Electric Cars

STAT184 FINAL PROJECT

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OUR FINAL PROJECT

Our group wanted to examine Electric Vehicles (EV's). We found datasets concerning car brands as well as charging stations.

- We came up with three data analysis questions, and also found an interesting outlier vehicle to compare and contrast with

DATA ANALYSIS QUESTIONS

- Question 1: How common are charging stations? We will create a Leaflet map to find the charging stations in Pennsylvania.

- Question 2: What vehicle has the longest excursion time/length on a full-charge? We will create a scatter plot to examine this relationship.

- Question 3: What is the most cost-efficient car? What would you buy if you had just graduated?

CHARGING STATIONS IN PENNSYLVANIA

How many charging stations are in PA? Where are they located?

Alternative Fuel Stations 2021.csv

Download

More Details

URL: https://data.openei.org/files/106/alt_fuel_stations%20%28Jul%2029%202021%29.csv

A "snapshot" of the alternative fueling station information for compressed natural gas (CNG), E85 (85% ethanol, 15% gasoline), propane/liquefied petroleum gas (LPG), biodiesel, electricity, hydrogen, and liquefied natural gas (LNG), as of July 29, 2021.

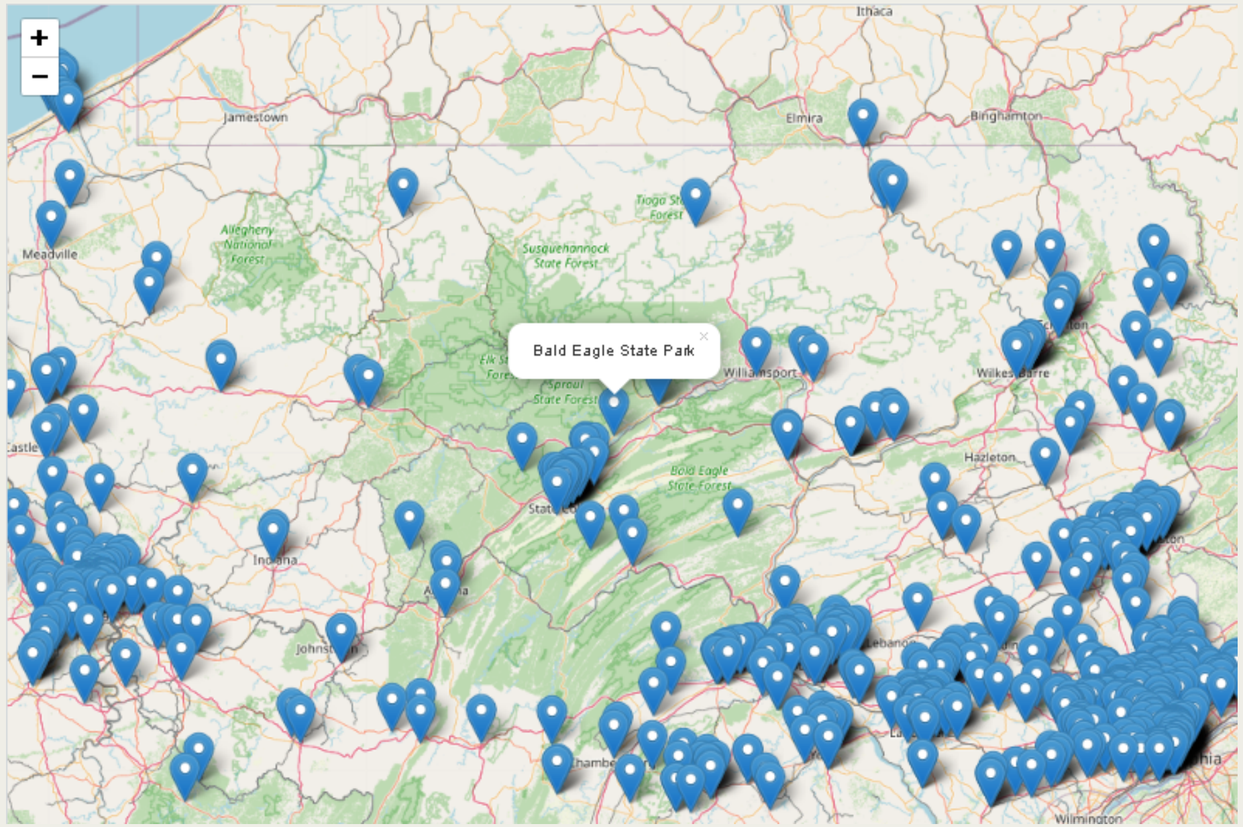
Source: Alternative Fueling Station Locations

Fuel Type Code	Station Name	Street Address	Intersection Direc	City	State	ZIP
CNG	Spire - Montgom	2951 Chestnut St		Montgomery	AL	36107
CNG	PS Energy - Atla	340 Whitehall St	From I-7585 N, e	Atlanta	GA	30303
CNG	Metropolitan Atla	2424 Piedmont Rd NE		Atlanta	GA	30324
CNG	United Parcel Se	270 Marvin Miller Dr		Atlanta	GA	30336
CNG	Clean Energy - T	7721A Washingt	I-10, Washington	Houston	TX	77007
CNG	Arkansas Oklaho	2100 S Waldron Rd		Fort Smith	AR	72903
CNG	Clean Energy - L	1000 Cottage St	From Route 1, ta	East Boston	MA	2128

1	Fuel Type Code	Station Name	City	State	Groups With Access Code	Latitude	Longitude
161	ELEC	LADWP - Truesdale Center	Sun Valley	CA	Private	34.24831915	-118.3879714
162	ELEC	LADWP - West LA District Office	Los Angeles	CA	Private	34.052542	-118.448504
163	ELEC	Southern California Edison - Rosemead Office B	Rosemead	CA	TEMPORARILY UNAVAILAB	34.050745	-118.081014
164	ELEC	Los Angeles Convention Center	Los Angeles	CA	Public	34.040539	-118.271387
165	ELEC	LADWP - John Ferraro Building	Los Angeles	CA	Private	34.059133	-118.248589
166	ELEC	LADWP - Haynes Power Plant	Long Beach	CA	Private	33.759802	-118.096665
167	ELEC	State Capitol Parking Garage	Sacramento	CA	Private - Government only	38.576769	-121.495022
168	ELEC	LADWP - Harbor Generating Station	Wilmington	CA	Private	33.770508	-118.265628

CHARGING STATIONS IN PENNSYLVANIA

```r
#----------------------
#-Data Visualizations-
#----------------------
##1. How common are charging stations?
#

## Use groundhog to make sure the code runs mostly everywhere
library(groundhog)
groundhog.day="2023-11-20"

## 'here' for using a relative filepath
## 'leaflet' will display the map of charging stations
## 'dplyr' is brought in for tidying data
pkgs=c('here', 'leaflet', 'dplyr')
groundhog.library(pkgs, groundhog.day)

## Using 'here' for a relative filepath
csv_path <- here("EVfuelstations.csv")
EVfuelstations <- read.csv(csv_path)

## This dataset includes a column called "Fuel Type Code" that can stand for electric, CNG, etc
## We want to only consider the fuel stations that are ELEC, in Pennsylvania, and for public use
filtered_stations <- EVfuelstations %>% filter(Fuel.Type.Code == "ELEC") %>%
  filter(State == "PA") %>% filter(Groups.With.Access.Code == 'Public')

num_stations = nrow(filtered_stations)

print("Number of Public EV Charging Stations in PA:")
print(num_stations)

## The station names and coordinates are easily selected
stationNames <- filtered_stations$Station.Name
latitude <- filtered_stations$Latitude
longitude <- filtered_stations$Longitude

## Create a custom data frame with station coordinates and names
## Leaflet is sensitive to large datasets
station_data <- data.frame(
  Name = stationNames,
  Latitude = latitude,
  Longitude = longitude
)

# Create the leaflet map
EVchargemap <- leaflet(station_data) %>%
  setView(lng = -77.8124, lat = 40.86833, zoom = 6) %>%  # Center the map around State College, PA
  addTiles() %>%  # Add map tiles as the base layer
  addMarkers(lat = ~Latitude, lng = ~Longitude, popup = ~Name)

# Display the map
EVchargemap
```



Answer: There are 931 charging stations available for public use in PA. Generally, if we travel along the US Interstate System, we can reliably recharge an EV.

EXCURSION TIMES AND OTHER FACTS

PICKING AN ENTRY-LEVEL ELECTRIC VEHICLE

AN INTERESTING OUTLIER

What would be a “supercar” to compare with usual EV’s like the Chevrolet Bolt and Hyundai Ioniq? The Mercedes-Benz Avatar

- Total engine power of **350** kW from four separate and individually-controlled motors
- All-wheel drive, with spherical wheels, capable of “Crab” movement. Uses a steering “pad” instead of a standard steering wheel
- Uses a new organic battery free of rare earth minerals, and is recyclable. Battery capacity is **110** kWh and charges quickly (15 minutes)
- Integrated solar panel system and technology to reduce energy consumption
- Interior design consists of Mercedes-Benz’s most cutting edge technology, including 360-Degree Vision