

# Analyzing Louisville Dockless Find-and-Ride Vehicles Trip Data

City of Louisville – Department of Public Works  
Commonwealth of Kentucky – Department of Transportation  
Abhiram Muktineni  
November 16, 2020

## Introduction

Dockless vehicles – bicycles and power assisted scooters that can be checked out from a fleet without human assistance or going to a docking station – have arrived in Louisville. These find-and-ride vehicles offer a fun and easy option for getting around the city. As a condition of operating in the city, dockless bikesharing companies are required to provide monthly data reports to City of Louisville's Department of Public Works (DPW) and Commonwealth of Kentucky's Department of Transportation (DOT). Companies are also required to provide anonymized trip data. This data will help DOT in evaluating the program and can support current and future planning efforts.

Much of this data sharing and policy standards Mobility Data Specification (MDS) and General Bikeshare Feed Specification (GBFS) set between the bikesharing companies and City/State departments aligns to the suggestions of Harvard's Civic Analytics Network and the work of other cities like Austin, TX, Washington DC and NATCO's Guidance.

However, in this project we'll be using some of this openly available anonymized data provided by DPW to conduct a Trip Data Analysis to understand micromobility impacts, identify gaps in the dockless transportation network, equitable service standards, and solve some of the crucial problems users are facing with the dockless vehicles program in Louisville.

## Problem Identification

**Problem Statement:** After gathering some feedback from the residents in Louisville through an optional user survey, it was reported that most of the downtown users were not satisfied with the availability of enough dockless vehicles in the city. In an effort to resolve this problem, the management at DOT has decided to conduct a Trip Data Analysis of the city's dockless vehicle program for ensuring better fleet management and equitable distribution of vehicles across the city, (to identify peak hours and special event days in the city to deploy more vehicles, understanding user behaviors, increasing or reducing distribution points etc.) DOT wants to rollout and implement a new strategy to reduce any existing problems causing inconvenience to users and increase operational efficiency of the program by the beginning of Christmas Holiday season this year, i.e. by Christmas eve on 12/24/2020.

**Criteria for Success:** Success of this project depends on a clear set of actions taken by December 24<sup>th</sup> 2020 to ensure better fleet management and equitable distribution of vehicles across the city based on ridership demand.

## Scope of Solution Space:

- Change the pricing strategy by adopting a data driven approach. Ex: Charge more during peak hours.

- Use the extra money obtained from increased pricing to reinvest in purchasing new vehicles and increase the existing fleet of vehicles.
- Identifying the root cause of vehicle unavailability. Ex: Is it due to increase in demand for ridership? or due to too many vehicles under repair and maintenance?
- Analyze the correlation between rider weights and vehicles going under repair and maintenance. If there is a correlation, try to set new limits on rider weights as well as limit number of riders per trip to increase the operational lifetime of vehicles.
- Analyze pick up and drop off locations to predict where new distribution points are needed.

#### **Constraints within Solution Space:**

- Longitude and Latitude data is aggregated for individual privacy to 3 decimal places, which equates to about the block level.
- There are inherent inaccuracies in GPS Tracking that is present in the source data.
- Aggregated data may show points in water, private locations, and places vehicles do not operate. This is due to data being snapped to a larger open data aggregation level, GPS issues or data issues from the bikeshare companies.
- Times are rounded to the nearest 15 minutes for rider privacy.
- VehicleID is not made available for rider privacy, competition concerns from other companies, they are not reliable to identify a vehicle's lifespan.
- There is no identifier for a company and all the trips are combined into one file to protect the privacy of riders and not to reveal company trade secrets.
- Some source data provided by the companies contains errant values, like negative or impossible distances. In these scenarios TripDistance is set to -1 where the value is less than 0, TripDistance is set to 100 where the value is over 100 (max range being 25 miles), errant TripDurations are left untouched, errant latitude and longitude coordinates (Eg: hundreds of miles away) are left untouched.

#### **Stakeholders to provide key insights:**

Big Data Manager at DOT – Krish Chaganti  
 Data Steward at Louisville Open Data – James Graham  
 Data Steward at DPW – David Webb  
 Chief Data Officer, Louisville – Michael Schuerle

#### **Data Sources:**

DocklessTripOpenData\_10.csv – A CSV file obtained from Louisville Open Data  
 City\_of\_Louisville\_Weather\_data.xlsx – An Excel file obtained from usclimatedata.com