Forecast space/time demand for scooter share pickups

**Motivation:**

A scooter sharing system is a shared transportation service in which electric scooters are available for short-term rentals. E-scooters are often "unparked" compared to shared bikes, meaning they don't have fixed racks but drop off and pick up from certain locations in the service area. Scooter sharing system aims to provide a fast and convenient means of transportation for the public. Due to the growing popularity of scooter sharing, the municipal government has implemented regulations on electric scooters to improve the safety of riders and pedestrians, while avoiding visual pollution. Scooter sharing systems are one of the cheapest and most popular micro transportation options.

Demand for parking Spaces, Uber rides, bike sharing, road access, and many urban traffic phenomena are dependent on time and space, and modeling them often involves simply controlling dates, times, places, weather, and other temporal phenomena. One of the problems that urban scooter sharing systems need to operate is how to "rebalance" scooters across the network. If users don't have a scooter available within walking distance when they want to use one, they're likely to give up looking, and sharing a scooter is useless. It is worth thinking about how we should properly and efficiently redistribute scooters to ensure they are available when needed. Combined with the population, social economy and other characteristics of the city, the prediction is conducted to check whether the potential demand for scooters is different in different census areas, which will also affect the impact of the fleet management and distribution choice of scooter companies. Here, this project answers the question, which part of the city has more demand for scooters? Companies need to invest in more equipment so we can better allocate resources.

The task of rebalancing is complex because there are many factors that affect the user's choice, including time of day, day of the week, location, distance, weather, altitude, and so on. The project will focus on the Chicago area and incorporate these key features into a model to predict the spatial/temporal requirements of shared scooters. We can see when the demand for scooters might lead to running out of vehicles, and then remove the excess scooters from elsewhere. Therefore, the company can reasonably predict demand and deploy in advance.

**Dataset Identified:**

E-Scooter Trips - Census Tract Summary – 2020 (<https://data.cityofchicago.org/Transportation/E-Scooter-Trips-Census-Tract-Summary-2020/3srm-twg4>)

E-Scooter Trips – 2020 (<https://data.cityofchicago.org/Transportation/E-Scooter-Trips-2020/3rse-fbp6>)

**Methods:**

A temporal and spatial model will be created to predict where and when scooter demand will peak in the city of Chicago.

Using the city of Chicago's publicly available 2020 scooter TRIP data, a machine learning approach was used to create a model. We will design several different linear regressions. Divide the data into training sets and test sets. Start by creating an initial model reg0 that contains all variables to help determine the exclusion of variables unrelated to the number of shared scooters. reg1 focuses on time, reg2 focuses on spatial effects, reg3 includes time and spatial fixed effects and so on.

**Deliverables:**

From this report, the company can learn how to better allocate scooter resources. They should put more vehicles into areas with large demand and which time of day, or a week, and which time of the month there is more demand for scooters.