Electric Vehicle Data Analysis Project

Project Overview

In this project, you will analyze a dataset related to electric vehicles (EVs). The dataset contains various features such as electric range, energy consumption, price, and other relevant attributes. Your goal is to conduct a thorough analysis to uncover meaningful insights, tell a compelling story, conduct hypothesis testing and provide actionable recommendations based on the data.

Dataset: FEV-data-Excel.xlsx

Dataset Overview

Car full name: The full name or designation of the vehicle, often combining make, model, and variant.

Make: The brand or manufacturer of the car.

Model: The specific model or version of the car.

Minimal price (gross) [PLN]: The minimum retail price of the car, in Polish złoty (PLN).

Engine power [KM]: The car's engine power, measured in horsepower (KM in Polish).

Maximum torque [Nm]: The peak torque the engine can produce, measured in Newton-meters (Nm).

Type of brakes: The braking system used, such as disc or drum brakes.

Drive type: The drivetrain configuration, like FWD (front-wheel drive), RWD (rear-wheel drive), or AWD (all-wheel drive).

Battery capacity [kWh]: Total energy capacity of the car's battery, measured in kilowatt-hours (kWh).

Range (WLTP) [km]: Estimated driving range on a full charge under WLTP standards, in kilometers.

Wheelbase [cm]: The distance between the front and rear axles, in centimeters.

Length [cm]: The overall length of the car, in centimeters.

Width [cm]: The car's width, in centimeters.

Height [cm]: The car's height, in centimeters.

Minimal empty weight [kg]: The car's minimum weight when empty, measured in kilograms.

Permissible gross weight [kg]: Maximum legally allowed weight, including passengers and cargo, in kilograms.

Maximum load capacity [kg]: The maximum weight the car can carry, in kilograms.

Number of seats: The number of passenger seats in the car.

Number of doors: The number of doors on the car.

Tire size [in]: The tire size, measured in inches.

Maximum speed [kph]: The top speed of the car, in kilometers per hour.

Boot capacity (VDA) [l]: Trunk or cargo space capacity, measured in liters according to VDA standards.

Acceleration 0-100 kph [s]: Time taken to accelerate from 0 to 100 kilometers per hour, in seconds.

Maximum DC charging power [kW]: The highest charging power supported when using a DC fast charger, in kilowatts (kW).

Mean - Energy consumption [kWh/100 km]: Average energy consumption per 100 kilometers, in kilowatt-hours (kWh).

Instructions

- Use Python and libraries such as Pandas, NumPy, SciPy, Matplotlib, and any other tools you find necessary.
- Focus on clear, structured code and explanations to guide readers through your thought process.
- Every task requires both a coding solution and a written analysis section explaining your findings.
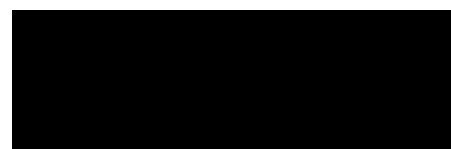
Task 1: A customer has a budget of 350,000 PLN and wants an EV with a minimum range of 400 km.
a) Your task is to filter out EVs that meet these criteria.(2 Marks)
b) Group them by the manufacturer (Make).(6 marks)
c) Calculate the average battery capacity for each manufacturer. (8 Marks)

Task 2: You suspect some EVs have unusually high or low energy consumption. Find the outliers in the mean - Energy consumption [kWh/100 km] column.(16 Marks)

Task 3: Your manager wants to know if there's a strong relationship between battery capacity and range.
a) Create a suitable plot to visualize.(8 Marks)
b) Highlight any insights.(8 Marks)

Task 4: Build an EV recommendation class. The class should allow users to input their budget, desired range, and battery capacity. The class should then return the top three EVs matching their criteria. (8+8 Marks)

Task 5: Inferential Statistics – Hypothesis Testing: Test whether there is a significant difference in the average **Engine power [KM]** of vehicles manufactured by two leading manufacturers i.e. **Tesla** and **Audi**. What insights can you draw from the test results? Recommendations and Conclusion: Provide actionable insights based on your analysis. (Conduct a two sample t-test using **ttest_ind** from **scipy.stats** module) (16 Marks)

Task 6: Project Video Explanation (20 Marks)

Record a brief video explaining your project, covering its objectives, methods, and outcomes. The evaluation will focus on clarity of explanation, communication skills, and demonstration of problem understanding.

Submit Guidelines
  ● Execute the project in a jupyter notebook file and download it as pdf. Once download zip the folder.
  ● Create a video of maximum of 5 mins explaining the analysis and share the drivelink in the ipynb file by creating a markdown and pasting the link of the video there.

How to ZIP a folder:

● Put all files you want to compress into a new folder.
● Right click on that folder.
● Select the "Compress to ZIP file" option and then click "Compressed (Zipped) folder."
● A new .ZIP file will be created that contains your document(s). Upload this folder.
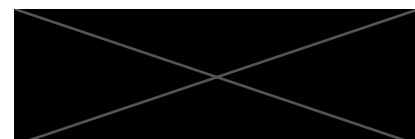
Note:

● Plagiarism will result in a penalty, including possible project disqualification.

● The project will be evaluated based on the quality of analysis, depth of insights, and feasibility of recommendations.

● Remember to keep the video length less than 5 minutes with your face clearly visible.