Spicer - Assignment 8

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GIS Assignment 8
Project Process Steps
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Project Goals

My project will analyze public transportation use in metro Boston to determine what areas are underserved and represent opportunity for MBTA expansion. My hypothesis is that areas without easy transit access and with commute times longer by transit than by car will show less use of transit. To determine this, I will look at two key data comparisons.

First, I will look at the percentage of commuters who travel by transit versus by car or other means. I will also look at a possible reason for this: transit accessibility (distance to nearest stop) and travel time comparison between transit users and drivers.

Second, I will create maps displaying lowest-income areas of the highest population density with the greatest amount of drivers, which are also further from transit stops. (Or I will at least examine these factors to see if there is a correlation or indeed a need for more transit in these areas. I will look at areas more than ¼ of a mile from a transit stop as being "far" from transit - but this may change depending on results.)

I hope these comparisons will show where additional or better quality transit is needed, and where the MBTA could expand/adapt to attract additional customers, reduce auto traffic, and encourage transit-oriented development.

Project Steps

Step 1. Create basic geographic map of the Boston Metro Area with the following layers:

- CENSUS2000BLOCKGROUPS_POLY.dbf
- EOTMAJROADS_ARC.dbf
- CENSUS2000TIGERHYDRO_POLY.dbf

Step 2. Add transit shape files from MassGIS/Census and CTPA

- MBTA_ARC.dbf
- MBTABUSROUTES_ARC.dbf
- MBTABUSSTOPS_PT.dbf
- TRAINS_NODE.dbf
- MBTA Rapid Transit - Typical Daily Boardings by Station
- MBTA Bus - Typical Daily Boardings by Route
- (I could additionally map each T stop with the size of the point relating to ridership at that stop using these last two data sets.)

Step 3. Select only the Boston Metro Area from these layers by selecting by location and exporting new data layers.

Step 4. Join the following census data to the census block group layer*:

- CEN2K_BG_TRNS_COM_MEANS.dbf
- CEN2K_BG_TRNS_COM_TIME.dbf
- CEN2K_CT_MED_INC_FAM.dbf

*using block group ID field. I believe this is what I used for Assignment 6

Step 5. Using the geographic "background" map created in steps 2 and 3, map the means of transportation by census block group. This will reveal commuting trends in relationship to the location of transit stops.

Step 6. Next I will use spatial analysis to determine the distance to each transit stop, identifying areas that are more than ¼ of a mile from a transit stop.

Step 7. I will next make another map presenting the travel time for commuters, to identify areas with higher commute times and compare these to the transit mode breakdown. Perhaps I could combine this with the preceding map by showing commute time using graduated dots or something.

Step 8. I will then make a map showing population density, to see if there are any high(er) density areas that are more than ¼ mile from a transit stop.

Step 9. I will next make a map (or add to the previous map) average household income by census block, in relation to transit stops. I think this is an important item to look at since lower income areas will most likely have fewer cars and greater need for transport.

Step 10. Assess the maps. I will probably have broken each map down by quintile. Now, perhaps I can identify an area with the highest population density of car-using lower income workers with longer commutes, which would signify the highest need for additional transport. (the commute time may end up being self-fulfilling, since people who live in denser neighborhoods closer to the city center will most likely have shorter commutes, but we'll see.)

To make the assessment, I will reclass my five transit factors, as we did in the Hugog exercise, using an addition function to identify which areas, if any, include all five factors:

- Commute travel time
- Average income level
- Transit mode majority
- Distance to transit stop
- Density of population

To develop a ranking system, I will create an attribute table combining the data from all 5 factors joined with the blockgroup polygon layer. I will add fields to develop a ranking column. The rankings will be developed based on the results from the maps described above - for example, once I see how travel time is broken down into quintiles, I will use these divisions to rank each as 1, 2, 3, 4, or 5, with the lowest travel time receiving the highest score. When I have completed these rankings for each of the five factors, the areas with the highest scores will then be those most requiring better transit.

I am not 100% certain yet how I will deal with bus transport versus subway/T transit - it may be simpler to keep them entirely separate, but I could also combine them somehow, just keeping a distance field for each in the attibute table.