**INTRODUCTION**

**Research Area**

The Metropolitan Area Planning Council (MAPC) is the regional planning agency serving the people who live and work in the 101 cities and towns of Metropolitan Boston. A considerable body of research seeks to develop models and measures of accessibility, which has been defined as "the ease with which activities at one place may be reached from another via a particular travel model. Compared with adults, the main daily destinations for young students after school (defined as below 21 years old) may be entertainment facilities, such as amusement parks and public libraries. As for travel model, most young students do not have their own cars or haven't reached the legal driving age, also in some semi-urban counties, the public transportation is not complete enough to rely on. Therefore, walking is a popular travel model among young students in MAPC. However, there is relatively little research on accessibility using walk as travel mode to entertainment destinations.

**DATA DISCRIPTION**

**Students' Locations & Entertainment Destinations**

The student data is from Tufts data Lab, M-drive. This is a table with students' information include age, income, and GEOIDs for each student. I select students under 21 years old. Since block is a very small spatial unit, I assume each student is at the center of its block. Then I join the block shapefile which has longitudes and latitudes with the student table through GEOID10 and get the points shapefile for students' locations (there are more than one students in some blocks, they are shown as a same point).

Four categories of destinations are included to represent entertainment destinations in this project. They are beaches, amusement parks, parks, and public libraries. Data for those destinations are tables from Reference U.S.A. with longitudes and latitudes. I also geocode them to get points shapefiles for those locations.

**Roads**

The roads data is a line shapefile from Tufts data Lab, M-drive with length (in feet) of all walkable roads in Massachusetts.

**METHODS**

**Build service area**

I use a Model with for iterator to set up service area. Each student is defined as a facility. The service areas are based on 10, 20 and 30 minutes walk. The walking time is conversed to walking distance through the average walking speed (272.3 feet/min).

**Calculate weighted scores for each student**

1. Count destination numbers in each service area: I join four destination shapefiles with three service area shapefiles(10, 20 30 minutes) to count how many destinations are in each student’s three service area.
2. Calculate and weight scores: I use those two formulas to calculate the weighted score for each student.

**RESULTS**

**Score (Dependent variable)**

The calculated results of weighted scores for students are from 0 to 237.5. The average of scores is 19.89, the mode is 0 and the median is 4.17. This means a large of students are under low accessibility to entertainment destinations.

**Relationship**

For the excel regression result, multiple R representants the correlation coefficient. It tells us how strong the liner relationship is. Since multiple R equal to 0.001037 in the result, which is close to 0, the liner relationship between income and the accessibility to entertainment destinations is weak. However, the relationship may not be liner and there may also exist other factor which influence the scores.

**CONCLUSIONS AND LIMITATIONS**

Rich people can enjoy more resources? The regression result may not be accurate enough because of the limitation of data. There is no significant high income cluster area looking from the 3D map. However, comparing two 3D maps, some students with high income (in red oval) is associated with high accessibility scores. Probably there do exist relationship between income and accessibility to local entertainment destination, may be not directly.

**Data Limitation**

The student data does not include all students of MAPC, there are only 444 students. Thus the result may not be accurate enough because of the missing of data. Also, each student is assumed to be at the center of each block. Since the accessibility to amusement destinations is related to spatial locations, although block is a small spatial unit, this assumption may cause error.