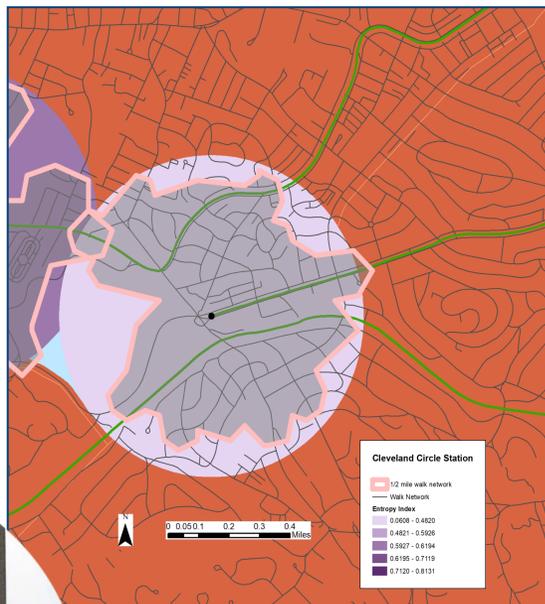


Connectivity and Diversity: Exploring the MBTA last stops

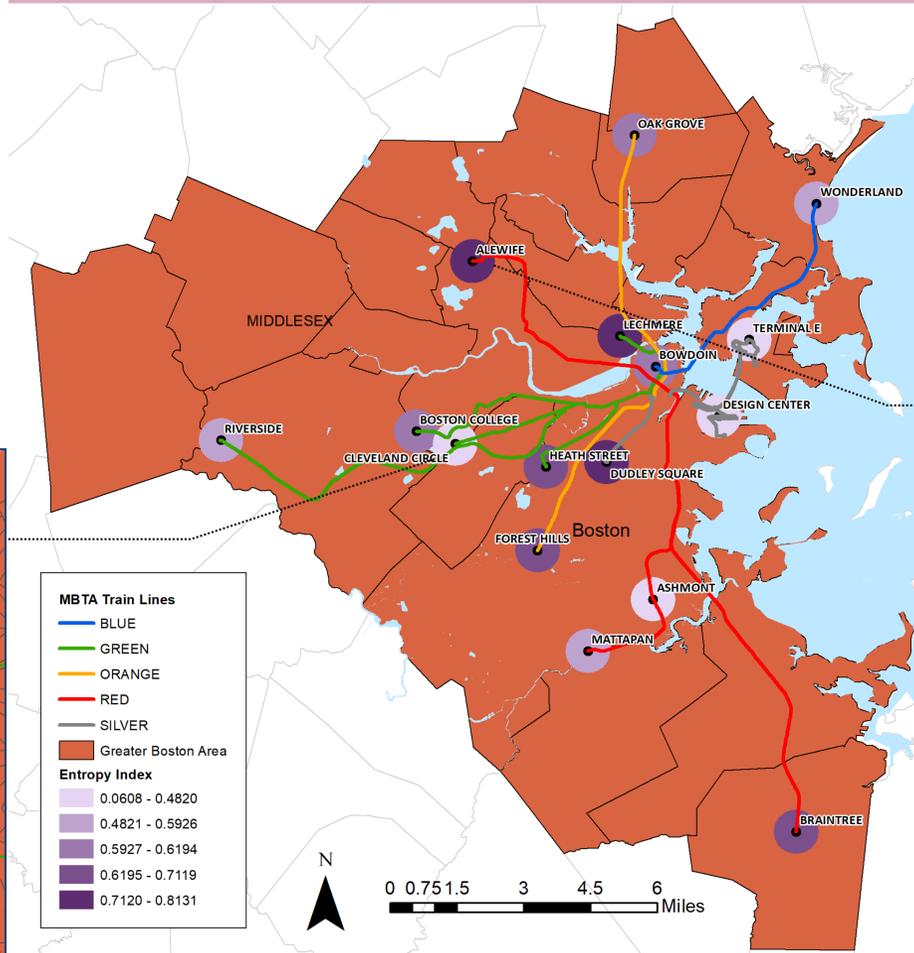
Introduction

Transit-oriented development (TOD) and focus on public transportation have been key development strategies that metropolitan cities have included their planning. Areas are usually within a 1/2 mile walkability to a transit station are considered transit-oriented development. These areas try to create mixed-use development, prioritize accommodations for pedestrians. Land use diversity plays a major role in transit-oriented development. I am exploring the built environment around the MBTA last stops. To get a better sense of how the built environment around TOD's impact low-income communities I compare variables like mode of transportation to work, property value, households with no cars and low-income households with land-use diversity and street connectivity.

Cleveland Circle Station has a lower entropy, but the walking service area is bigger with an intersection density of 266.81 sq. mile. The buffer around Cleveland Circle also included 2 more MBTA Green lines which could signify that transit-oriented development in that area has created a more connected street network.



Entropy Index for 1/2 mile buffers around the last stops for the MBTA lines



Alewife Station has a high entropy however, the 1/2 mile walking service area is not as connected due to large parking areas and major highways. With plans for residential development, it'll be interesting to see how this area changes.



Methods

Land-use diversity around the 1/2 mile transit stop buffers were calculated using an Entropy Index formula with six land use types from the MassGIS Land Use 2005 data. The entropy index calculates values between 0 and 1, 0 being homogenous land use and 1 being 'perfect' mix of land use. To measure connectivity and walkability, I used Network Analyst and the MassDOT streets layer to create a 1/2 mile services areas from the end nodes of the MBTA lines. Intersection density was calculated by counting the number of nodes in the service area and dividing by the area to get a density per sq. mile. Various attribute queries were used to calculate the different variables from the high and low entropy table.

Conclusion

There are more low-income households living in the low-entropy area which means they have less land-use diversity and connectivity. Generally low-income households have a higher need for transit. It is difficult to serve the community with a higher need for transit if they can't afford to live in these TOD corridors because property value is much higher. Zoning and development policies need to consider requiring more affordable housing and retail spaces when promoting TOD.

Results

On average property value is higher in the transit areas with high entropy. Almost double the amount of people are walking to work in high entropy areas. More people are also taking public transit to work in high versus low entropy area. Low-income HH's are higher in low entropy areas compared to high entropy. There are more households with zero cars in the high entropy areas. Generally, stations with high entropy have high intersection density. There are some where that's not the case, as displayed above: Cleveland Circle and Alewife. The Terminal E station was excluded for the two tables as it skewed the results due to the airport infrastructure being assessed in the property value data. Additionally, only six land use types were chosen from the extensive land use data but it would be interesting to look at the entire mix in the future.

Station	Intersection Density (sq. mile)
Alewife	187.19
Design Center	218.95
Boston College	260.06
Braintree	262.78
Cleveland Circle	266.81
Ashmont	291.57
Forest Hills	295.33
Riverside	307.78
Wonderland	321.99
Lechmere	323.00
Mattapan	331.73
Heath Street	343.92
Oak Grove	379.77
Dudley Street	428.33
Bowdoin	755.64

Average	High Entropy (>=.60)	Low Entropy (<=.59)
Property Value	6.79 million	1.57 million
Walk to work (HH)	17.7 %	6.9 %
Public Transit to work (HH)	29 %	27 %
No vehicle (HH)	30 %	21 %
Low-income (HH)	30 %	33 %