# Report: Data Analysis With Python

## Introduction

This report presents a comprehensive analysis of a dataset containing information about vehicles. The analysis aims to explore, clean, and derive insights from the data, utilizing various data manipulation and visualization techniques.

## Data Exploration

The analysis begins with the exploration of the dataset, which includes importing necessary libraries and inspecting the data's structure.

### Exploring a DataFrame

- Loaded the dataset using Pandas.

- Displayed the first 10 rows of the dataset.

- Checked the columns and their data types.

- Checked for missing values and dropped rows/columns with a significant number of missing values.

- Explored the distribution of missing values and handled them appropriately.

- Removed relevant columns.

## Outlier Detection and Handling

- Detected outliers using boxplots and the interquartile range (IQR) method.

- Addressed outliers in the 'year,' 'lat,' 'long,' 'price,' and 'odometer' columns.

## Data Validation and Cleaning

- Checked for duplicated values and removed them.

- Validated and converted data types of columns.

- Handled zero values in the 'price' column by replacing them with NaN.

## Data Analysis

### Price Analysis

- Calculated the average price of vehicles.

- Explored how prices vary across regions, manufacturers, and years.

- Analyzed the relationship between price and fuel type, transmission type, and title status.

### Vehicle Characteristics

- Identified the most common vehicle manufacturers and models.

- Explored the distribution of vehicles over the years.

- Examined the prevalence of different fuel types, title statuses, and transmission types.

### Odometer Analysis

- Calculated the average and median odometer readings.

- Explored differences in odometer readings across manufacturers, models, and years.

### Geographic Insights

- Analyzed the distribution of vehicle listings by region.

- Explored average prices and odometer readings by region.

- Visualized the distribution of vehicle listings by latitude and longitude.

### Image Presence and Price

- Analyzed the correlation between the presence of images in listings and vehicle prices.

## Conclusion

This data analysis provides valuable insights into the characteristics and pricing of vehicles. The findings can be used to inform decision-making processes related to buying and selling vehicles. The cleaning and validation steps ensure the reliability of the analysis, and the visualizations aid in the interpretation of trends and patterns in the data.