***numtests*** at 15 resulted in a cell having many fewer neighbors on average.

It is not surprising that a high priority attached to proximity to services results in less sprawl. With everyone trying to live closer to the relatively few clusters of services, everyone aims to live in the same few places. That development affecting landscape leads to more sprawl is not surprising, either. Residents seeking unspoiled landscapes obviously do not want to live near services and other residents. Perhaps, if such a variable is present in the model, a fourth one should be included—the importance of proximity to unspoiled landscape, a sliding control with a scale of 0 to 2 not unlike the importance of proximity to services. The effect of the number of tests, however, if not unpredictable, seems to vary dramatically depending on other variables.

Table 1 Experiments with the unmodified model				
Importance of proximity to services	Number of tests	Development affects landscape	Average	Standard deviation
0.5	25	Yes	368.3	24.31301
0.5	50	Yes	372.1	23.45421
0.5	75	Yes	376.6	18.67381
0.5	25	No	184.1	36.74068
0.5	50	No	199.6	61.08864
0.5	75	No	197.8	44.9711
1	25	Yes	233.4	34.98317
1	50	Yes	238.5	46.02717
1	75	Yes	235.9	91.05671
1	25	No	183.5	32.0737
1	50	No	156.3	41.84641
1	75	No	169.7	52.53792
1.5	25	Yes	165.8	26.71163
1.5	50	Yes	171.6	53.87681
1.5	75	Yes	176.1	43.13918
1.5	25	No	173.8	41.60075
1.5	50	No	158.1	34.42367
1.5	75	No	162.4	46.44997

Table 2 Experiments with real-"world" GIS data as inputs				
Importance of proximity to services	Number of tests	Development affects landscape	Average	Standard deviation
0.5	15	No	4.344924	0.033049
1.5	15	No	4.345164	0.028466
0.5	15	Yes	3.601998	0.033502
1.5	15	Yes	4.096083	0.035756
0.5	75	No	5.054996	0.020824
1.5	75	No	4.934532	0.028406
0.5	75	Yes	3.702238	0.033935
1.5	75	Yes	4.540608	0.032112