New York City is the largest public transit commuter hub in the United States, with over half of all commuters using some public transportation to travel to and from work. Crucial to this influx of people are the three most frequently used commuter rail systems in the United States—the Long Island Rail Road, New Jersey Transit Rail, and Metro-North Railroad. The majority of these commuters come from the New York Metropolitan area, which consists of 28 counties in New York, Connecticut, New Jersey, and Pennsylvania. The objective of this project is to identify how these counties rank in terms of commuting based on commuting times as well as several demographic factors.

**INTRODUCTION**

The quality of each county is determined by the sum of its rankings in each of the factors, with additional weight given to the commuting time. The network analysis provided me with the average commuting time from each county into New York City. Next I found data for each of the counties on average income level, home sales price, and population density to be used along with the average commuting time to determine which counties are the best and worst to commute from.

**METHODOLOGY**

The most significant factor in identifying the best counties from which to commute is the commute time into New York City. To generalize a commute time for each entire county as a whole, the counties were broken down by zip code which was used to determine the average time within each county. With the routes and stops of the three rail systems, a train network was built using the ArcGIS network analyst toolset that provided me with the times taken to get from each stop into its respective destination—Penn Station, Grand Central, or 33rd Street—in New York City. To quickly determine the times from each of the stops, I built a model to create an OD Cost Matrix for each destination. The stops were then spatially joined with the lines created by the matrices and then joined to each zip code by its nearest stop to provide times for the zip codes.

The vector maps for each of the factors were turned into rasters and reclassified to have a rank of 1 to 5, from worst to best. These rasters were then added to each other to yield a final raster with the combined score of all factors. Each county received a score out of 25, with the higher numbers proving to be the better counties from which to commute.

**RESULTS**

New York City Metro Area
with Long Island Rail Road, New Jersey Transit Rail, and Metro-North Railroad

The resulting raster was then reconverted to polygons so that the scores for each of the counties could be displayed, and the relative viability of commuting could be determined. As expected the counties that were closer to the city had a larger advantage over those that were farther away due to the significant increase in travel time. The lower counties on the list suffer from a combination of low wealth factors and tremendously high travel times, which would make them less suitable for commuting.

Data Sources: New York City Department of Transportation, New Jersey Department of Transportation, Metropolitan Transportation Authority, United States Census Bureau, Spatiality, Zillow, University of Connecticut