In [1]:

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

In [2]:

```
df = pd.read_csv('/kaggle/input/used-car-price-prediction-dataset/used_cars.csv')
```

In [3]:

```
df
```

Out[3]:

	brand	model	model_year	milage	fuel_type	engine	transmission	e
0	Ford	Utility Police Interceptor Base	2013	51,000 mi.	E85 Flex Fuel	300.0HP 3.7L V6 Cylinder Engine Flex Fuel Capa...	6-Speed A/T	
1	Hyundai	Palisade SEL	2021	34,742 mi.	Gasoline	3.8L V6 24V GDI DOHC	8-Speed Automatic	Mo
2	Lexus	RX 350 RX 350	2022	22,372 mi.	Gasoline	3.5 Liter DOHC	Automatic	
3	INFINITI	Q50 Hybrid Sport	2015	88,900 mi.	Hybrid	354.0HP 3.5L V6 Cylinder Engine Gas/Electric H...	7-Speed A/T	
4	Audi	Q3 45 S line Premium Plus	2021	9,835 mi.	Gasoline	2.0L I4 16V GDI DOHC Turbo	8-Speed Automatic	(M
...	...	...	...	...	...	...	...	
4004	Bentley	Continental GT Speed	2023	714 mi.	Gasoline	6.0L W12 48V PDI DOHC Twin Turbo	8-Speed Automatic with Auto-Shift	
4005	Audi	S4 3.0T Premium Plus	2022	10,900 mi.	Gasoline	349.0HP 3.0L V6 Cylinder Engine Gasoline Fuel	Transmission w/Dual Shift Mode	
4006	Porsche	Taycan	2022	2,116 mi.	NaN	Electric	Automatic	
4007	Ford	F-150 Raptor	2020	33,000 mi.	Gasoline	450.0HP 3.5L V6 Cylinder Engine Gasoline Fuel	A/T	
4008	BMW	X3 xDrive30i	2020	43,000 mi.	Gasoline	248.0HP 2.0L 4 Cylinder Engine Gasoline Fuel	A/T	

4009 rows × 12 columns

In [4]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4009 entries, 0 to 4008
Data columns (total 12 columns):
 #   Column        Non-Null Count  Dtype 
---  ------        --------------  ----- 
 0   brand         4009 non-null   object
 1   model         4009 non-null   object
 2   model_year    4009 non-null   int64 
 3   milage        4009 non-null   object
 4   fuel_type     3839 non-null   object
 5   engine        4009 non-null   object
 6   transmission  4009 non-null   object
 7   ext_col       4009 non-null   object
 8   int_col       4009 non-null   object
 9   accident      3896 non-null   object
 10  clean_title   3413 non-null   object
 11  price         4009 non-null   object
dtypes: int64(1), object(11)
memory usage: 376.0+ KB
```

In [10]:

```
df.describe().T
```

Out[10]:

	count	mean	std	min	25%	50%	75%	max
model_year	4009.0	2015.51559	6.104816	1974.0	2012.0	2017.0	2020.0	2024.0

In [11]:

```
# Check for NULL Values in the Dataset

df.isna().sum()
```

Out[11]:

```
brand             0
model             0
model_year        0
milage            0
fuel_type       170
engine            0
transmission      0
ext_col           0
int_col           0
accident        113
clean_title     596
price             0
dtype: int64
```

In [12]:

```
# Check for Duplicates in the Dataset

df.duplicated().sum()
```

Out[12]:

```
0
```

Cleaning of the Dataset

In [13]:

```
# Encoding 'brand' categorical data column

from sklearn.preprocessing import LabelEncoder

labelEncoder = LabelEncoder()
```

In [14]:

```
df['brand'] = labelEncoder.fit_transform(df['brand'])
```

In [26]:

```
# Create new Fature named 'milage_int'
# Contains Milage converted to int dtype

def return_milage_int(s):
    d = int((s.replace(',','')).replace(' mi.',''))
    return d


df['milage_int'] = df['milage'].map(return_milage_int)
df.drop('milage', axis=1, inplace=True)
```

In [28]:

```
# Create new Fature named 'price_int'
# Contains Price converted to int dtype

def return_price_int(s):
    d = int((s.replace(',','')).replace('$',''))
    return d


df['price_int'] = df['price'].map(return_price_int)
df.drop('price', axis=1, inplace=True)
```

In [35]:

```
# Fill NULL Values in 'clean_title' feature
df['clean_title'] = df['clean_title'].fillna('No')


# Encoding the 'clean_title' feature
df['clean_title'] = labelEncoder.fit_transform(df['clean_title'])
```

In [42]:

```
# Fill NULL Values in 'accident' feature
# df['accident'] = df['accident'].fillna('No')


# Replace the Values in 'accident' feature
df['accident'] = df['accident'].replace({'At least 1 accident or damage reporte
d':'Yes',
                                         'None reported': 'No'})


# Encoding the 'accident' feature
df['accident'] = labelEncoder.fit_transform(df['accident'])
```

In [74]:

```
df['fuel_type'].value_counts()
```

Out[74]:

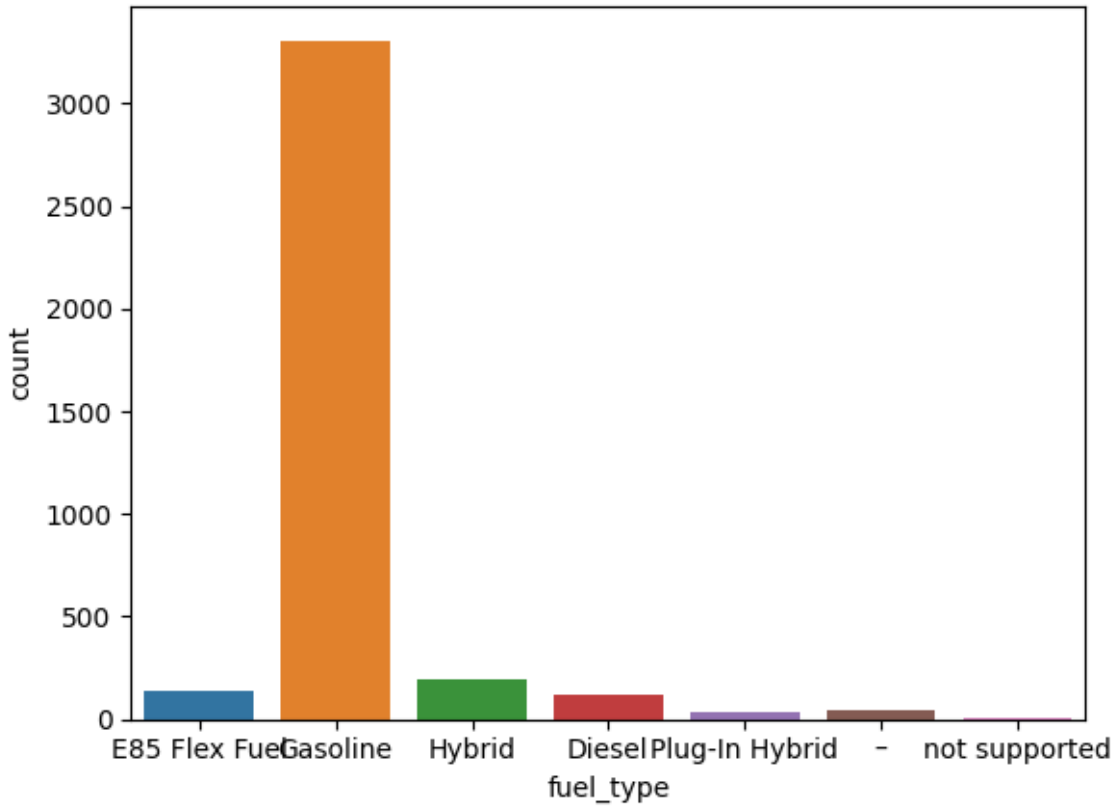
```
fuel_type
Gasoline          3479
Hybrid             194
E85 Flex Fuel      139
Diesel             116
–                   45
Plug-In Hybrid      34
not supported        2
Name: count, dtype: int64
```

In [68]:

```
sns.countplot(x='fuel_type', data=df)
```

Out[68]:

```
<Axes: xlabel='fuel_type', ylabel='count'>
```



In [77]:

```
# Fill the Mode Value i.e. 'Gasoline'
df['fuel_type'] = df['fuel_type'].fillna('Gasoline')

df['fuel_type'] = df['fuel_type'].replace({'–':'Hybrid', 'not supported':'Hybrid'})

# Perform Encoding on the 'fuel_type' Feature
df['fuel_type'] = labelEncoder.fit_transform(df['fuel_type'])
```

In [81]:

```
# Encoding 'ext_col' and 'int_col' Features

df['ext_col'] = labelEncoder.fit_transform(df['ext_col'])
df['int_col'] = labelEncoder.fit_transform(df['int_col'])
```

In [87]:

```
# Encoding the 'transmission' Feature

df['transmission'] = labelEncoder.fit_transform(df['transmission'])
```

In [91]:

```
# Encoding the 'engine' Feature

df['engine'] = labelEncoder.fit_transform(df['engine'])
```

In [95]:

```
# Encoding the 'model' Feature

df['model'] = labelEncoder.fit_transform(df['model'])
```

In [94]:

```
len(df['model'].unique())
```

Out[94]:

```
1898
```

In [93]:

```
df['model'].unique()
```

Out[93]:

```
array(['Utility Police Interceptor Base', 'Palisade SEL', 'RX 350 RX 3
50',
       ..., 'Martin DB7 Vantage Volante', 'Impala 2LZ', 'Taycan'],
      dtype=object)
```

In [108]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4009 entries, 0 to 4008
Data columns (total 12 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   brand         4009 non-null   int64
 1   model         4009 non-null   int64
 2   model_year    4009 non-null   int64
 3   fuel_type     4009 non-null   int64
 4   engine        4009 non-null   int64
 5   transmission  4009 non-null   int64
 6   ext_col       4009 non-null   int64
 7   int_col       4009 non-null   int64
 8   accident      4009 non-null   int64
 9   clean_title   4009 non-null   int64
 10  milage_int    4009 non-null   int64
 11  price_int     4009 non-null   int64
dtypes: int64(12)
memory usage: 376.0 KB
```

Extract Feature and Target Variables

In [100]:

```
X = df.drop('price_int', axis=1)
Y = df['price_int']
```

In [101]:

```
from sklearn.model_selection import train_test_split
```

In [102]:

```
x_train,x_test,y_train,y_test = train_test_split(X, Y, test_size=0.20, random_state
=42)
```

Create and Train the SVR Model

In [117]:

```
from sklearn.svm import SVR
```

In [120]:

```
# Create an SVR model
svr_rbf = SVR(kernel='rbf', C=1e3, gamma=0.1)

svr_rbf.fit(x_train, y_train)
```

Out[120]:

SVR

SVR(C=1000.0, gamma=0.1)

In [121]:

```
y_pred = svr_rbf.predict(x_test)
```

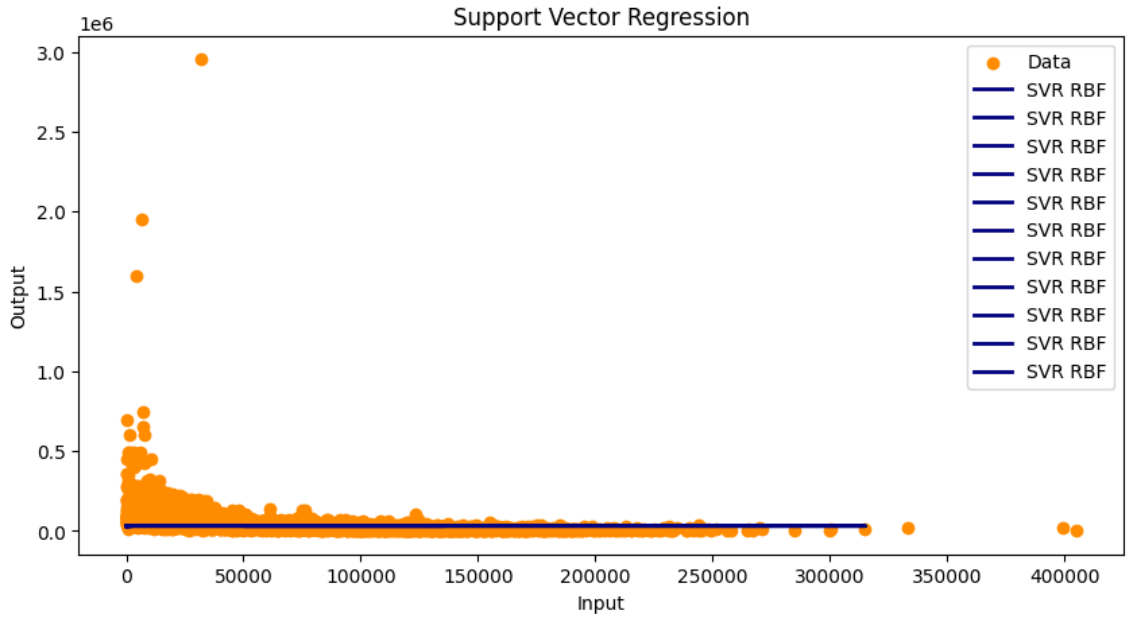
In [124]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4009 entries, 0 to 4008
Data columns (total 13 columns):
 #   Column            Non-Null Count  Dtype  
---  ------            --------------  -----  
 0   brand             4009 non-null   int64  
 1   model             4009 non-null   int64  
 2   model_year        4009 non-null   int64  
 3   fuel_type         4009 non-null   int64  
 4   engine            4009 non-null   int64  
 5   transmission      4009 non-null   int64  
 6   ext_col           4009 non-null   int64  
 7   int_col           4009 non-null   int64  
 8   accident          4009 non-null   int64  
 9   clean_title       4009 non-null   int64  
 10  milage_int        4009 non-null   int64  
 11  price_int         4009 non-null   int64  
 12  model_year_trans  4009 non-null   float64
dtypes: float64(1), int64(12)
memory usage: 407.3 KB
```

In [125]:

```
# Plot the results
plt.figure(figsize=(10, 5))
plt.scatter(X['milage_int'], Y, color='darkorange', label='Data')
plt.plot(x_test, y_pred, color='navy', lw=2, label='SVR RBF')
plt.xlabel('Input')
plt.ylabel('Output')
plt.title('Support Vector Regression')
plt.legend()
plt.show()
```



In [ ]:

```
```