

# Analysis of Gentrification Trends in Transit-oriented Communities in Boston Area

## Introduction:

From 1970s, the Massachusetts Bay Transportation Authority (MBTA) has spent several billion dollars to sustain, improve, and extend the region's rapid transit system. During the time 1980 to 2000, several subway stations were built linking cities like Cambridge, Somerville, Quincy and Braintree with Boston. These investments have many positive impact on surrounding communities and on the Greater Boston area, including reducing congestion, improving accessibility to jobs in downtown Boston, revitalizing communities, and encouraging denser, transit-oriented development patterns. This project is to use GIS analysis tools to determine the gentrification trends from 1980 to 2000 in subway stations service area and in areas within network distance of 1 mile from stations (catchment area). The questions I will answer from this analysis include:

- Is gentrification level higher in areas near new built stations than that in other areas?
- How did the catchment areas near "Walk and Ride" stations and near "Park and Ride" stations gentrify differently?



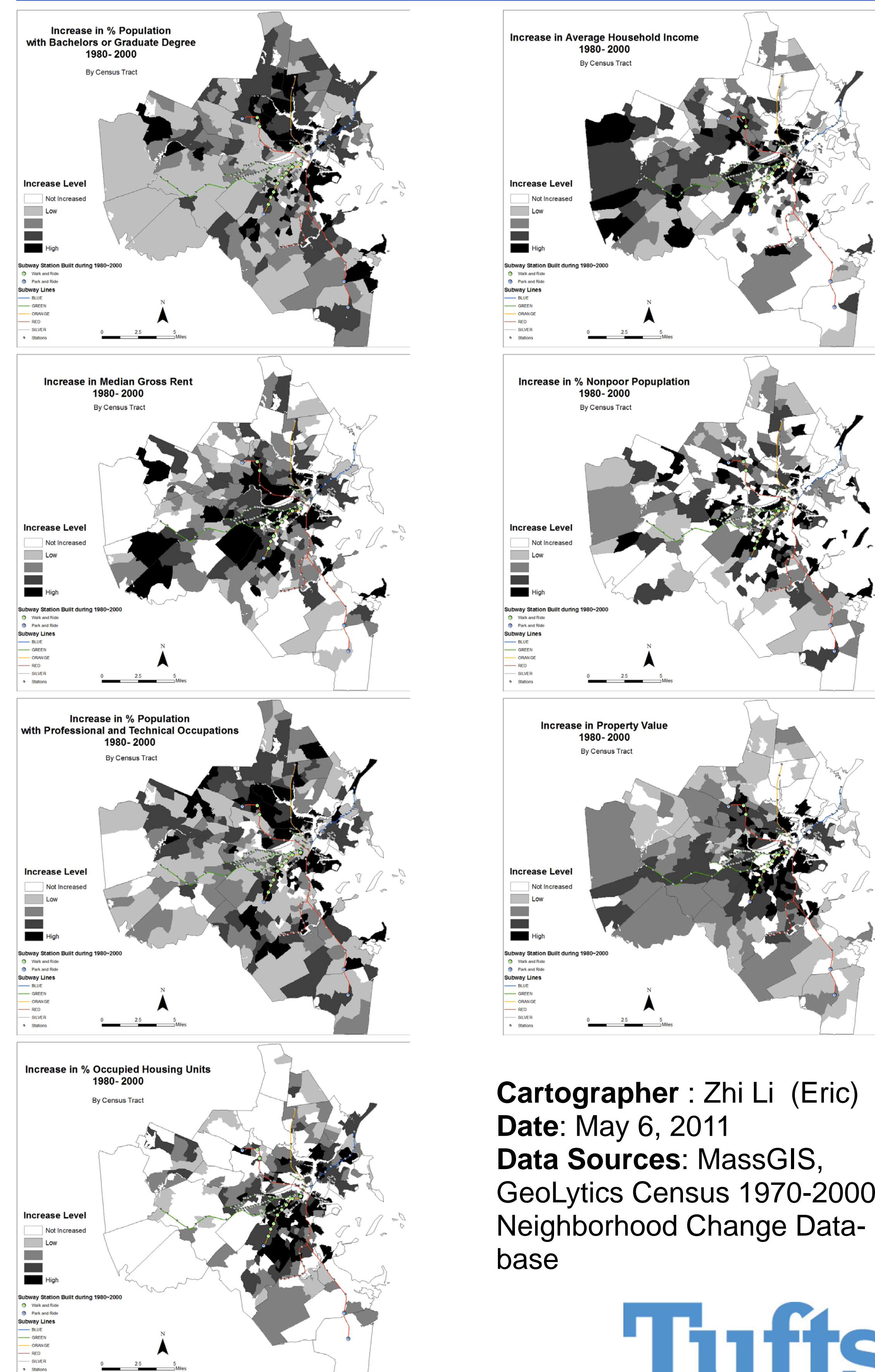
## Methodology:

I first choose the subway service area, including towns and cities near subway stations and subway lines. Then I highlight the stations built during 1980 and 2000, and divide them into "Walk and Ride" stations and "Park and Ride" stations (see map Subway Service Area). To determine the gentrification trends, I select seven indicators in tract level from GeoLytics Census 1970-2000 Neighborhood Change Database (Table 1). For "average household income", "Median Gross Rent" and "property value", I calculate the ratio of value in each tract to the value in service area, in order to take inflation into account. For each indicator, the more increased from 1980 to 2000, the higher degree of gentrification happened. To determine the increase level, I use the equation  $(B-A)/A$  to calculate the percent

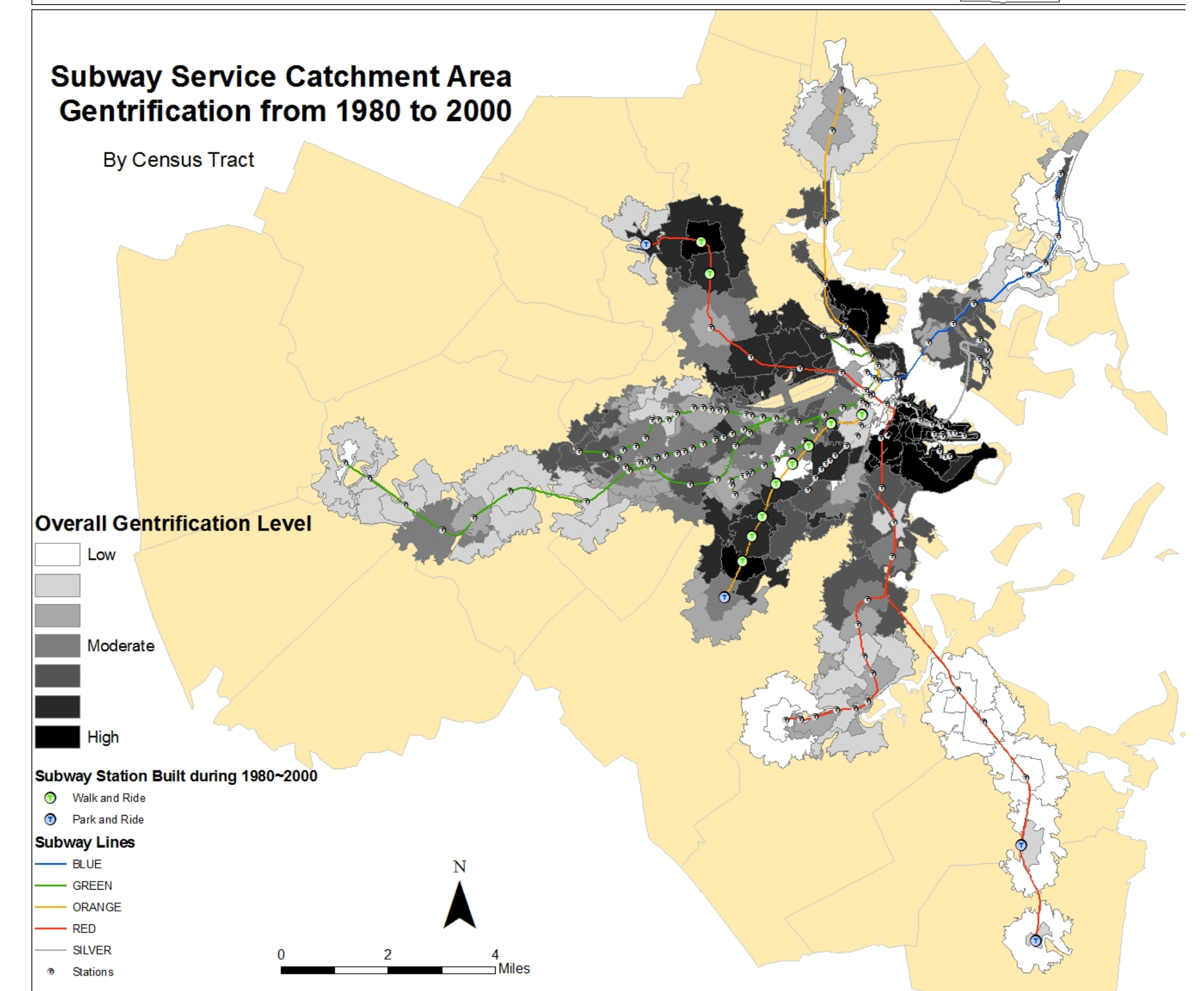
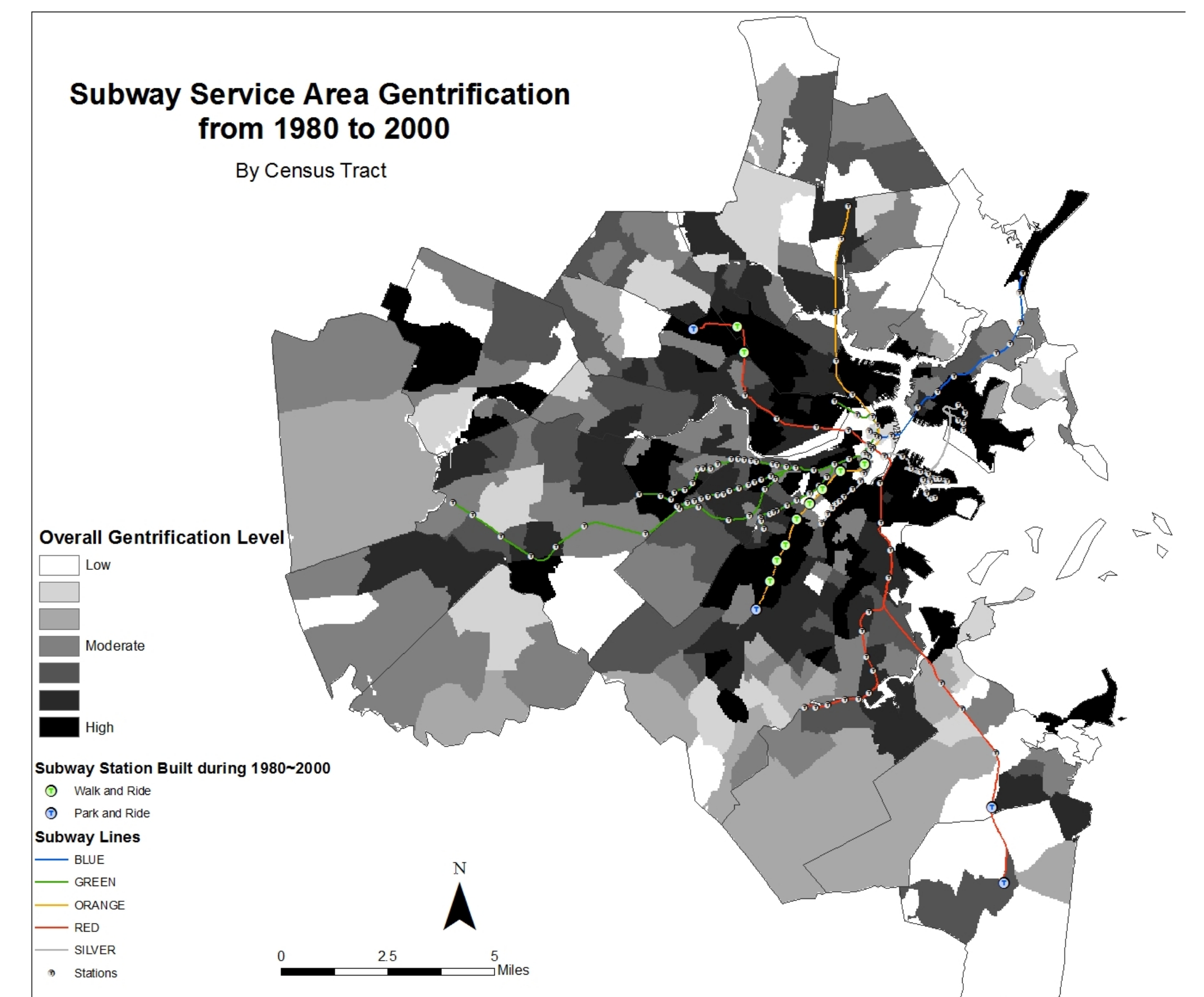
Table 1 Gentrification Indicator Table	
Indicator	Calculation
%Population with Bachelors or Graduate Degree	$(\% \text{Population with Bachelors or Graduate Degree}) / (\text{Total Population})$
Average Household Income	$(\text{Average Household Income in each tract}) / (\text{Average Household Income in service area})$
Median Gross Rent	$(\text{Median Gross Rent in each tract}) / (\text{Median Gross Rent in service area})$
%Nonpoor Population	$(\text{Nonpoor population}) / (\text{Total Population})$
%Population with Professional and Technical Occupations	$(\text{Population with Professional and Technical Occupations}) / (\text{Total Population})$
% Occupied Housing Units	$(\text{Occupied Housing Units}) / (\text{Total Housing Units})$
Property Value	$(\text{Average Property Value in each tract}) / (\text{Average Property Value in service area})$

change from 1980 to 2000 for each indicator. B stands for the value of each indicator in 2000, and A stands for the value of each indicator in 1980. Then I rank each indicator's increase level from 0 to 4 based on quantile (see indicator map). I add all the ranks of each indicator to get the overall rank of gentrification, which ranges from 0 to 28, and I rank overall gentrification based on quantile (see Subway Service Area Gentrification map). Based on the service area gentrification map, I use "zonal statistics" and "network analyst" function to get the gentrification trends map in catchment area, which is within 1-mile network distance from subway stations (see Subway Service Catchment Area Gentrification map).

## Increase in Each Indicator



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**Data Sources:** MassGIS, GeoLytics Census 1970-2000 Neighborhood Change Database



## Conclusion

The Subway Service Area Gentrification map successfully shows the gentrification trends in subway service area, and we can find that most areas with higher gentrification level are near the subway stations built during 1980 to 2000. Subway Service Catchment Area Gentrification map also shows the gentrification trends in the areas within 1-mile network distance from stations. In the north end of Red Line, we can clearly find that areas around "Walk and Ride" stations experienced higher degree of gentrification than the areas near "Park and Ride" station, and this conclusion can be also found in the south end of Orange Line and in the south end of Red Line. In some places near Orange Line, the gentrification level is moderate or lower. The reason may be that these new built stations in Orange Line are so close to stations built long before, and these areas might have already experienced gentrification. For further studies, if we have census data for each decade in block groups, the gentrification trends can be analyzed more accurately, and the differences between gentrification trends in area near "Walk and Ride" stations and that in area near "Park and Ride" stations can be perceived more clearly.