

GIS5577 - FINAL PROJECT

Comparing Bike Share & Motorized Scooter Usage in Minneapolis, MN



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Introduction

What is micromobility?

- “The use of micro-vehicles: vehicles with a mass of no more than 350 kg(771 lbs) and a design speed no higher than 45 km/h (ITF 2020).
- Examples: escooters, bikes



Introduction

Purpose

- Solve the first + last mile problem.
- Increase accessibility to transit stops
- Social, environmental, and economic benefits



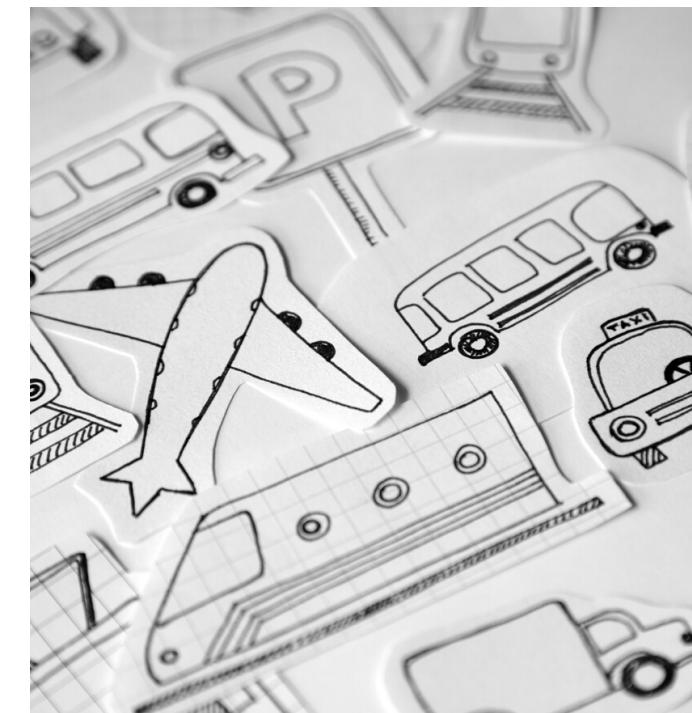
MINNEAPOLIS, MN

E-Scooters + Bike Share

- NiceRide bike share pilot launched in 2010
- Scooter share pilot launched in 2018
- Bike lanes
- Docks + dockless



Questions asked



COMPARE

Are bike share and e-scooter usages complimentary or competing against one another?

EXAMINE

Where are people going? Are their start and end locations near existing transit stops?

PREDICT

Who are using these micro-vehicles? If there are social benefits from micromobility, who is benefiting?

Datasets used

- ESCOOTER TRIPS 2018
- NICERIDE TRIPS 2018
- METRO TRANSIT STOPS
- MN CENSUS TRACTS 2010
- MPLS STREET CENTERLINES
- MPLS CITY BOUNDARY
- ACS 2014-2018 SURVEY

Methods

COMPARE

ARE BIKE SHARE AND E-SCOOTER
USAGES COMPLIMENTARY OR
COMPETING AGAINST ONE ANOTHER?

STATISTICS

Mean duration, mean distance traveled,
total trips

USAGE

Examine total trips for each hour of each
weekday for each micromobility method.

A little code

USAGE PER HOUR PER
WEEKDAY

```
WITH trip_occurrence AS
(
  SELECT tripid,
  tripdistance,
  tripduration,
  to_char(starttime, 'day') AS day_trip,
  EXTRACT (hour from starttime):: text AS hour_trip
  FROM escooter_2018
)

SELECT day_trip,
hour_trip,
COUNT(tripid),
AVG(tripdistance)::INT AS avg_trip_dist_hr,
AVG(tripduration)::INT AS avg_trip_dur_hr
FROM trip_occurrence
GROUP BY (day_trip||' '||hour_trip), day_trip, hour_trip
```

	day_trip text	hour_trip text	count bigint	avg_trip_dist_hr integer	avg_trip_dur_hr integer
1	wednesday	9	47	2442	2642
2	wednesday	8	41	3761	4061

Methods

EXAMINE

WHERE ARE PEOPLE GOING? ARE
THEIR START AND END LOCATIONS
NEAR EXISTING TRANSIT STOPS?

START/END

Observations of starting and ending locations. Where people are going to and from most.

- Road centerlines + coordinates

TRANSIT

Percentage of micromobility trips starting and ending within 1 mile or ~1610 m of an existing transit stop

A little code

```
-- Get escooter trip counts for each start centerline
CREATE VIEW scooter18_starts AS
WITH trip_starts AS
(
  SELECT startcenterlineid, COUNT(startcenterlineid) AS start_trips_counts
  FROM escooter_2018
  GROUP BY startcenterlineid
)
SELECT geom, m.gbsid, t.startcenterlineid, t.start_trips_counts
  FROM mpls_streets m
  INNER JOIN trip_starts t
    ON m.gbsid::text = t.startcenterlineid
  ORDER BY t.start_trips_counts DESC
-- where did most trips start (road centerline)?
-- road segment 19563:2662
```

SCOOTER: START / END

	geom geometry	gbsid integer	startcenterlineid text	start_trips_counts bigint
1	0105000020E61...	19563	19563	2662
2	0105000020E61...	19437	19437	2332
3	0105000020E61...	21808	21808	1979

Methods

PREDICT

WHO ARE USING THESE BIKES? IF
THERE ARE SOCIAL BENEFITS FROM
MICROMOBILITY, WHO IS BENEFITING?

DEMOGRAPHICS

Observation of race and median
household income in block groups where
trips are occurring most.

MAPS - QGIS

- Hotspots for start and end location for each micromobility type
- Calculated demographic with start and end trips
- Transit stops that have the most trips within the walking distance buffer

GRAPH

- Weekday comparison of usage for each hour of the day.

TABLES

- Statistics about the trips

Final Expected Results

PRIMARY KEY

- Trip IDs

DATATYPE FUNCTIONS

- Time data

Challenges