10. Comprehensive Car Dataset Analysis

October 18, 2024

1 Importing Libraries

[1]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

2 Importing Data

[3]:
```
df = pd.read_csv("D:\\Practice CSV\\Car Sales\\Car_sales.csv")

df.head()
```

[3]:

	Manufacturer	Model	Sales_in_thousands	__year_resale_value	Vehicle_type	Price_in_thousands	Engine_size	Horsepower	Wheelbase	Width	Length	Curb_weight	Fuel_capacity	Fuel_efficiency	Latest_Launch	Power_perf_factor
0	Acura	Integra	16.919	16.360	Passenger	21.50	1.8	140.0	101.2	67.3	172.4	2.639	13.2	28.0	2/2/2012	58.280150
1	Acura	TL	39.384	19.875	Passenger	28.40	3.2	225.0	108.1	70.3	192.9	3.517	17.2	25.0	6/3/2011	91.370778
2	Acura	CL	14.114	18.225	Passenger	NaN	3.2	225.0	106.9	70.6	192.0	3.470	17.2	26.0	1/4/2012	
3	Acura	RL	8.588	29.725	Passenger	42.00	3.5	210.0	114.6	71.4	196.6	3.850	18.0	22.0	3/10/2011	
4	Audi	A4	20.397	22.255	Passenger	23.99	1.8	150.0	102.6	68.2	178.0	2.998	16.4	27.0	10/8/2011	

```
2                NaN
3          91.389779
4          62.777639
```

3 Missing Data Handling

[4]:
```
# Checking for missing values
df.isnull().sum()
```

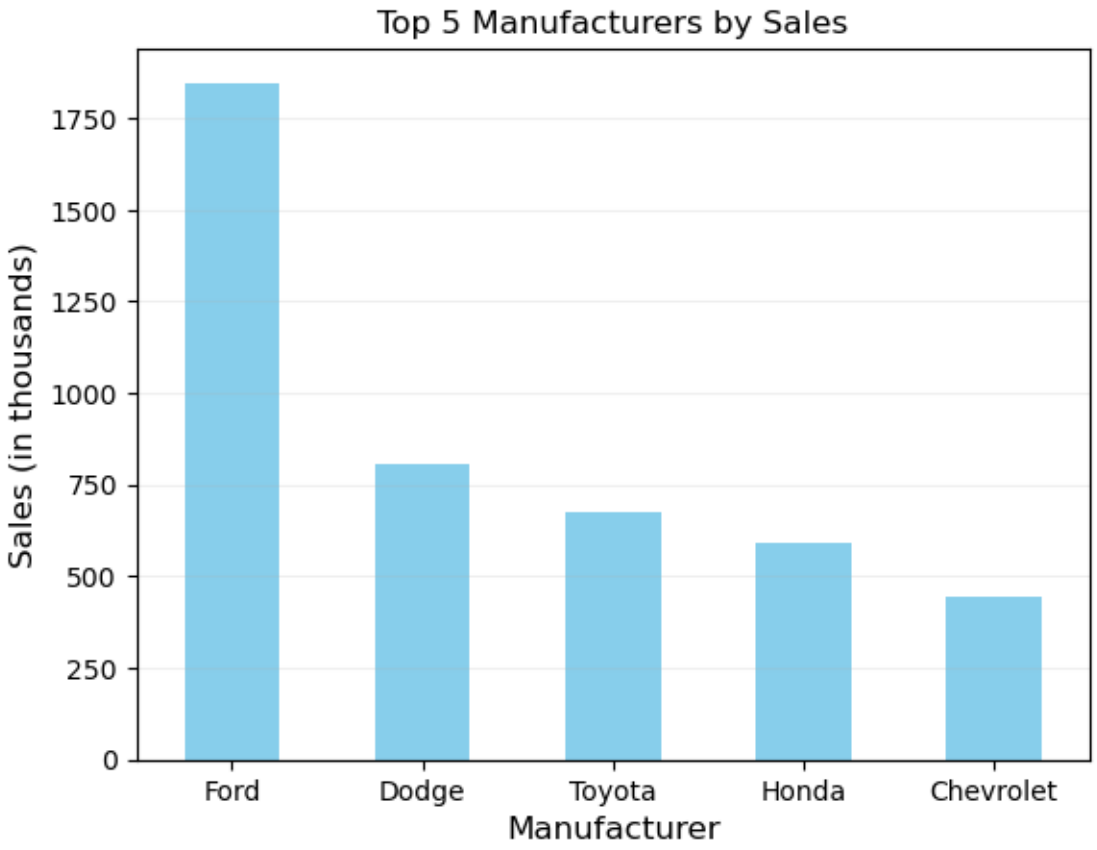
[4]:
```
Manufacturer            0
Model                   0
Sales_in_thousands      0
__year_resale_value    36
Vehicle_type            0
Price_in_thousands      2
Engine_size             1
Horsepower              1
Wheelbase               1
Width                   1
Length                  1
Curb_weight             2
Fuel_capacity           1
Fuel_efficiency         3
Latest_Launch           0
Power_perf_factor       2
dtype: int64
```

[5]:
```
# Fill missing values or drop rows if necessary

df.dropna(subset=['__year_resale_value'], inplace = True)

df.fillna(method = 'ffill', inplace = True)
```

4 Top 5 Manufacturers by Sales

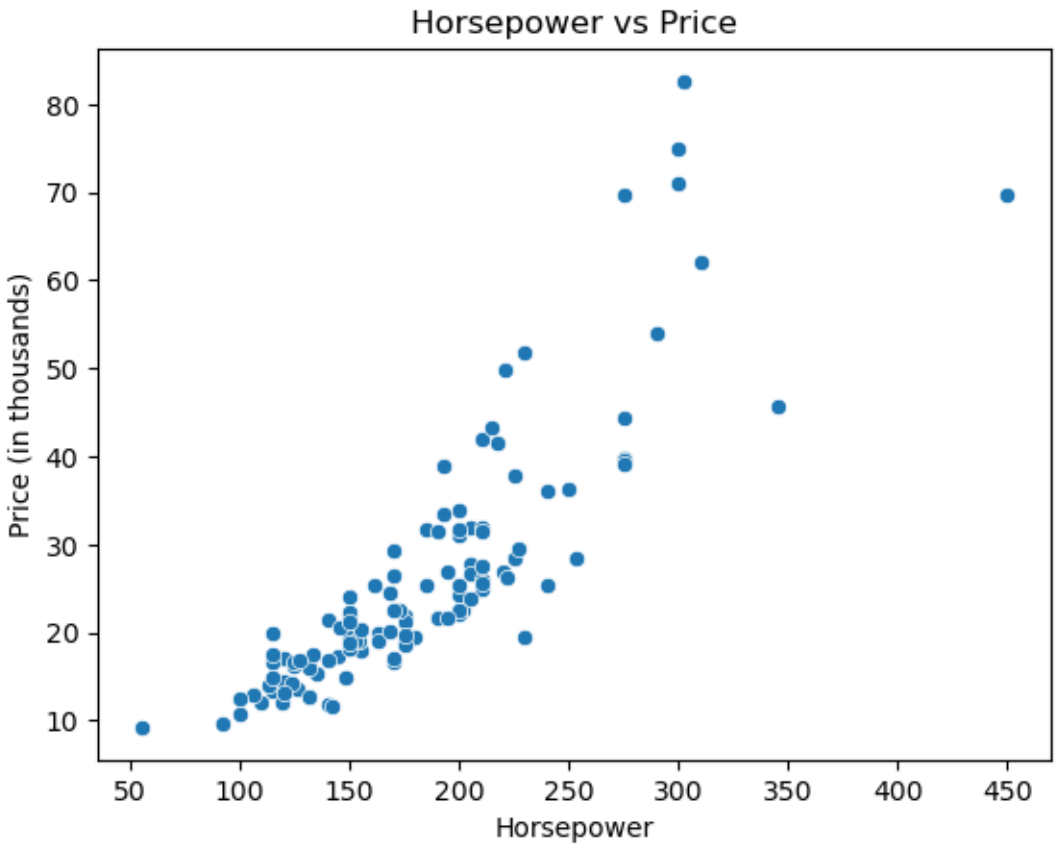
[5]:
```
top_manufacturers = df.groupby('Manufacturer')['Sales_in_thousands'].sum().
 ↪sort_values(ascending = False).head()
```

[8]:
```
top_manufacturers.plot(kind = 'bar', color='skyblue')
plt.title('Top 5 Manufacturers by Sales', fontsize = 12)
plt.xlabel('Manufacturer', fontsize = 12)
plt.ylabel('Sales (in thousands)', fontsize = 12)
plt.grid(alpha = 0.2, axis = 'y')
plt.xticks(rotation = 0)
plt.show()
```



5 Correlation Analysis: Horsepower vs Price

[10]:
```
sns.scatterplot(x='Horsepower', y='Price_in_thousands', data=df)
plt.title('Horsepower vs Price')
plt.xlabel('Horsepower')
plt.ylabel('Price (in thousands)')
plt.show()
```



[12]:
```
# Calculate the correlation coefficient

correlation = df['Horsepower'].corr(df['Price_in_thousands'])

print(f'Correlation between Horsepower and Price: {correlation:.2f}')
```

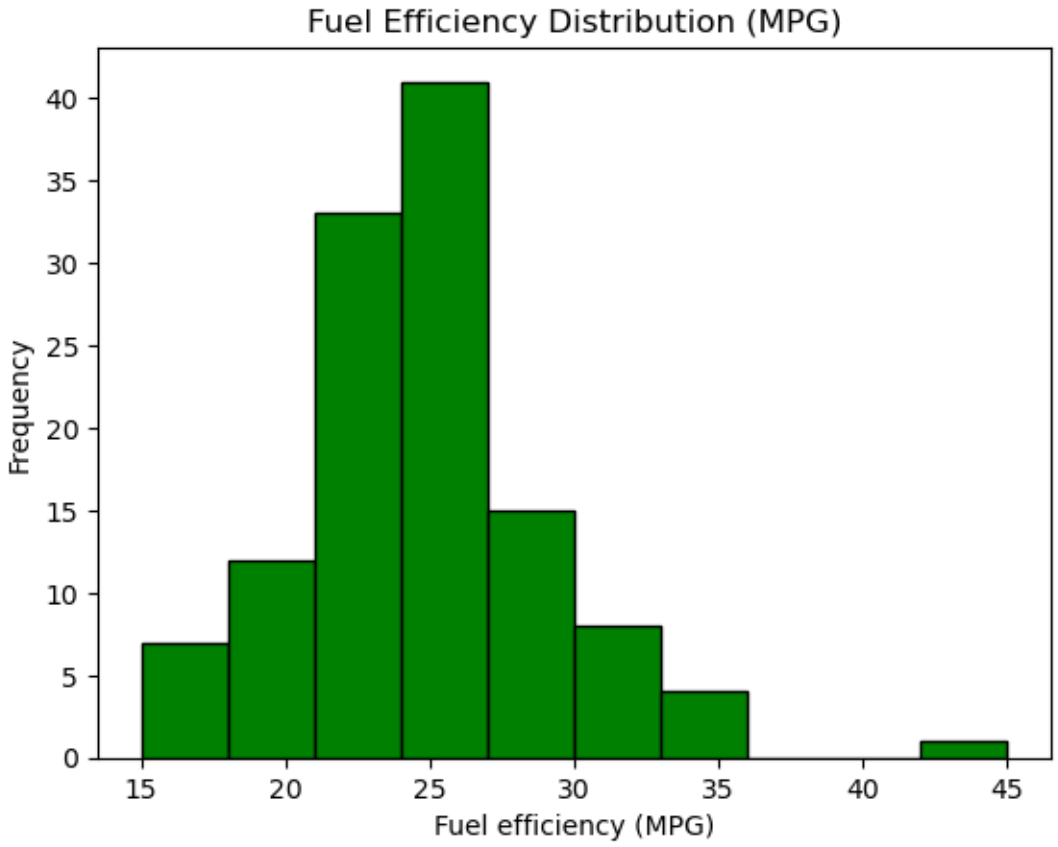
```
Correlation between Horsepower and Price: 0.85
```

6 Fuel Efficiency Distribution

[9]:
```
df.columns
```

[9]:
```
Index(['Manufacturer', 'Model', 'Sales_in_thousands', '__year_resale_value',
       'Vehicle_type', 'Price_in_thousands', 'Engine_size', 'Horsepower',
       'Wheelbase', 'Width', 'Length', 'Curb_weight', 'Fuel_capacity',
       'Fuel_efficiency', 'Latest_Launch', 'Power_perf_factor'],
      dtype='object')
```

[19]:
```
df['Fuel_efficiency'].plot(kind='hist', bins = 10, color='green',␣
 ↪edgecolor='black')
plt.title('Fuel Efficiency Distribution (MPG)')
plt.xlabel('Fuel efficiency (MPG)')
plt.show()
```



7 Top 5 Most Expensive Cars

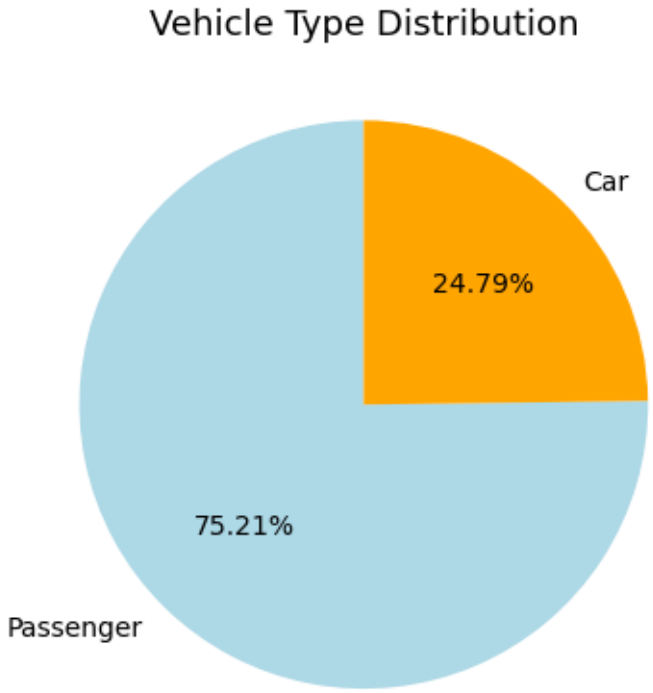
[7]:
```
most_expensive = df[['Manufacturer', 'Model', 'Price_in_thousands']].
 ↪sort_values(['Price_in_thousands'], ascending = False)

most_expensive.head(5)
```

[7]:

	Manufacturer	Model	Price_in_thousands
95	Mercedes-B	SL-Class	82.600
126	Porsche	Carrera Cabrio	74.970
125	Porsche	Carrera Coupe	71.020
39	Dodge	Viper	69.725
94	Mercedes-B	S-Class	69.700

8 Vehicle Type Distribution

[13]:
```
v_type = df['Vehicle_type'].value_counts()

v_type.plot(kind = 'pie', autopct = '%.2f%%', startangle=90,␣
 ↪colors=['lightblue', 'orange'])
plt.title('Vehicle Type Distribution', fontsize = 13)
plt.ylabel('')
plt.show()
```

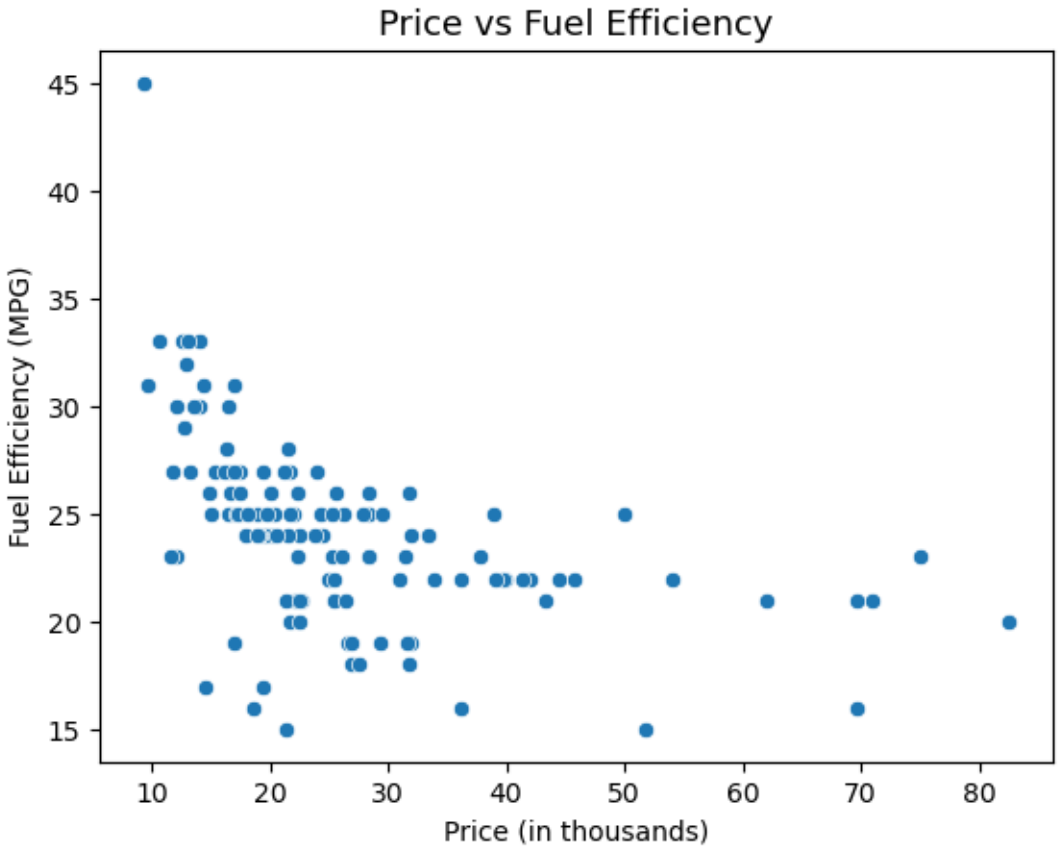


9 Price vs. Fuel Efficiency

[5]:
```
df.columns
```

[5]:
```
Index(['Manufacturer', 'Model', 'Sales_in_thousands', '__year_resale_value',
       'Vehicle_type', 'Price_in_thousands', 'Engine_size', 'Horsepower',
       'Wheelbase', 'Width', 'Length', 'Curb_weight', 'Fuel_capacity',
       'Fuel_efficiency', 'Latest_Launch', 'Power_perf_factor'],
      dtype='object')
```

[16]:
```
# Scatter plot of Price vs Fuel Efficiency
sns.scatterplot(x='Price_in_thousands', y='Fuel_efficiency', data=df)
plt.title('Price vs Fuel Efficiency', fontsize = 13)
plt.xlabel('Price (in thousands)')
plt.ylabel('Fuel Efficiency (MPG)')
plt.show()
```



10 Cars with the Best Resale Value

[8]:
```
top_resale_value = df[['Manufacturer', 'Model', '__year_resale_value']].
↪sort_values(by='__year_resale_value', ascending=False).head(5)

top_resale_value
```

[8]:

	Manufacturer	Model	__year_resale_value
126	Porsche	Carrera Cabrio	67.550
125	Porsche	Carrera Coupe	60.625
95	Mercedes-B	SL-Class	58.600
39	Dodge	Viper	58.470

```
94    Mercedes-B        S-Class              50.375
```

11 Cars with the Best Power-to-Performance Ratio

[10]:
```
df.columns
```

[10]:
```
Index(['Manufacturer', 'Model', 'Sales_in_thousands', '__year_resale_value',
       'Vehicle_type', 'Price_in_thousands', 'Engine_size', 'Horsepower',
       'Wheelbase', 'Width', 'Length', 'Curb_weight', 'Fuel_capacity',
       'Fuel_efficiency', 'Latest_Launch', 'Power_perf_factor'],
      dtype='object')
```

[12]:
```
df['Power_to_Performance'] = df['Horsepower'] / df['Price_in_thousands']

# Top 5 cars by power-to-performance ratio
best_power_performance = df[['Manufacturer', 'Model', 'Power_to_Performance']].
 ↪sort_values(by='Power_to_Performance', ascending=False).head(5)
best_power_performance
```

[12]:

	Manufacturer	Model	Power_to_Performance
140	Toyota	Tacoma	12.317835
63	Hyundai	Elantra	11.865412
40	Dodge	Ram Pickup	11.819116
114	Plymouth	Neon	10.443038
35	Dodge	Neon	10.443038

[ ]:
```

```