Data I/O 2022

Mobility Pattern Analysis

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Summary

Goals

What we want to achieve?

Original Assumptions

What we think we will find?

Trends

What we found?

Discussion

If given more time what would we have done?

Goals

Generate as many insights as we could from the Data given by using a multitude of grouping and classification techniques

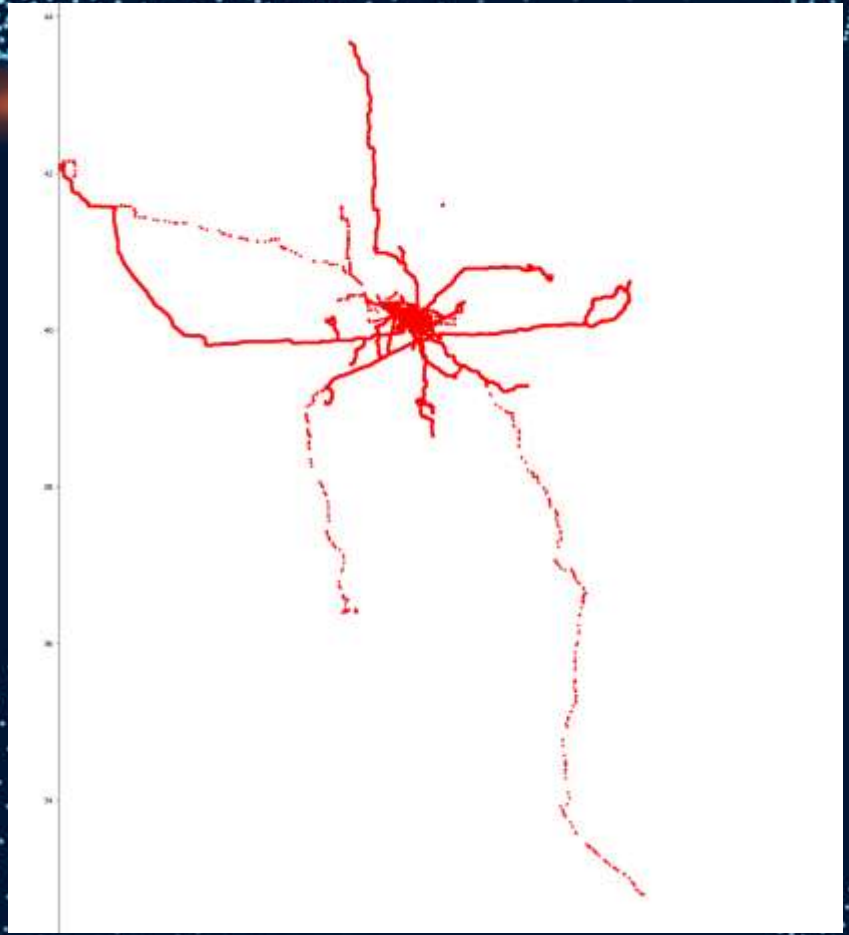
- Trends by Location
- Trends by Time of year (Winter vs. Summer)
- Trends by Time by time of Day (Night and Day)
- Trends by speed and grouping of speed datapoints
- Trends by communication connection quality (Outages, received vs. sent)
- Trends by Altitude
- Trends by Population Density

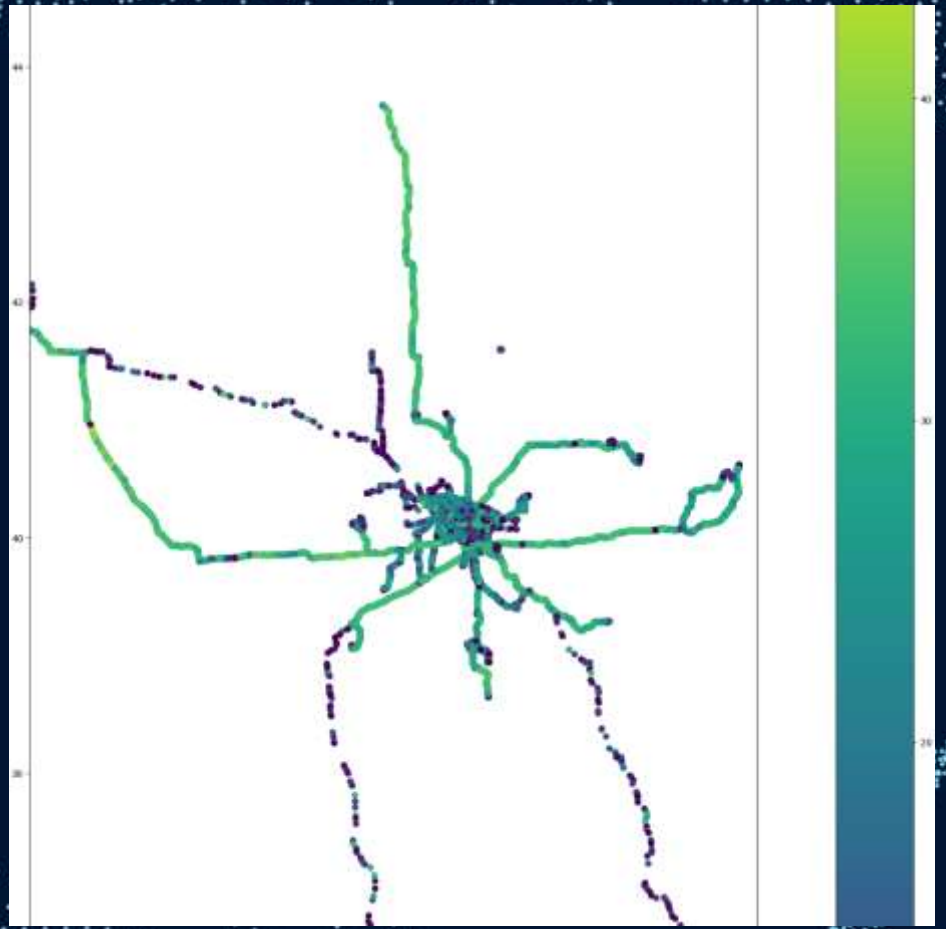
Original Assumptions

- People will be driving slower during the winter months as opposed to warmer months (also night vs. Day)
- The feature Speed would be normally distributed from Start to End
- People would be traveling faster on Highways than local roads
- Sensor outages were a result of bad weather
- Change in altitude would affect the average speed
- There would be changes in distance traveled and average speed compared to week days and weekends
- Traffic or accidents on roadways would lower average speed

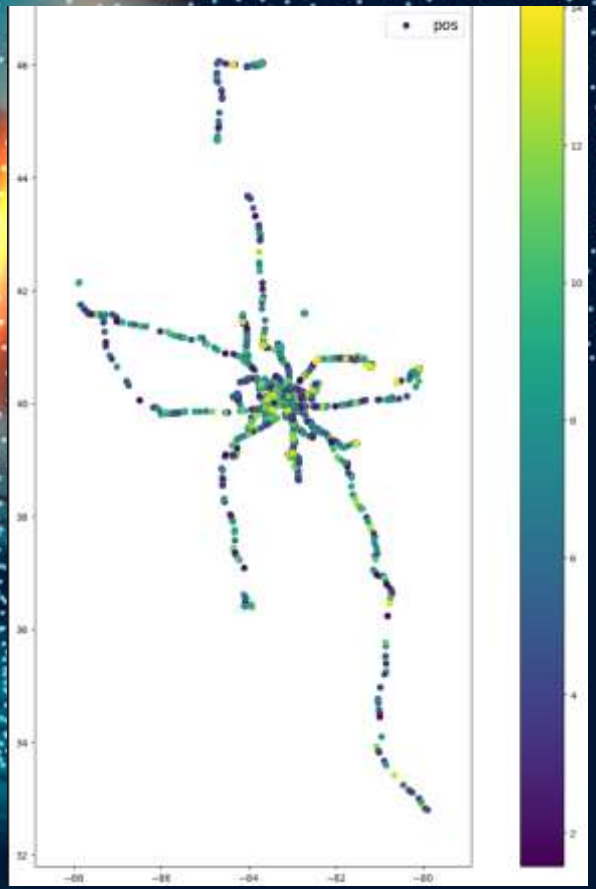
Trends

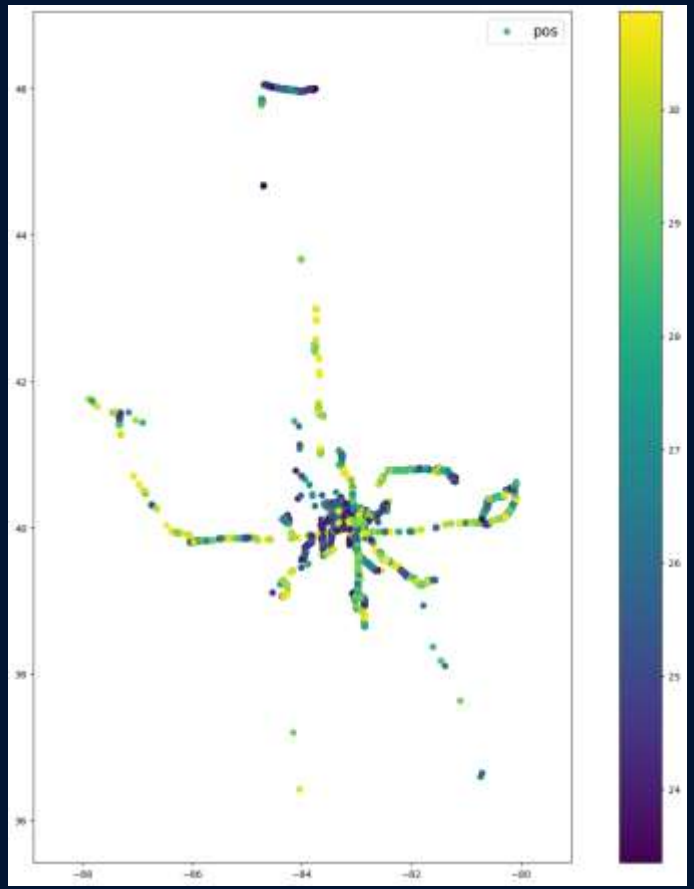
What we discovered?

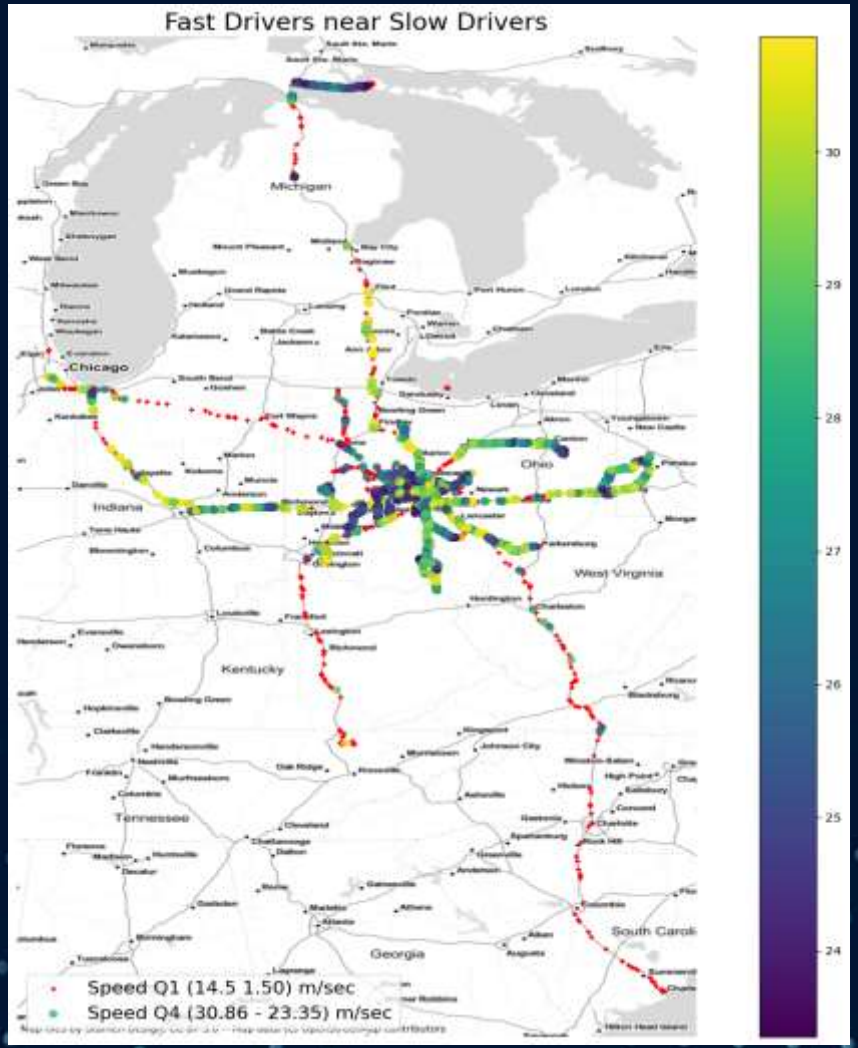


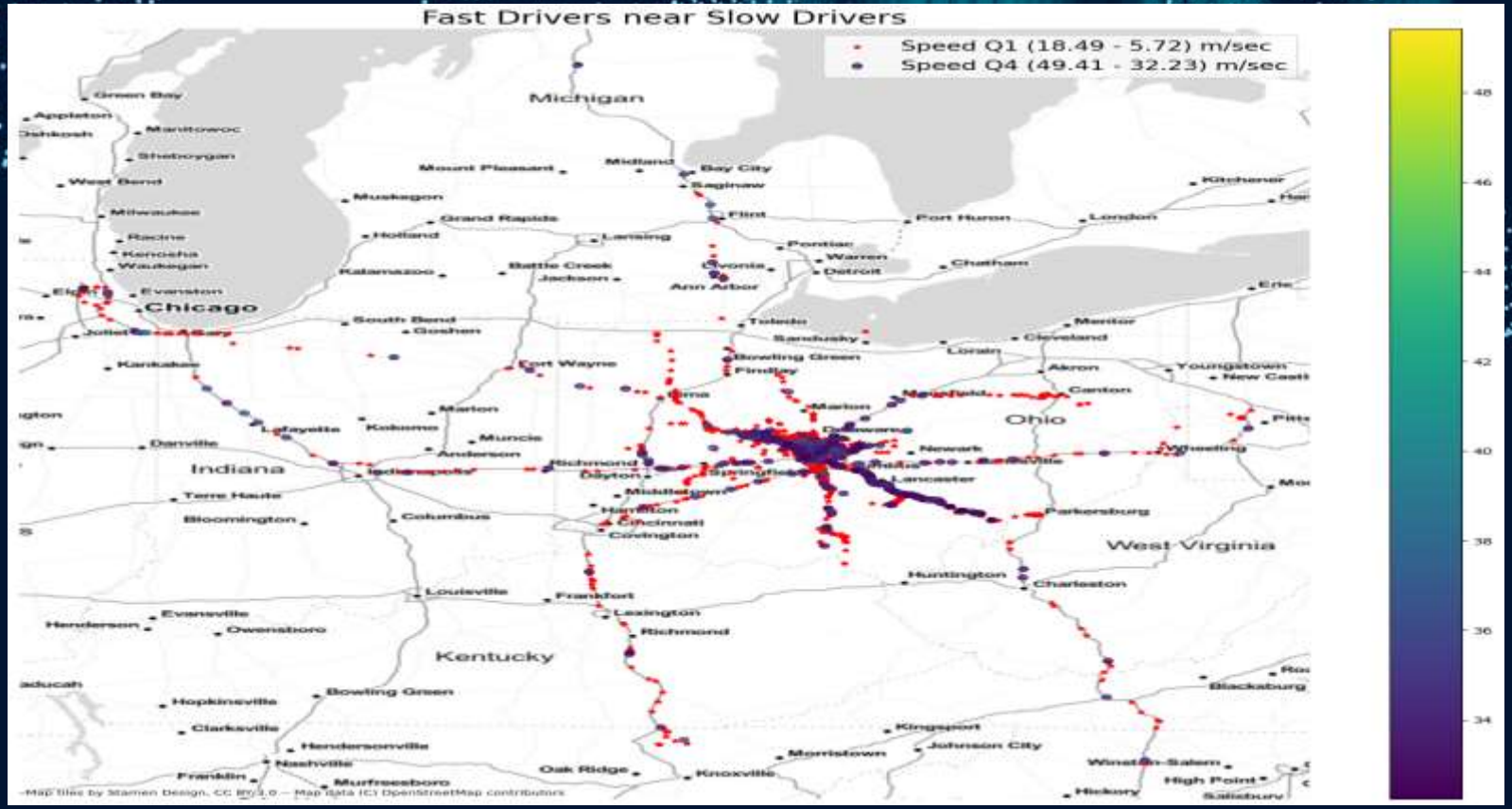


Sunday Q1 and Sunday Q4






Fast Drivers near Slow Drivers
Michigan
Chicago
Indiana
Ohio
West Virginia
Kentucky
Tennessee
Georgia
South Carol
Speed Q1 (14.5 1.50) m/sec
Speed Q4 (30.86 - 23.35) m/sec
30
29
28
27
26
25
24


Fast Drivers near Slow Drivers
Speed Q1 (18.49 - 5.72) m/sec
Speed Q4 (49.41 - 32.23) m/sec
Michigan
Chicago
Indiana
Ohio
Kentucky
West Virginia
Green Bay
Appleton
Oshkosh
Manitowoc
Sheboygan
West Bend
Milwaukee
Racine
Kenosha
Waukegan
Evanston
Joliet
Aurora
Kankakee
Mount Pleasant
Midland
Bay City
Saginaw
Muskegon
Grand Rapids
Holland
Flint
Port Huron
Kitchener
London
Pontiac
Warren
Detroit
Chatham
Lansing
Battle Creek
Jackson
Kalamazoo
Ann Arbor
Toledo
Sandusky
Cleveland
Mentor
Lorain
Akron
Youngstown
New Castle
Canton
Bowling Green
Findlay
South Bend
Goshen
Fort Wayne
Marion
Kokomo
Muncie
Anderson
Lafayette
Danville
Terre Haute
Bloomington
Columbus
Richmond
Dayton
Springfield
Middletown
Hamilton
Cincinnati
Covington
Newark
Zanesville
Wheeling
Lancaster
Parkersburg
Huntington
Charleston
Louisville
Frankfort
Lexington
Richmond
Evansville
Henderson
Owensboro
Hopkinsville
Bowling Green
Clarksville
Hendersonville
Nashville
Franklin
Murfreesboro
Oak Ridge
Knoxville
Morristown
Johnson City
Kingsport
Blacksburg
Winston-Salem
High Point
Hickory
Salisbury
Paducah
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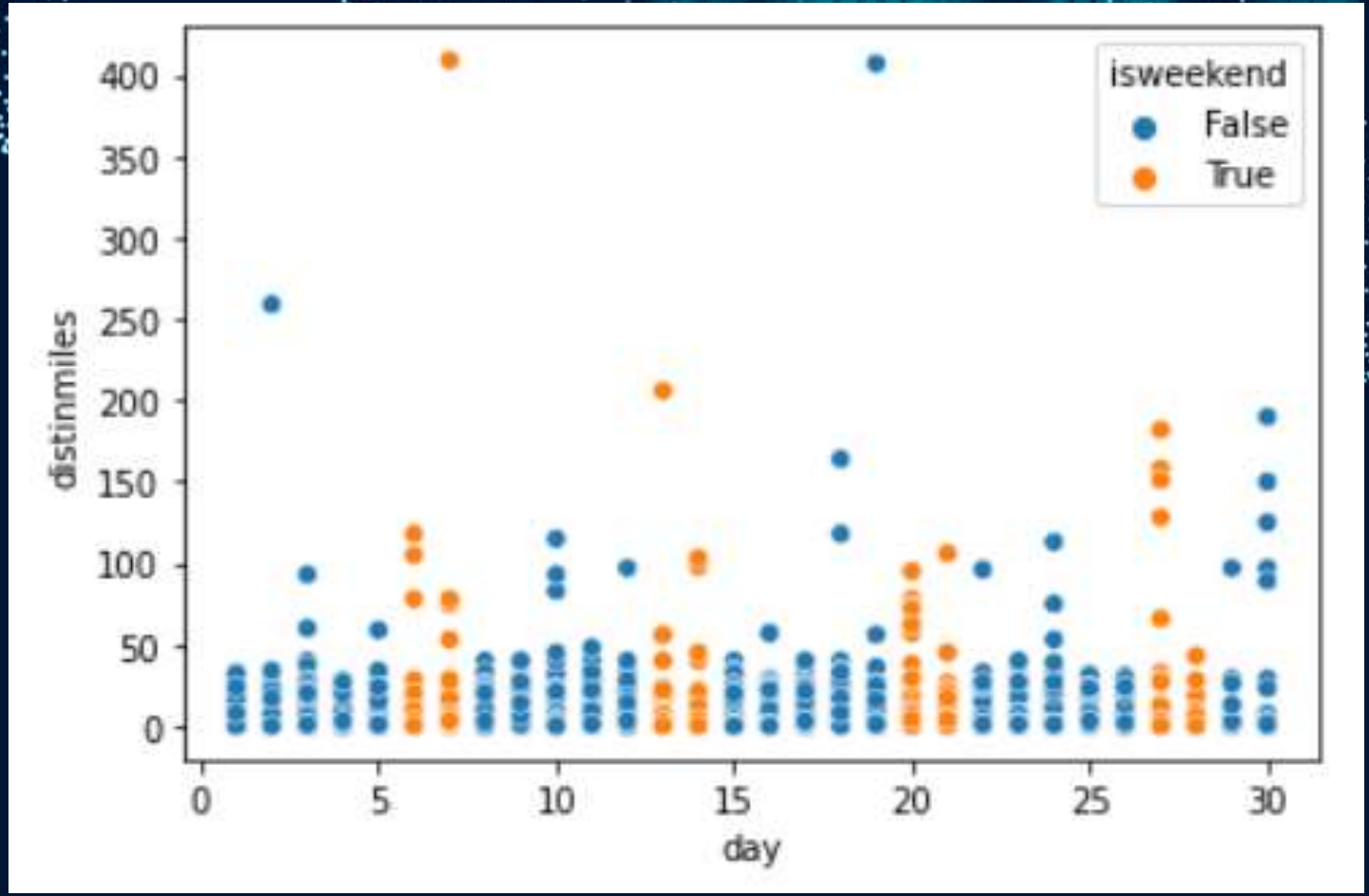
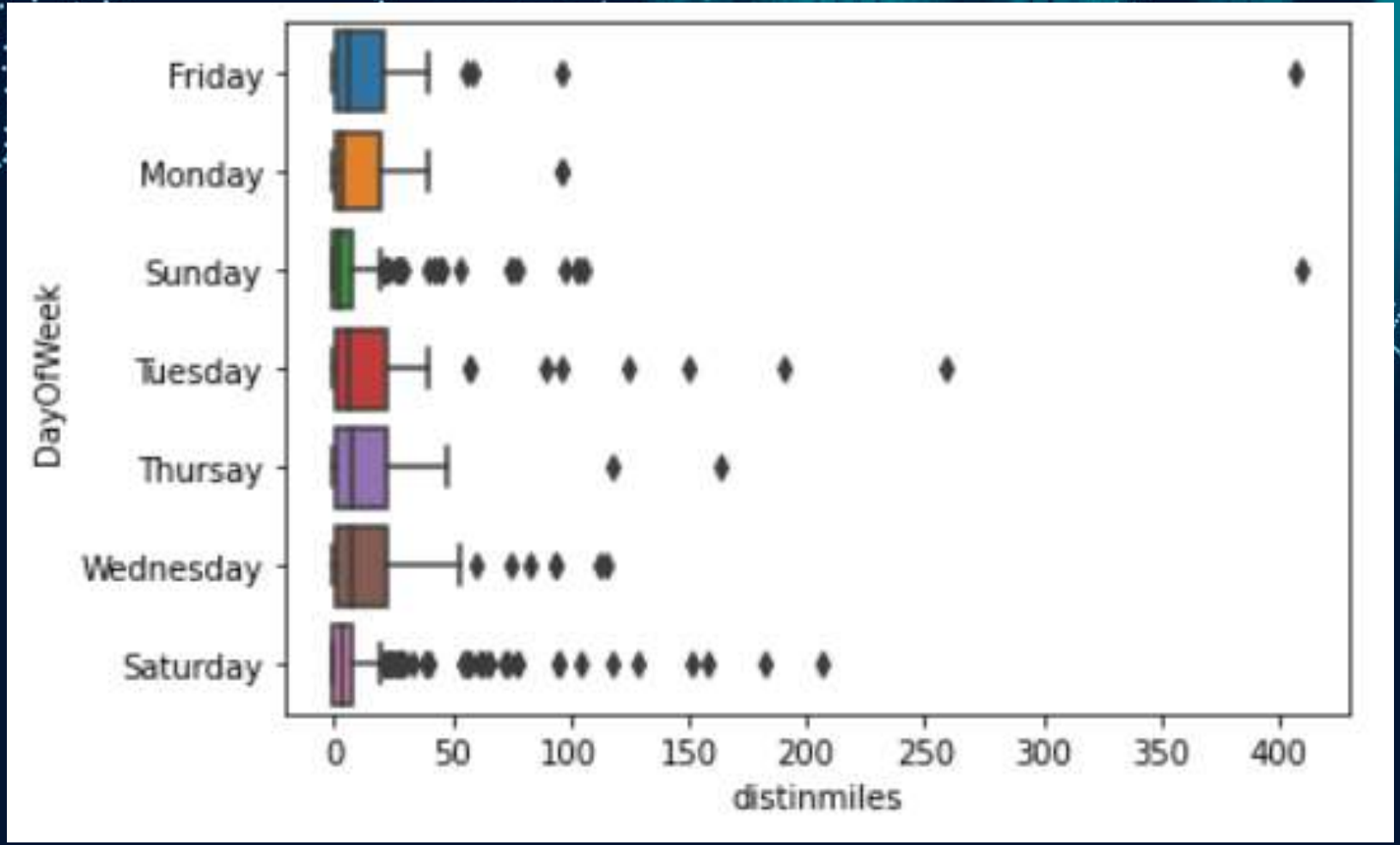
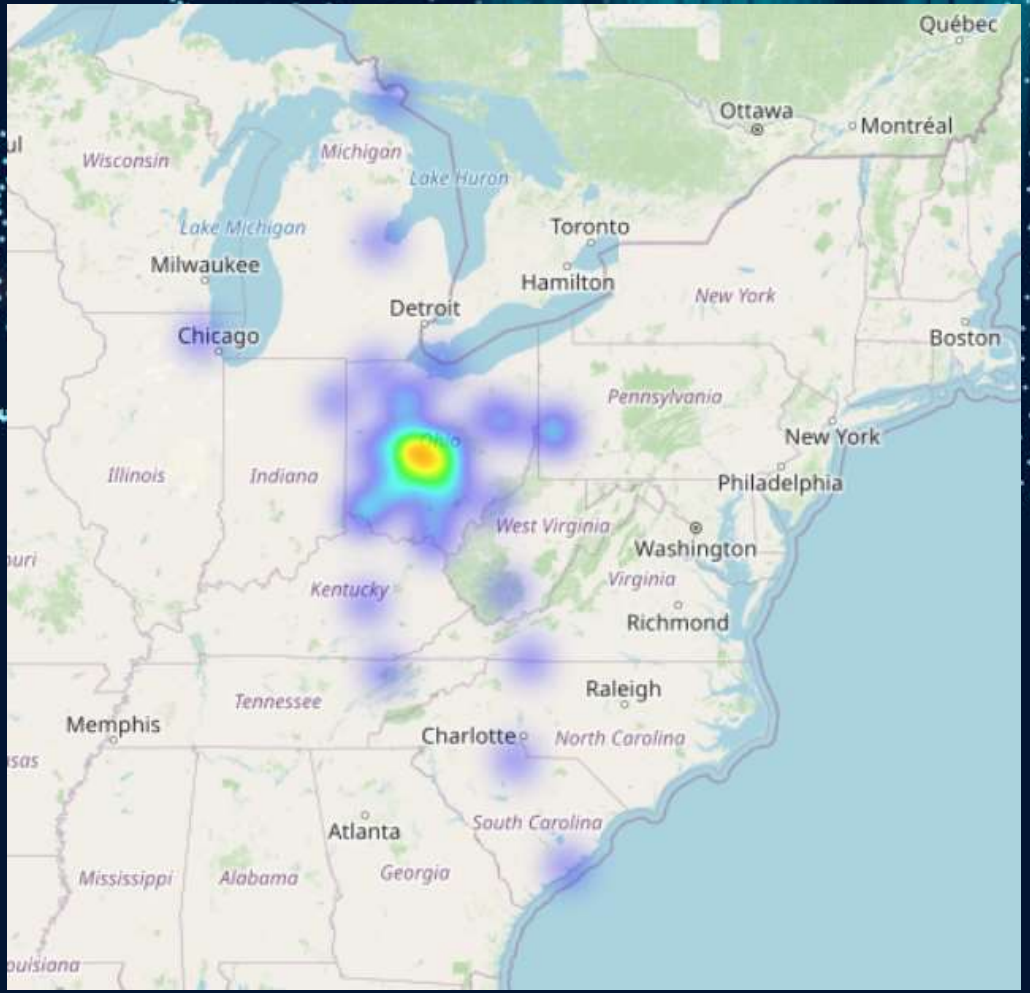
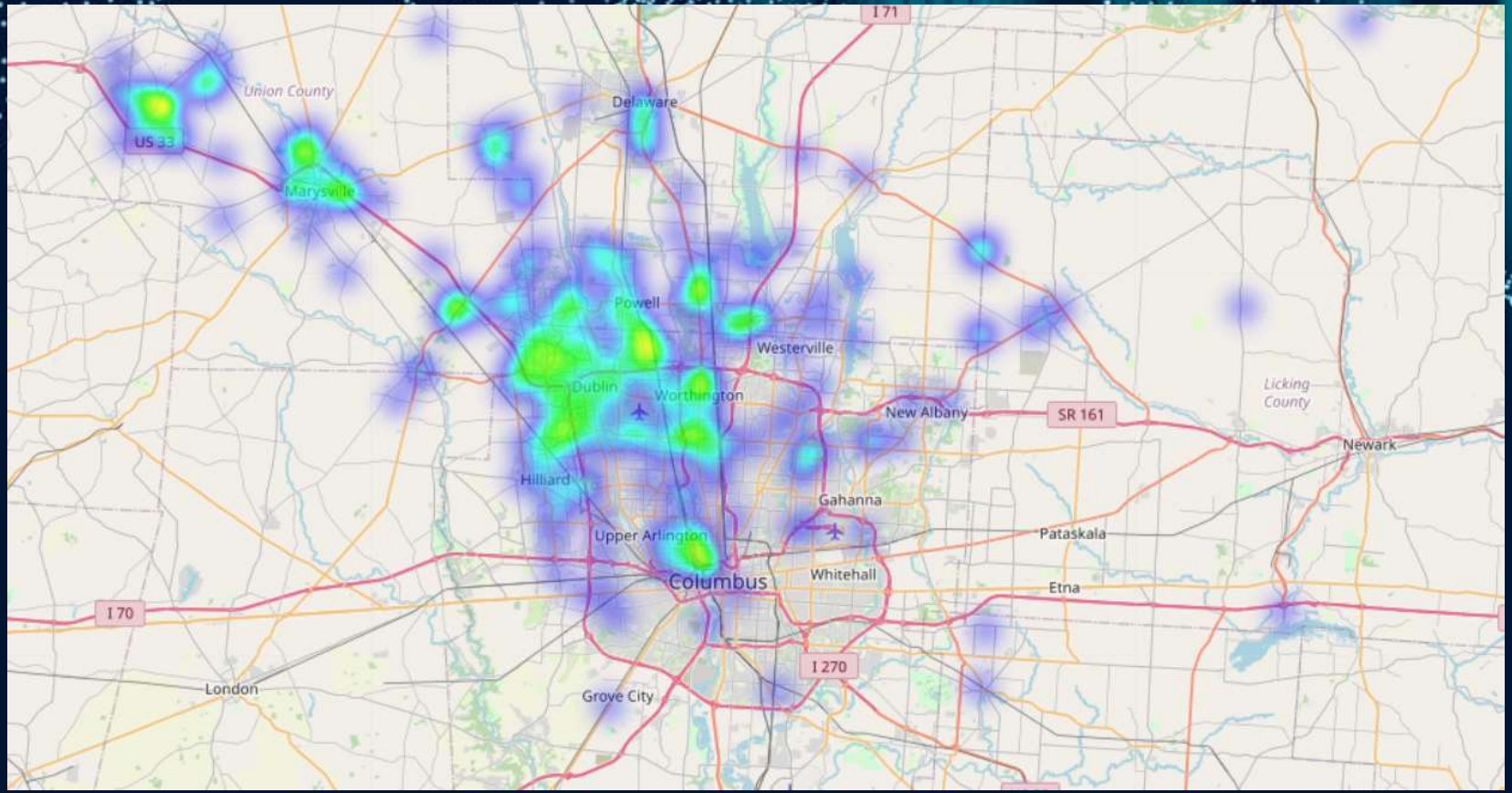
48
46
44
42
40
38
36
34


isweekend
False
True
distinmiles
400
350
300
250
200
150
100
50
0
0
5
10
15
20
25
30
day


Friday
Monday
Sunday
Tuesday
Thursay
Wednesday
Saturday
DayOfWeek
0
50
100
150
200
250
300
350
400
distinmiles


Québec
Ottawa
Montréal
Wisconsin
Michigan
Lake Huron
Lake Michigan
Toronto
Milwaukee
Hamilton
New York
Detroit
Chicago
Boston
Pennsylvania
New York
Illinois
Indiana
Philadelphia
West Virginia
Washington
Kentucky
Virginia
Richmond
Raleigh
Tennessee
Memphis
Charlotte
North Carolina
Atlanta
South Carolina
Mississippi
Alabama
Georgia


I 71
Union County
US 33
Marysville
Delaware
Powell
Westerville
Dublin
Worthington
New Albany
SR 161
Licking County
Newark
Hilliard
Gahanna
Upper Arlington
Pataskala
Columbus
Whitehall
Etna
I 70
I 270
London
Grove City

With more time we would . . .

Only focused on trends by Date due to time constraint.

- Shift our perspective to Location
- Refine our Data Better
- Used Jupyter Notebook Early on
- If speed and time of day are related?
- Divide and Conquer Strategy
- Clean up the rest of our Graphs for weekdays

Thank You!