# ICE 9 - Using Color and Size in Visualization

In [290]:
```
import matplotlib.pyplot as plt
import pandas as pd
import numpy as np
import warnings
import seaborn as sns
import altair as alt

warnings.filterwarnings('ignore')
```

## 1. Encoding Data using Color and Size (25 points)

In [291]:
```
# Load the data
cars = pd.read_csv('https://gist.githubusercontent.com/nehabaddam/1f47243bf7cd
```

### 1.1) Please show part of your dataset (use python), submit the screenshot of the data, and describe your data including its different attributes/ columns.

In [292]:
```
print(cars.shape)
cars.head()
```

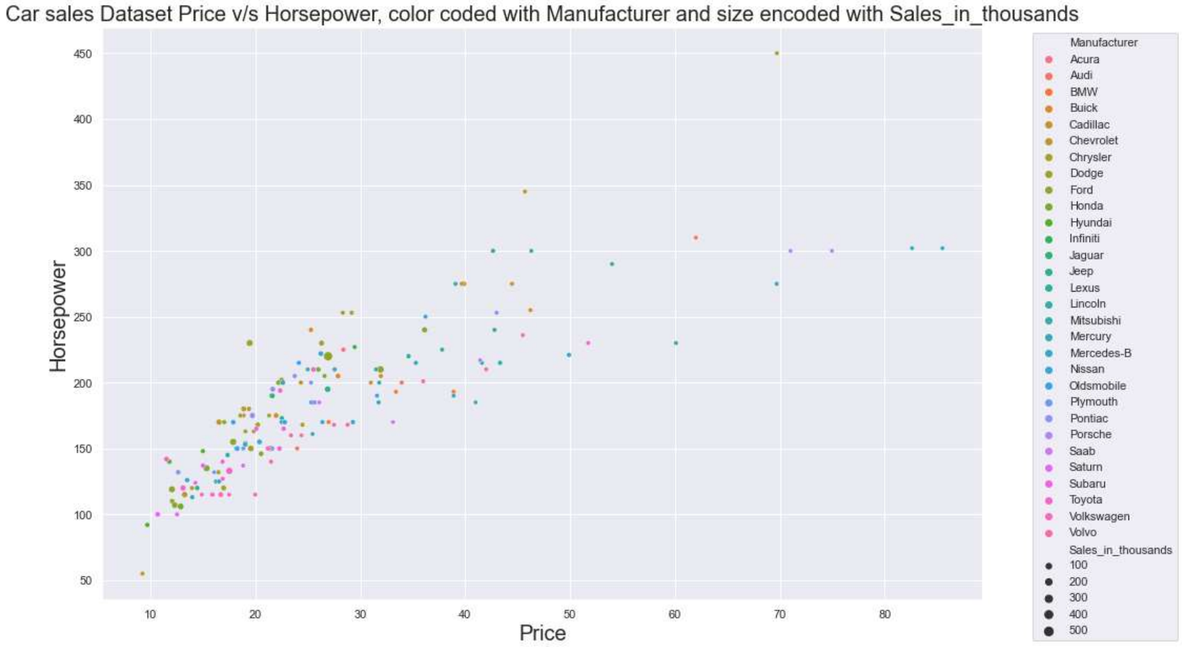
```
(157, 16)
```

Out[292]:

| | Manufacturer | Model | Sales_in_thousands | __year_resale_value | Vehicle_type | Price_in_thousa |
|---|---|---|---|---|---|---|
| **0** | Acura | Integra | 16.919 | 16.360 | Passenger | 21 |
| **1** | Acura | TL | 39.384 | 19.875 | Passenger | 28 |
| **2** | Acura | CL | 14.114 | 18.225 | Passenger | N |
| **3** | Acura | RL | 8.588 | 29.725 | Passenger | 42 |
| **4** | Audi | A4 | 20.397 | 22.255 | Passenger | 23 |

# 1.2) Encoding the data with x-y channels, add both color and size to your graph, different color and size should represent different attributes of the data. Submit a screenshot of the graph and a screenshot of your code (commented properly).

In [293]:
```
# create scatter plot

# set the figure size
plt.figure(figsize=(15, 10))

# Create a scatter plot with colors and size
sns.scatterplot(data=cars, x='Price_in_thousands', y='Horsepower', hue='Manufa

# Set the legend
plt.legend(bbox_to_anchor=(1.05, 1), loc='upper left')

# set x and y axis labels
plt.xlabel('Price',  fontsize=20)
plt.ylabel('Horsepower',  fontsize=20)

# set plot title
plt.title('Car sales Dataset Price v/s Horsepower, color coded with Manufactur
          fontsize=20)

# show the plot
plt.show()
```

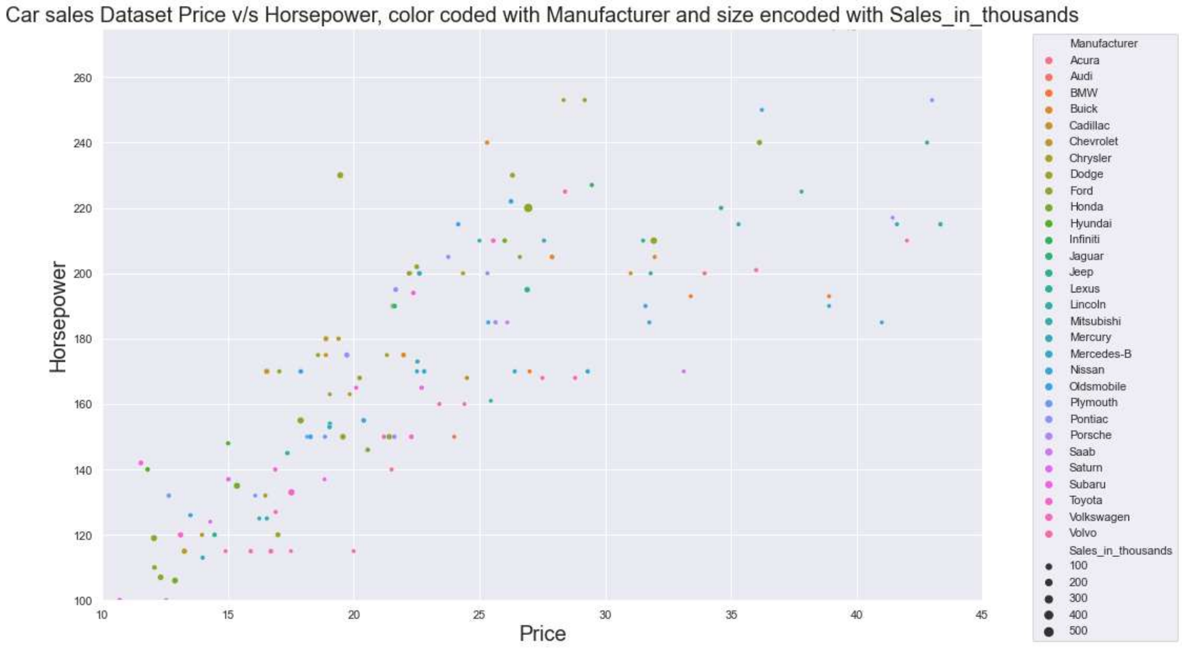


# 1.3) Try to Optimize your graph and explain why and how you optimize it. Provide a screenshot of your

## optimized graph and the code for optimization

In [216]:

```
# create a optimized scatter plot

# set the figure size
plt.figure(figsize=(15, 10))

# Create a scatter plot with colors and size
sns.scatterplot(data=cars, x='Price_in_thousands', y='Horsepower', hue='Manufa

# Set the legend
plt.legend(bbox_to_anchor=(1.05, 1), loc='upper left')


# set axis limits
plt.xlim(10, 45)
plt.ylim(100, 275)

# set x and y axis labels
plt.xlabel('Price',  fontsize=20)
plt.ylabel('Horsepower',  fontsize=20)

# set plot title
plt.title('Car sales Dataset Price v/s Horsepower, color coded with Manufactur
          fontsize=20)

# show the plot
plt.show()
```



In [ ]:

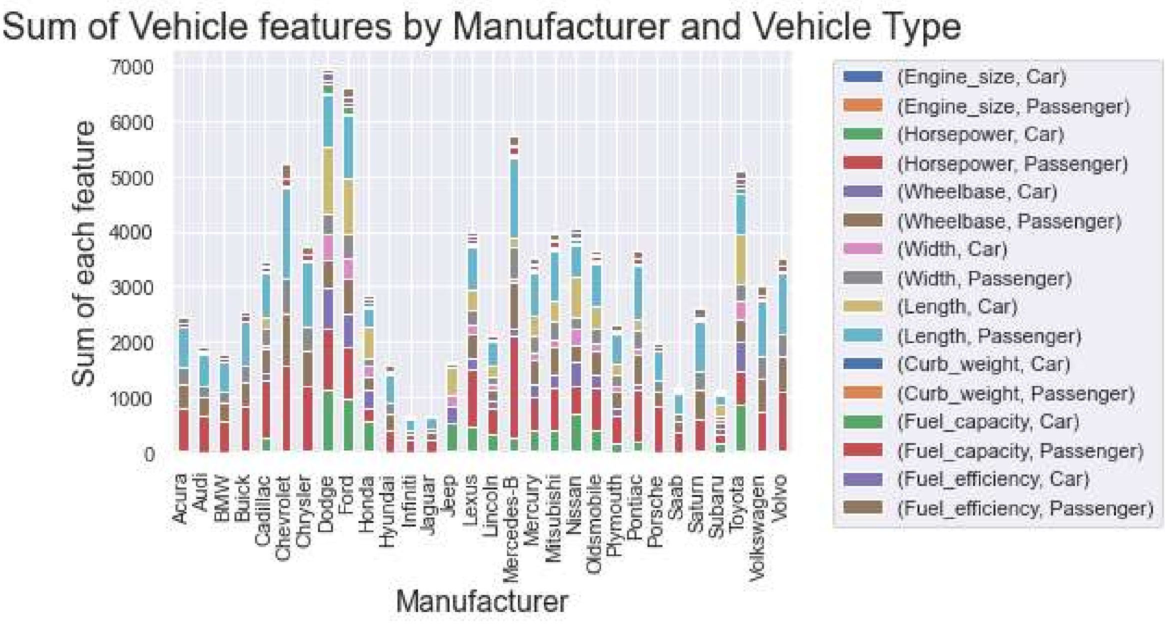
```
```

## 2. Stacked & Grouped Bar Chart (15 points)

## 2.1) Create a stacked & Grouped Bar Chart for your data. Submit a screenshot of the graph and a screenshot of your code (commented properly).

In [308]:

```
# Group the data by Manufacturer and Vehicle_type and get the sum of Sales_in_
grouped_data = cars.groupby(['Manufacturer', 'Vehicle_type'])['Engine_size', '

# Create a stacked and grouped bar chart
grouped_data.plot(kind='bar', stacked=True)

# Set the legend
plt.legend(bbox_to_anchor=(1.05, 1), loc='upper left')

# Set the x and y axis labels
plt.xlabel('Manufacturer', fontsize=16)
plt.ylabel('Sum of each feature', fontsize=16)

# Set the plot title
plt.title('Sum of Vehicle features by Manufacturer and Vehicle Type', fontsize

# Show the plot
plt.show()
```



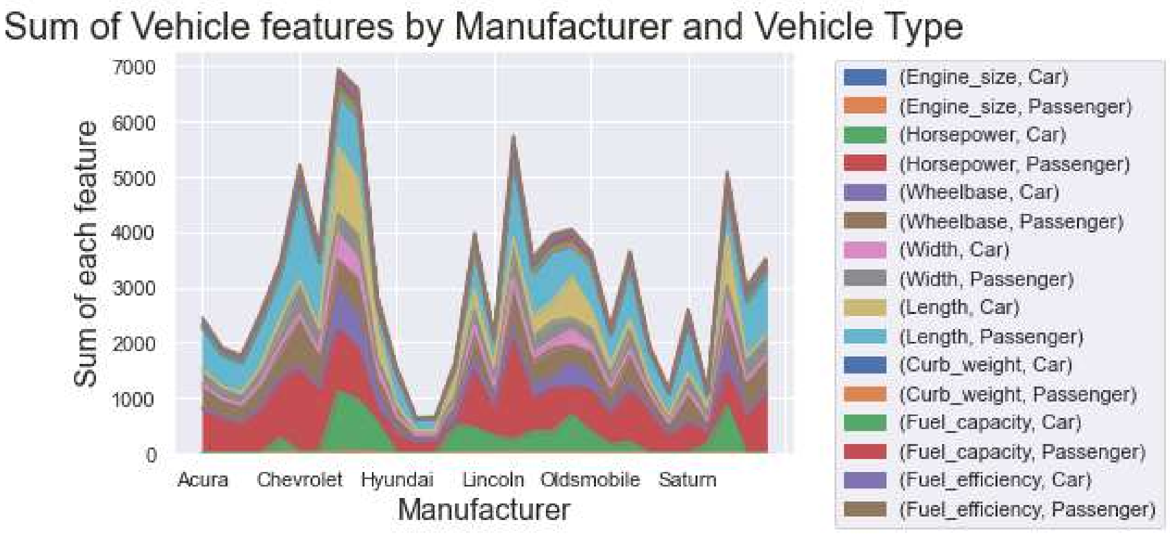
In [ ]:

## 3. Stacked Area Chart (15 points)

### 3.1) Create a stacked area chart for your data (or part of your data). Submit a screenshot of the graph and a screenshot of your code

In [306]:

```
# Group the data by Manufacturer and Vehicle_type and get the sum of Sales_in_
area = cars.groupby(['Manufacturer', 'Vehicle_type'])['Engine_size', 'Horsepow

# Create an area chart
area.plot.area()

# Set the legend
plt.legend(bbox_to_anchor=(1.05, 1), loc='upper left')

# Set the x and y axis labels
plt.xlabel('Manufacturer', fontsize=16)
plt.ylabel('Sum of each feature', fontsize=16)

# Set the plot title
plt.title('Sum of Vehicle features by Manufacturer and Vehicle Type', fontsize

# Show the plot
plt.show()
```



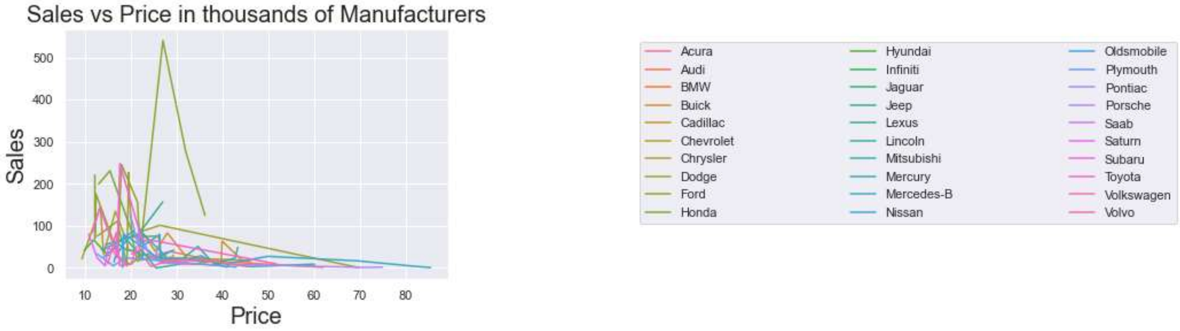
In [ ]:

## 4. Line Chart with Multiple Lines (25 points)

### 4.1) Create a line chart for your data. Submit a screenshot of the graphand a screenshot of your

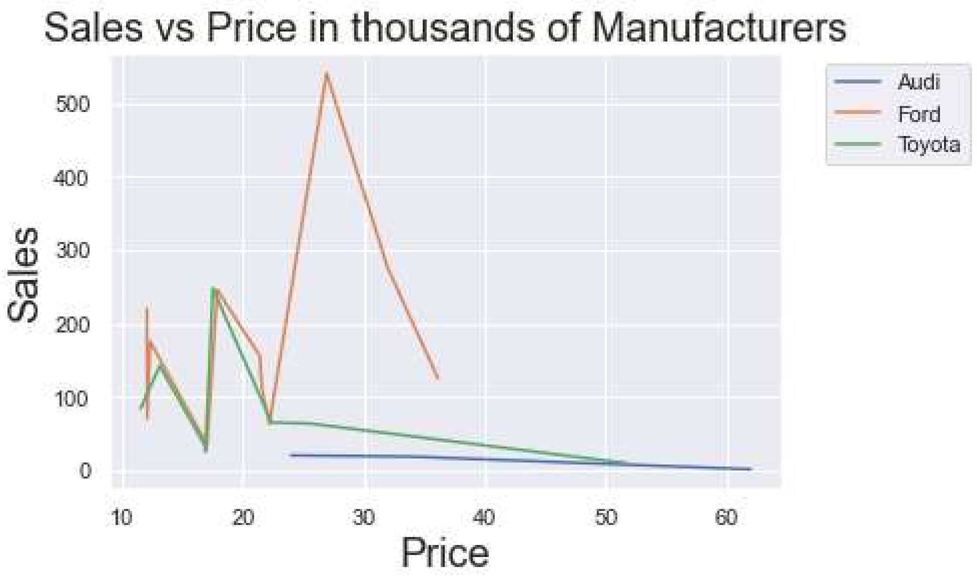
In [345]:

```
# Create a line chart

sns.lineplot(data=cars, x='Price_in_thousands', y='Sales_in_thousands', hue='M
# Set the legend
plt.legend(bbox_to_anchor=(1.5, 0.9, 1.4, .05), loc='upper left',
           ncol=3, mode="expand", borderaxespad=0.)



# set x and y axis labels
plt.xlabel('Price',  fontsize=20)
plt.ylabel('Sales',  fontsize=20)



# Set the plot title
plt.title('Sales vs Price in thousands of Manufacturers', fontsize=20)

# Show the plot
plt.show()
```



## 4.2) Create another line chart which is more comparative

In [349]:
```
# Filter the dataset to include only 'Ford' and 'Audi' and 'Toyota'
cars_filtered = cars.loc[(cars['Manufacturer'] == 'Ford') | (cars['Manufacture

# Create a line chart with colors
sns.lineplot(data=cars_filtered, x='Price_in_thousands', y='Sales_in_thousands

# Set the legend
plt.legend(bbox_to_anchor=(1.05, 1), loc='upper left')

# set x and y axis labels
plt.xlabel('Price',  fontsize=20)
plt.ylabel('Sales',  fontsize=20)

# Set the plot title
plt.title('Sales vs Price in thousands of Manufacturers', fontsize=20)

# Show the plot
plt.show()
```



In [ ]:

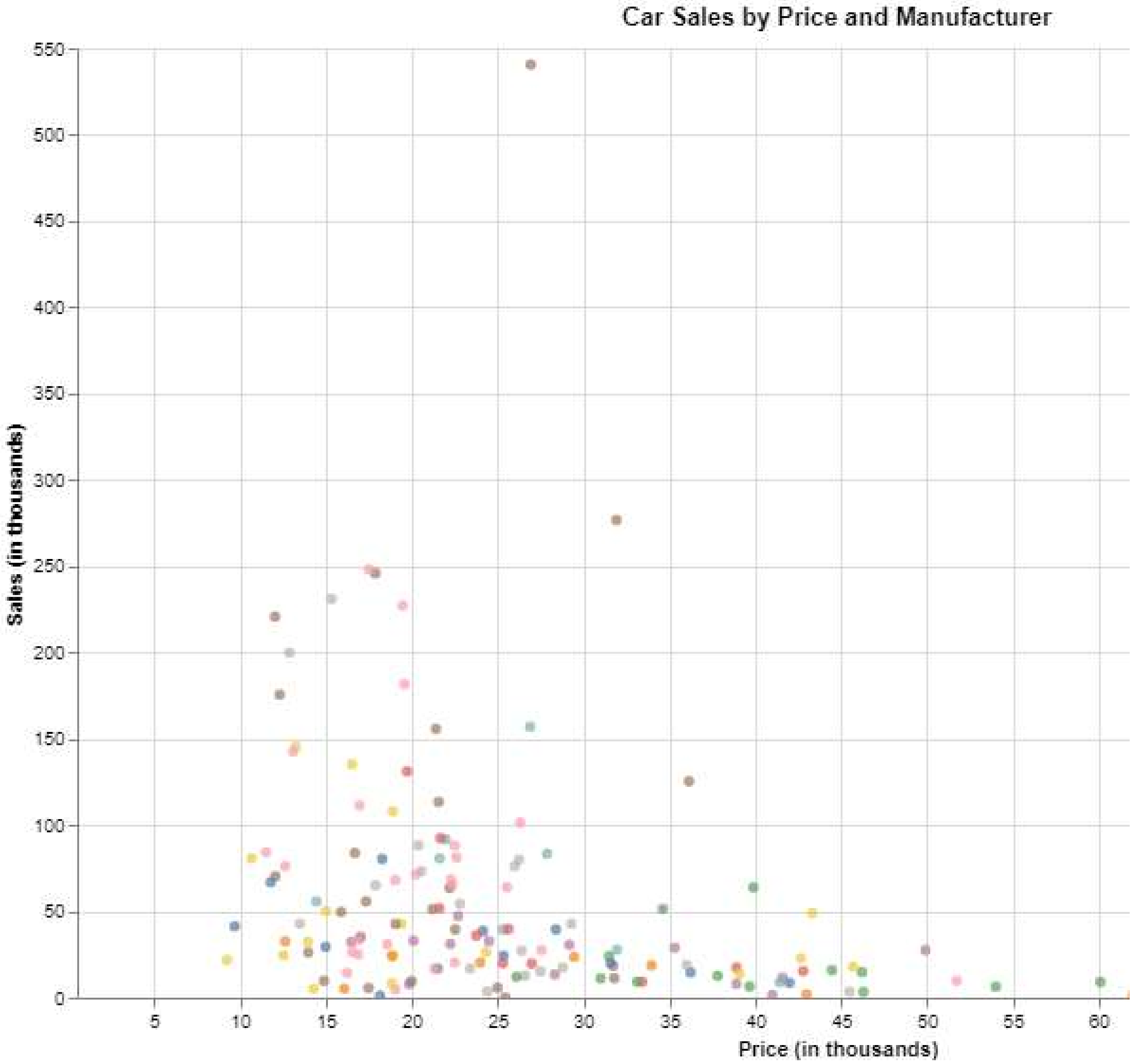
## 5. Interactive Chart(20 points)

## 5.1) Create any chart of your choice for your data and make it interactive. Submit a screenshot of the graph and a screenshot of your code

In [381]:

```
# Create the dropdown selection
dropdown = alt.binding_select(options=list(cars['Manufacturer'].unique()))
selection = alt.selection_single(fields=['Manufacturer'], bind=dropdown, name=
interval = alt.selection_interval()
zoom = alt.selection_interval(bind='scales', encodings=['x'])
# Create the scatter plot
scatter = alt.Chart(cars).mark_circle().encode(
    x=alt.X('Price_in_thousands:Q', title='Price (in thousands)'),
    y=alt.Y('Sales_in_thousands:Q', title='Sales (in thousands)'),
    color=alt.condition(selection, 'Manufacturer:N', alt.value('lightgray')),
    tooltip=['Model:N', 'Latest_Launch:N', 'Price_in_thousands:Q', 'Sales_in_t
).add_selection(selection).properties(
    width=800,
    height=500,
    title='Car Sales by Price and Manufacturer'
).add_selection(
    zoom,interval
).interactive(bind_y=False)

# Show the plot
scatter
```

Out[381]:



Select_from_the_dropdown_the_car_Manufacturer Acura

```
In [ ]:
```

```
In [ ]:
```