

# VeoRide E-Scooter Usage within the UMD Transportation System

**Team 15**

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# OUR DATASET

Includes ride counts, times, distances and routes of Veo e-scooters from October 2019 and October 2020

This data is collected by the riders' mobile device, with an accuracy of  $\sim \pm 1$  meter.

VeoRide Inc. is the sole e-scooter provider with the University of Maryland.



# OUR PROCESS

Remove rides with low or high distance, time, or speed

CLEAN

Step 01

Step 02

CLASSIFY

Separate by year, and on-campus, off-campus, or "hybrid"

Find numerical values (averages, SDs) and create plots & histograms

DESCRIBE

Step 03

Step 04

VISUALIZE

Use Tableau and Python to plot and visualize the data

Draw real-world conclusions and applications of the results

CONCLUDE

Step 05

# Cleaning & Classifying

## All Rides were Removed that Satisfied:

- Non-scooter (E-bike)
- DISTANCE < 0.06 miles
- DISTANCE > 43 miles
- DURATION < 2 mins
- DURATION > 4 hours
- Avg Speed > 20 mph

40,325 Rides pre-clean

34,538 Rides post-clean

## Rides then classified by:

**Year:** 2019 or 2020

### **Location:**

- Start & end on-campus
- Start & end off-campus
- Start on, end off
- Start off, end on

8 datasets total

# Raw Numbers: 2019



|            | Number of Rides | Mean Distance (mi) | Standard Deviation of Distance (mi) | Mean Duration (min) | Standard Deviation of Duration (min) |
|------------|-----------------|--------------------|-------------------------------------|---------------------|--------------------------------------|
| On-Campus  | 11,854          | 0.84               | 0.67                                | 9.83                | 12.22                                |
| Off-Campus | 597             | 1.16               | 1.38                                | 13.71               | 21.93                                |
| On to Off  | 972             | 1.13               | 0.98                                | 12.08               | 15.27                                |
| Off to On  | 950             | 1.08               | 0.71                                | 11.15               | 10.36                                |
| All Rides  | 14,373          | 0.89               | 0.75                                | 10.23               | 12.95                                |

# Raw Numbers: 2020

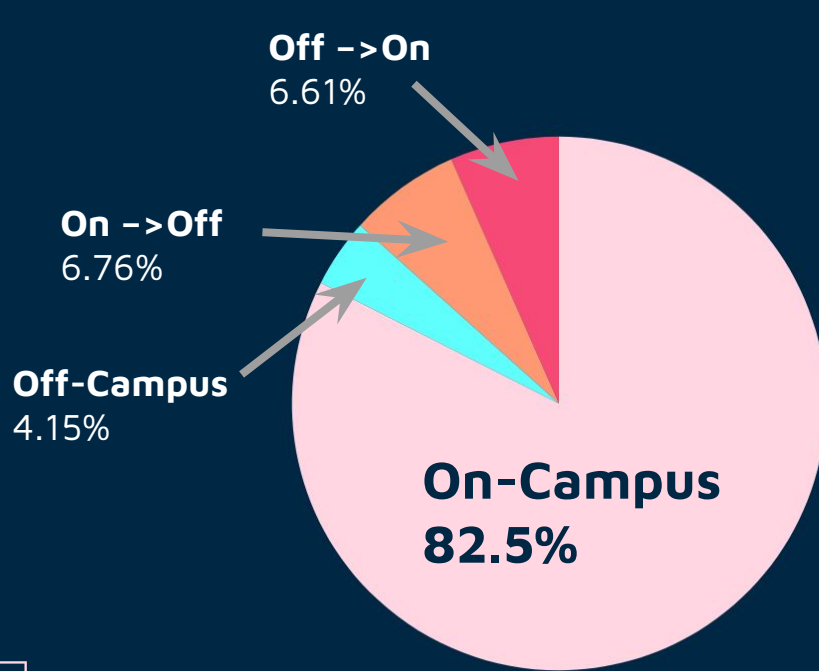
|            | Number of Rides | Mean Distance (mi) | Standard Deviation of Distance (mi) | Mean Duration (min) | Standard Deviation of Duration (min) |
|------------|-----------------|--------------------|-------------------------------------|---------------------|--------------------------------------|
| On-Campus  | 16,079          | 0.81               | 0.70                                | 8.20                | 9.86                                 |
| Off-Campus | 1,049           | 1.17               | 1.65                                | 13.24               | 19.84                                |
| On to Off  | 1,514           | 1.05               | 0.95                                | 10.11               | 11.98                                |
| Off to On  | 1,523           | 1.07               | 0.81                                | 10.37               | 11.39                                |
| All Rides  | 20,165          | 0.87               | 0.81                                | 8.77                | 10.96                                |

# Comparing 2019 & 2020

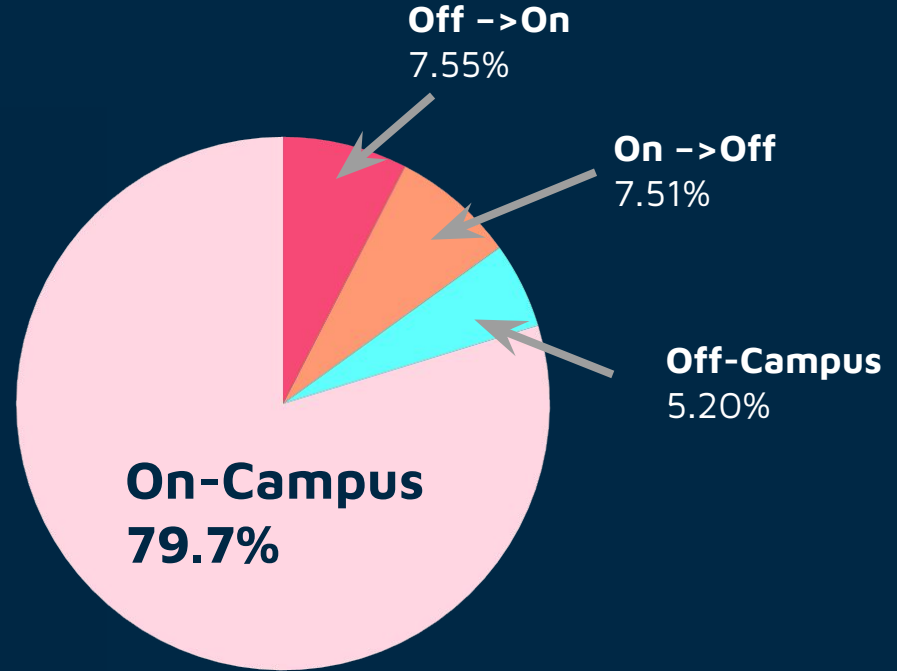
|            | Change in<br>Number of Rides | % Change in<br>Number of Rides | % Change in Avg.<br>Distance | % Change in Avg.<br>Duration |
|------------|------------------------------|--------------------------------|------------------------------|------------------------------|
| On Campus  | +4,225                       | +35.64%                        | -2.75%                       | -16.59%                      |
| Off Campus | +452                         | +75.71%                        | +0.48%                       | -3.41%                       |
| On to Off  | +542                         | +55.76%                        | -6.84%                       | -16.36%                      |
| Off to On  | +573                         | +60.32%                        | -1.08%                       | -6.92%                       |
| All Rides  | +5,792                       | +40.30%                        | -1.89%                       | -14.28%                      |

- Use caution when interpreting data: it **appears** that from 2019 to 2020 more scooters were used for shorter distances and durations
- There is plenty of variance in scooter usage

# Comparing Campus & Non-Campus Rides



2019 Ride Distribution

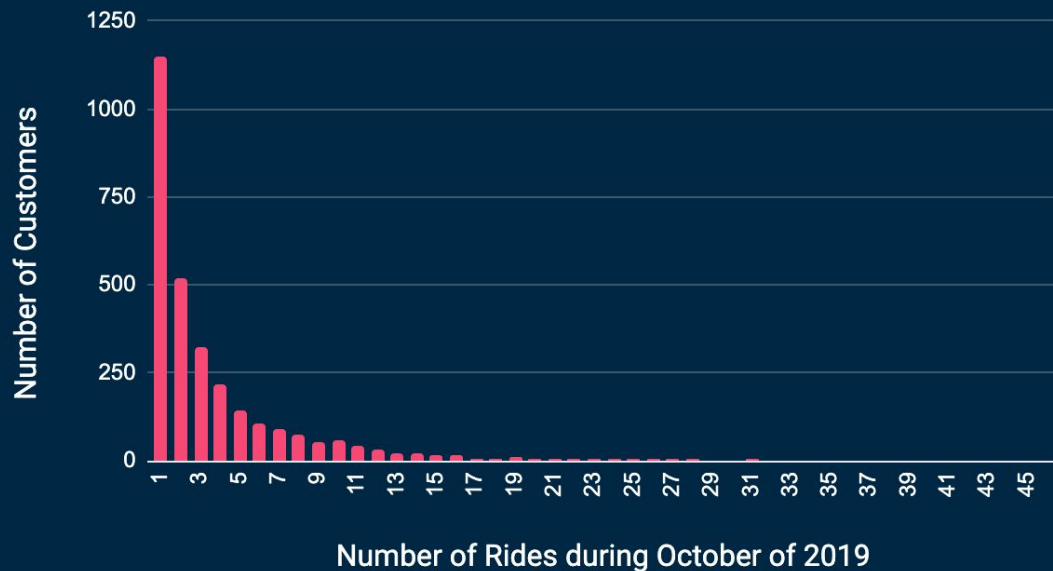


2020 Ride Distribution



# Repeat Riders: 2019

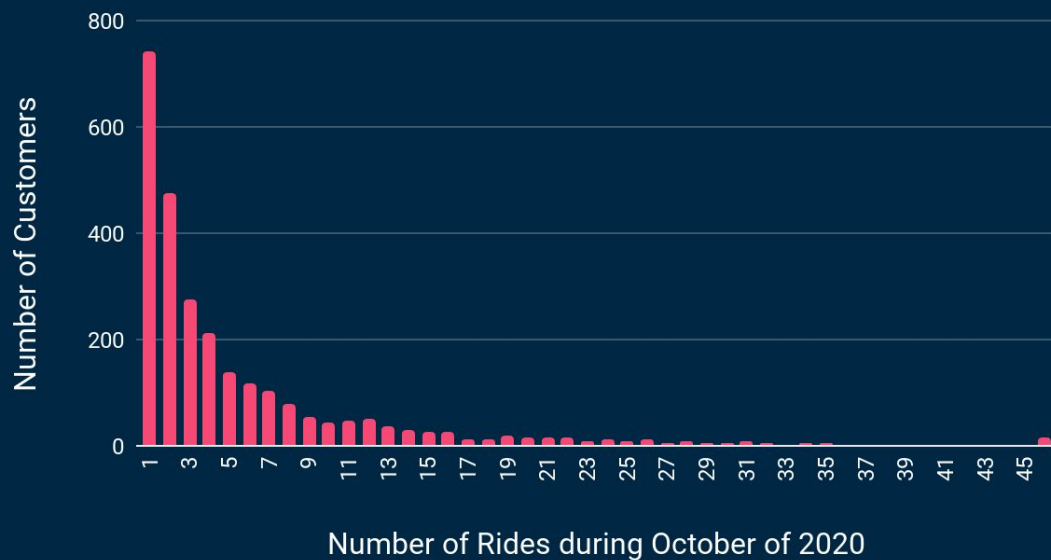
Number of On-Campus Rides by Riders per Month



- Assuming 7 or more rides per month is regular usage
- About 39% are one time users
- About 18% of riders are regulars

# Repeat Riders: 2020

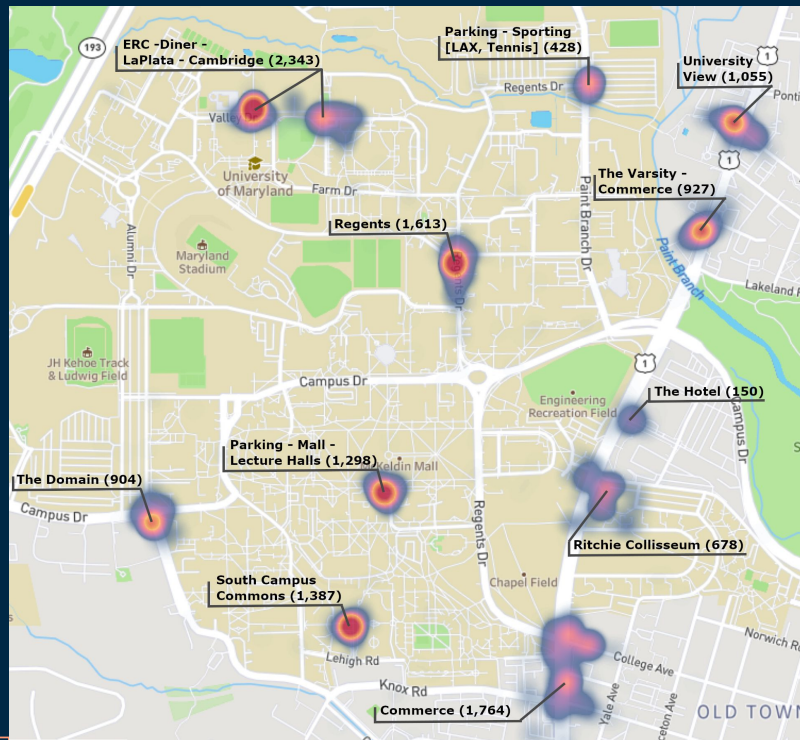
Number of On-Campus Rides by Riders per Month



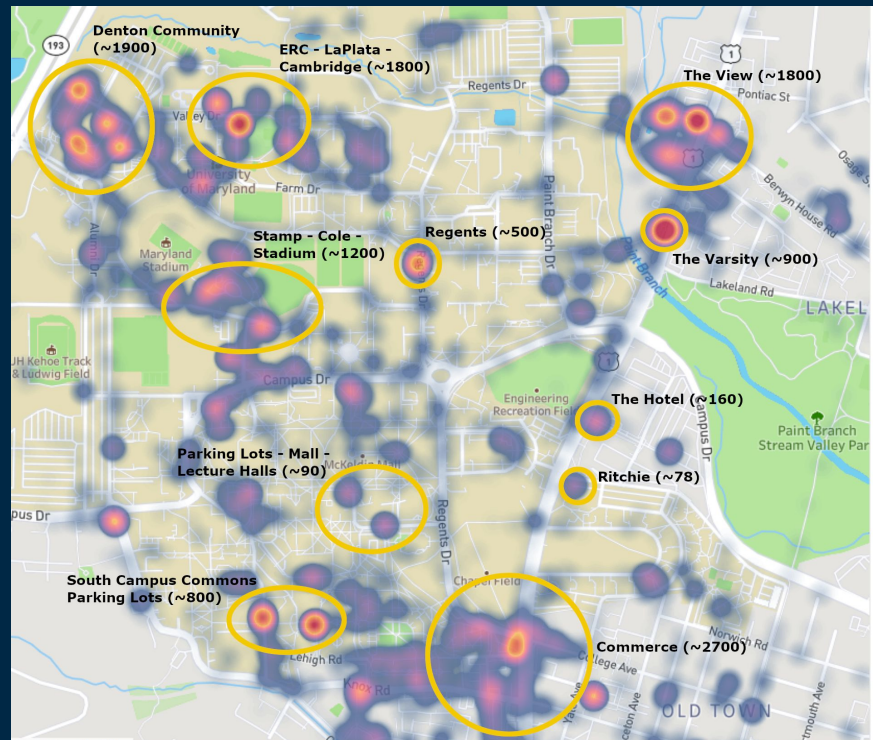
- About **28%** are one time users
- About **27%** of riders are regulars
- About **10% fewer 1 one time riders and 10% more regulars**

# On-Campus Ride Destinations

2019



2020



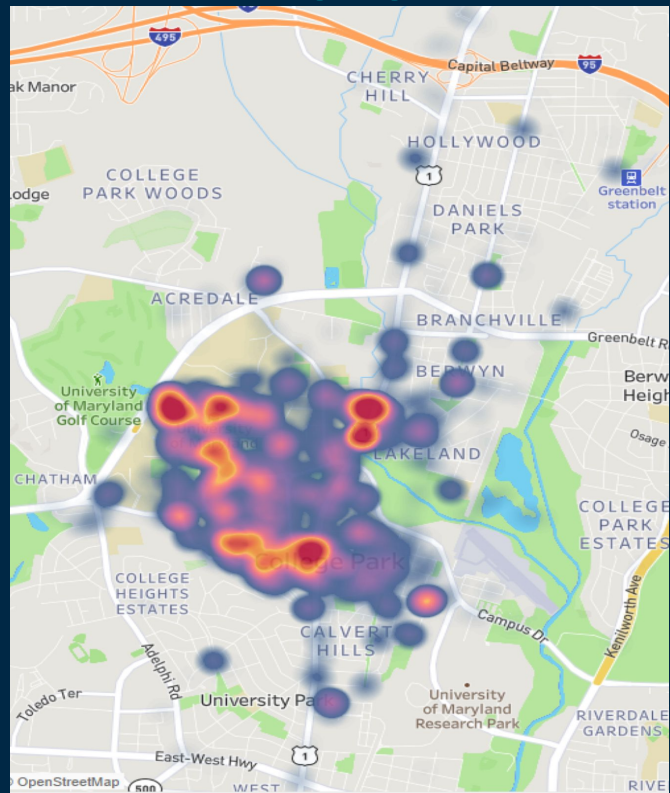
# 2020



**Commercial:**  
171 (10.3%)

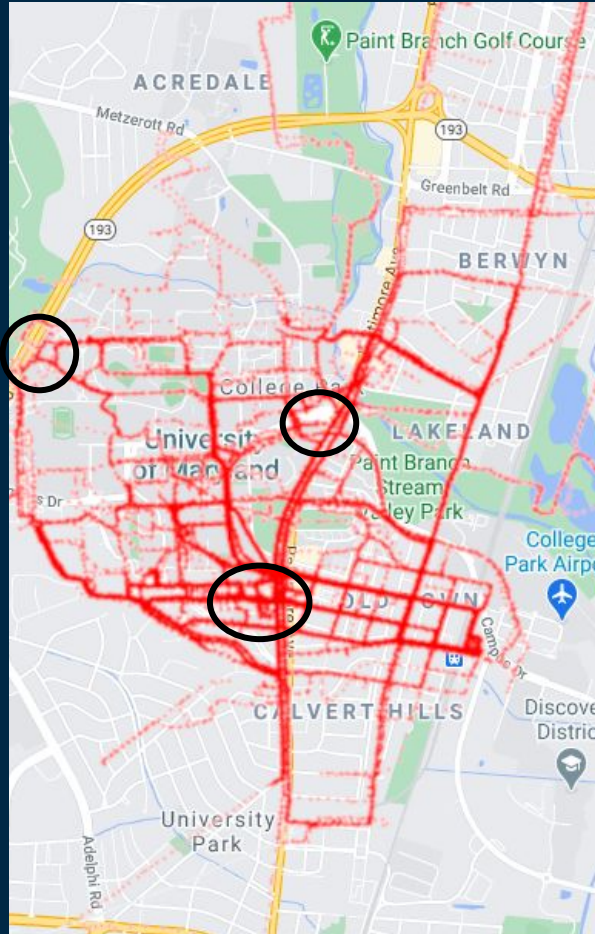
**Transport:**  
676 (40.7%)

**Other:**  
145 (8.7%)

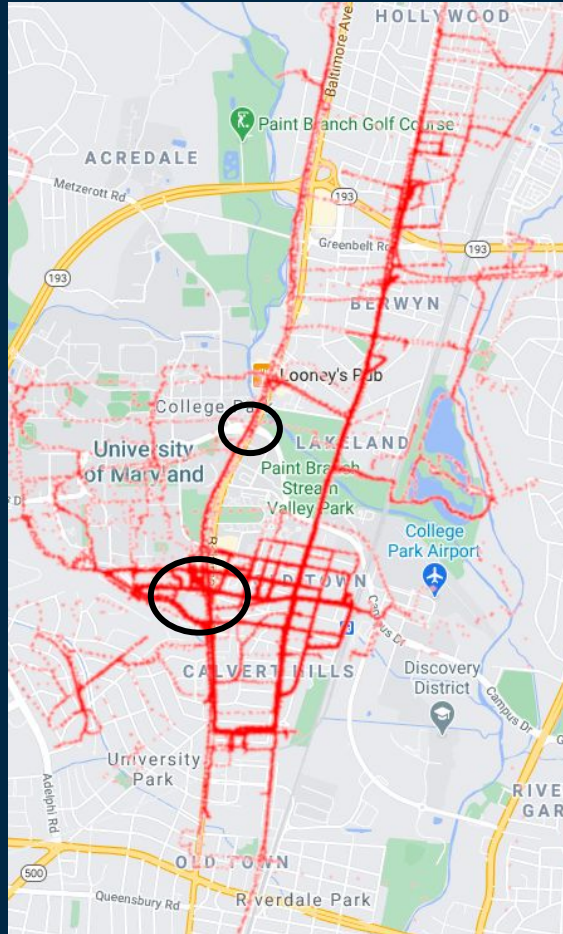




2019



2020



# On and Off Campus

- Most hybrid rides traveled in Oldtown and Calvert Hills areas
- Most used entrances/exits: Knox Rd/College Ave., Campus Dr. East and West (2019)
- 400 rides on each map

# Possible Impacts of the Pandemic

**Maximum number of rides: 334,800 rides per month at max capacity**

- October 2020 only had **20,165** rides (6.0% utilization)
- October 2019 could sustain **156,240** rides per month at max, with **14,373** (9.2% utilization)

The pandemic lowered campus population density to less than half

With half the people and double the scooters, we expect one quarter the utilization in 2020; we get more than half (6.0 vs 9.2)

# Recommendations & Conclusions

- **More research** is needed after the pandemic ends:
  - Find **utilization rate** after pandemic
  - Match **new hotspot** destinations against 2019
- The pandemic has **not had major impacts** on the scooter market
  - If anything, it's likely that scooters are **on the rise** on campus (utilization, repeat riders, etc.)
  - The network helps to fill a **short-distance** and **widely convenient** niche in transportation **on campus**

# CONTRIBUTORS

## Data Analysis Software

- Python
  - Pandas & Geopandas libraries
- Tableau
- Excel

## External Dataset Providers

- Office of Institutional Research, Planning & Assessment (2020)  
[https://irpa.umd.edu/CampusCounts/Enrollments/stuprofile\\_allug.pdf](https://irpa.umd.edu/CampusCounts/Enrollments/stuprofile_allug.pdf)

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