



Understanding EV Adoption and Charging Infrastructure Accessibility in Florida

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Abstract

- Electric Vehicles (EVs) is becoming an ever-growing industry and leaning towards replacement to the former household gas powered vehicle. With rising fuel prices around the country, consumers are choosing to go green and adopt an environmentally friendly option of purchasing an EV.
- Using multiple outlets of resources, we recorded and analyzed data on the number of registered EVs and number of charging stations located throughout Florida.
- Through our analysis we then searched by county, the number of registered EVs and the number of charging stations. With this data we then begin to understand the disparity between charging station numbers in comparison to registered EVs.
- The data can help set the structure for creating a plan of introduction to either EVs or charging stations that consumers, businesses, and local governments can all use.

Introduction

- The study begins with doing extensive research on EV population, at first the study was a survey of the United States EV registration statistics. Eventually narrowing down to our home state of Florida.
- Florida as our primary focus led us into now specializing the search by looking for not only EV registration, but as well as public and private charging stations.
- Through this research we plan to find counties with specific disparities and formulate a targeted plan to introduce EVs or charging stations to said county.
- Understanding these numbers help predict the supply and demand for both EVs' and charging stations dependent on the county and further to the region.
- Through the data we can then advance this initial plan to other areas of Florida keeping the same principle.

Methods

- Through the course of this study, we used multiple data sets from ranging from public record on the Department of Transportation to private articles about the changes of introduction of EVs in Florida and their impacts on the economy.
- Using these data sets, we organized specific data about charging station availability and EV registration presence.
- Using Python and associated libraries we would append and combine excel files to a dictionary that can then be appended into a Geojson file.
- This Geojson file would contain matches of either registered EV's or charging stations and how many are located in a set county, the file also included the geometric properties needed for Mapbox to distribute it.
- We would then upload this file to Mapbox, a mapping software, using the number of charging stations for a specific county, and the number of registered EV's for that county, creating choropleth maps that help visualize the density of each category.
- Color hue density would then be categorized by average density for either category, in the case for charging stations, we incremented it by tens based on the color hue, while registered EV's were incremented by thousands.
- We use heatmaps to illustrate the density of each county and those counties with lighter colors of one category and darker of another can help show which are more accessible to either EV or charging station introduction.

Results

- The choropleth maps follow a density guideline of color hues, red on the top displaying the density of charging stations while purple on the bottom displaying EV registration.
- A multitude of inferences can be drawn from each of choropleth maps created. Beginning with, a noticeable difference in the color hue intensity in the southern region of Florida.
- The county most notable for comparison, with the second highest number of registered EVs and the highest amount of charging station per square mile is Broward County.
- Palm Beach County directly above Broward County, shows the third largest number of EV registrations and yet doesn't account for nearly the same number of charging stations as Broward County.
- The importance of this examples highlights the value of understanding EV accessibility. EV accessibility in this standard can be noted as the number of registered EVs per given county divided by the number of charging stations per given county.
- The comparison between counties becomes important to note as this how we can group multiple counties that EVs can be introduced to or charging stations and create a plan to target certain areas of Florida.
- In the northern region of Florida, containing more rural counties, there is still a significant number of registered vehicles in the thousands, but a low number of charging stations ranging from one to ten.
- This data can become instrumental in identifying areas and specifically counties that can be marked as having high accessibility.

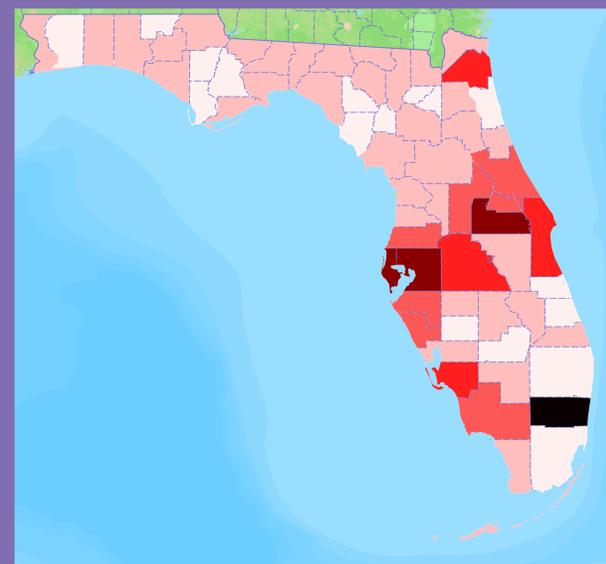


Figure 1
Density of Charging Stations in Florida

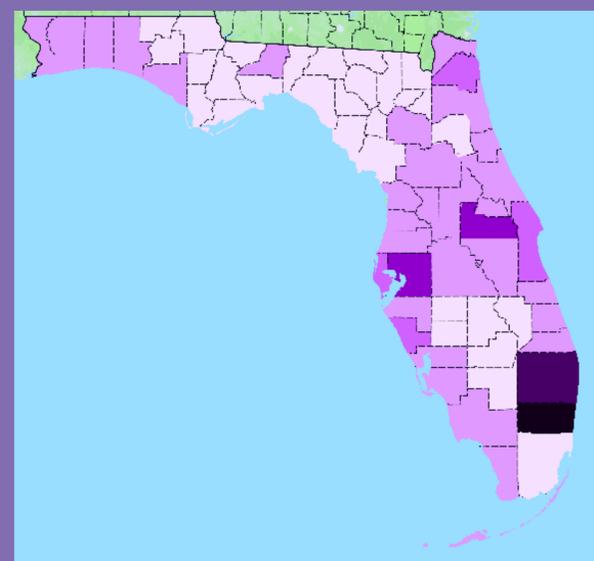


Figure 2
Density of EV Registration in Florida

Conclusions

- Initial conclusions proved that there are many areas in Florida with a high demand for charging stations or EVs, especially in more developed and populated counties, mainly near big cities.
- The data collected and organized to create the maps is vital to create a plan to introduce EVs to an area. Understanding where the concentration of either EV's or charging stations are in each area is an important factor to knowing which areas to target and have a high level of EV accessibility.
- Based on our findings it would seem reasonable to first target areas in the southern region of Florida, such as Palm Beach County with a high level of EV accessibility and larger populations.
- Income can also be a factor in EV and charging station accessibility levels, as income plays a role in consumer purchasing power.
- The push towards household usage of EV's begins with data collection. Consumers, businesses, and local governments can all use this data to better understand areas that can be targeted for EV introduction.

References

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