SELLING PRICE PREDICTION OF OLD VEHICLES

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

In [2]:
```
dataset=pd.read_csv("car_prediction_dataset.csv")
```

In [3]:
```
dataset.shape
```

Out[3]:
```
(301, 9)
```

In [4]:
```
dataset.head(2)
```

Out[4]:

	car_name	year	present_price	kms_driven	fuel_type	seller_type	transmission	owner
0	ritz	2014	5.59	27000	Petrol	Dealer	Manual	0
1	sx4	2013	9.54	43000	Diesel	Dealer	Manual	0

In [5]:
```
dataset.isnull().sum()
```

Out[5]:
```
car_name         0
year             0
present_price    0
kms_driven       0
fuel_type        0
seller_type      0
transmission     0
owner            0
selling_price    0
dtype: int64
```

In [6]:
```
dataset.duplicated().sum()
```

Out[6]:
```
np.int64(2)
```

In [7]:
```
dataset.drop_duplicates()
```

Out[7]:

	car_name	year	present_price	kms_driven	fuel_type	seller_type	transmission	owne
0	ritz	2014	5.59	27000	Petrol	Dealer	Manual	
1	sx4	2013	9.54	43000	Diesel	Dealer	Manual	
2	ciaz	2017	9.85	6900	Petrol	Dealer	Manual	
3	wagon r	2011	4.15	5200	Petrol	Dealer	Manual	
4	swift	2014	6.87	42450	Diesel	Dealer	Manual	
...	...	...	...	...	...	...	...	
296	city	2016	11.60	33988	Diesel	Dealer	Manual	
297	brio	2015	5.90	60000	Petrol	Dealer	Manual	
298	city	2009	11.00	87934	Petrol	Dealer	Manual	
299	city	2017	12.50	9000	Diesel	Dealer	Manual	
300	brio	2016	5.90	5464	Petrol	Dealer	Manual	

299 rows × 9 columns

In [8]:
```
dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 301 entries, 0 to 300
Data columns (total 9 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   car_name       301 non-null    object 
 1   year           301 non-null    int64  
 2   present_price  301 non-null    float64
 3   kms_driven     301 non-null    int64  
 4   fuel_type      301 non-null    object 
 5   seller_type    301 non-null    object 
 6   transmission   301 non-null    object 
 7   owner          301 non-null    int64  
 8   selling_price  301 non-null    float64
dtypes: float64(2), int64(3), object(4)
memory usage: 21.3+ KB
```

In [9]:
```
dataset.describe()
```

Out[9]:

	year	present_price	kms_driven	owner	selling_price
count	301.000000	301.000000	301.000000	301.000000	301.000000
mean	2013.627907	7.628472	36947.205980	0.043189	4.661296
std	2.891554	8.644115	38886.883882	0.247915	5.082812
min	2003.000000	0.320000	500.000000	0.000000	0.100000
25%	2012.000000	1.200000	15000.000000	0.000000	0.900000
50%	2014.000000	6.400000	32000.000000	0.000000	3.600000
75%	2016.000000	9.900000	48767.000000	0.000000	6.000000
max	2018.000000	92.600000	500000.000000	3.000000	35.000000

LABEL ENCODING

In [10]:
```
from sklearn.preprocessing import LabelEncoder
```

CAR NAME ENCODING

In [11]:
```
car_name_le=LabelEncoder()
dataset['car_name']=car_name_le.fit_transform(dataset['car_name'])
```

FUEL TYPE ENCODING

In [12]:
```
dataset['fuel_type'].unique()
```

Out[12]:
```
array(['Petrol', 'Diesel', 'CNG'], dtype=object)
```

In [13]:
```
fuel_type_le=LabelEncoder()
dataset['fuel_type']=fuel_type_le.fit_transform(dataset['fuel_type'])
```

SELLER TYPE ENCODING

In [14]:
```
seller_type_le=LabelEncoder()
dataset['seller_type']=fuel_type_le.fit_transform(dataset['seller_type'])
```

TRANSMISSION ENCODING

In [15]:
```
transmission_le=LabelEncoder()
dataset['transmission']=fuel_type_le.fit_transform(dataset['transmission'])
```

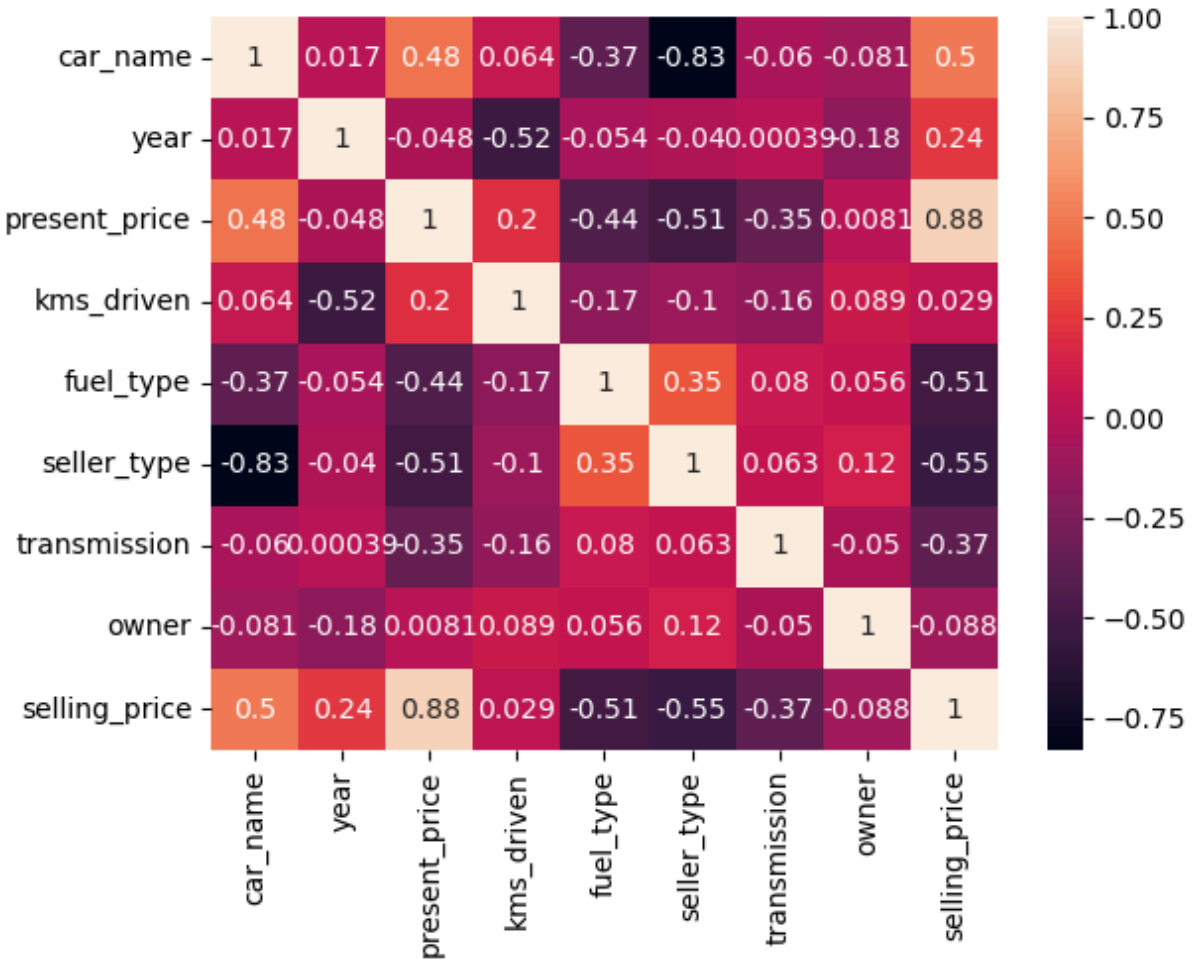
VISUALISING THE DATA

In [16]:
```
dataset.head(3)
```

Out[16]:

	car_name	year	present_price	kms_driven	fuel_type	seller_type	transmission	owner
0	90	2014	5.59	27000	2	0	1	0
1	93	2013	9.54	43000	1	0	1	0
2	68	2017	9.85	6900	2	0	1	0

In [17]:
```
sns.heatmap(data=dataset.corr(),annot=True)
plt.show()
```



In [18]:
```
input_data=dataset.iloc[:,:-1]
output_data=dataset['selling_price']
```

SCALING DATA TO REMOVE ANAMOLY

In [19]:
```
from sklearn.preprocessing import StandardScaler
```

In [20]:
```
ss=StandardScaler()
input_data=pd.DataFrame(ss.fit_transform(input_data),columns=input_data.columns)
```

In [21]:
```
dataset.head(3)
```

Out[21]:

	car_name	year	present_price	kms_driven	fuel_type	seller_type	transmission	owner
0	90	2014	5.59	27000	2	0	1	0
1	93	2013	9.54	43000	1	0	1	0
2	68	2017	9.85	6900	2	0	1	0

SPLITTING DATA

In [22]:
```
from sklearn.model_selection import train_test_split
```

In [23]:
```
x_train,x_test,y_train,y_test=train_test_split(input_data,output_data,test_size=0.2
```

MODEL SELECTION

In [24]:
```
from sklearn.linear_model import LinearRegression, Lasso, Ridge, ElasticNet
from sklearn.tree import DecisionTreeRegressor
from sklearn.svm import SVR
from sklearn.neighbors import KNeighborsRegressor
from sklearn.ensemble import RandomForestRegressor
```

In [25]:
```
 from sklearn.metrics import mean_squared_error,mean_absolute_error
```

In [26]:
```
lr=LinearRegression()
lr.fit(x_train,y_train)
lr.score(x_train,y_train)*100, lr.score(x_test,y_test)*100
```

Out[26]: (88.40630578239454, 84.65539666857805)

In [27]:
```
mean_squared_error(y_test,lr.predict(x_test)),mean_absolute_error(y_test,lr.predict
```

Out[27]: (3.5347190697129753, 1.2142339415047014)

In [28]:
```
lr1=Lasso(alpha=0.5)
lr1.fit(x_train,y_train)
lr1.score(x_train,y_train)*100, lr1.score(x_test,y_test)*100
```

Out[28]: (85.0124395411389, 78.63348352385346)

In [29]:
```
mean_squared_error(y_test,lr1.predict(x_test)),mean_absolute_error(y_test,lr1.predi
```

Out[29]: (4.921901961904479, 1.4658722139390727)

In [30]:
```
lr2=Ridge(alpha=10)
lr2.fit(x_train,y_train)
lr2.score(x_train,y_train)*100, lr2.score(x_test,y_test)*100
```

Out[30]: (88.28628537091497, 84.16213595432284)

In [31]:
```
mean_squared_error(y_test,lr2.predict(x_test)),mean_absolute_error(y_test,lr2.predi
```

Out[31]: (3.6483445584506238, 1.233161689725921)

In [32]:
```
lr3=ElasticNet(alpha=0.5)
lr3.fit(x_train,y_train)
lr3.score(x_train,y_train)*100, lr3.score(x_test,y_test)*100
```

Out[32]: (84.00059239671332, 78.3177718663528)

In [33]:
```
mean_squared_error(y_test,lr3.predict(x_test)),mean_absolute_error(y_test,lr3.predi
```

Out[33]: (4.99462798760845, 1.4094819518715052)

In [34]:
```
dt=DecisionTreeRegressor(max_depth=15)
dt.fit(x_train,y_train)
dt.score(x_train,y_train)*100, dt.score(x_test,y_test)*100
```

Out[34]: (100.0, 94.52366873121181)

In [35]:
```
mean_squared_error(y_test,dt.predict(x_test)),mean_absolute_error(y_test,dt.predict
```

Out[35]: (1.2615049180327873, 0.6940983606557376)

In [36]:
```
rf=RandomForestRegressor(n_estimators=100)
rf.fit(x_train,y_train)
rf.score(x_train,y_train)*100, rf.score(x_test,y_test)*100
```

Out[36]: (98.33237614607282, 96.59775818440349)

In [37]:
```
mean_squared_error(y_test,rf.predict(x_test)),mean_absolute_error(y_test,rf.predict
```

Out[37]: (0.7837262890163934, 0.5828016393442627)

In [38]:
```
sv=SVR()
sv.fit(x_train,y_train)
sv.score(x_train,y_train)*100, sv.score(x_test,y_test)*100
```

Out[38]: (66.00840380338376, 78.48466914602926)

In [39]:
```
mean_squared_error(y_test,sv.predict(x_test)),mean_absolute_error(y_test,sv.predict
```

Out[39]: (4.956182223686514, 0.9945642205689335)

In [40]:
```
knn=KNeighborsRegressor(n_neighbors=10)
knn.fit(x_train,y_train)
knn.score(x_train,y_train)*100, knn.score(x_test,y_test)*100
```

Out[40]: (86.59124637342433, 90.59004346126326)

In [41]:
```
mean_squared_error(y_test,knn.predict(x_test)),mean_absolute_error(y_test,knn.predi
```

Out[41]: (2.1676384918032783, 0.9017704918032786)

In [42]:
```
## now its clear that random forest is the best suitable model with good accuracy a
```

In [43]:
```
x_test #taking a test data to predict
```

Out[43]:

	car_name	year	present_price	kms_driven	fuel_type	seller_type	transmission
177	-1.275759	0.821718	-0.817924	-0.333500	0.500183	1.356327	-2.554408
289	0.251795	0.821718	0.691970	-0.668875	0.500183	-0.737285	0.391480
228	1.230996	-0.563924	0.205282	0.593804	-1.852241	-0.737285	0.391480
198	-2.059120	-0.910335	-0.817924	-0.050157	0.500183	1.356327	0.391480
60	0.330131	-0.217514	1.272521	0.078661	0.500183	-0.737285	0.391480
...	...	...	...	...	...	...	...
234	0.760979	0.475308	-0.223468	-0.835995	0.500183	-0.737285	0.391480
296	0.251795	0.821718	0.460214	-0.076225	-1.852241	-0.737285	0.391480
281	0.251795	-2.642389	-0.003299	0.347965	0.500183	-0.737285	0.391480
285	0.956819	0.821718	0.100991	-0.563806	0.500183	-0.737285	-2.554408
182	-1.158255	-0.217514	-0.816765	-0.178949	0.500183	1.356327	0.391480

61 rows × 8 columns

In [44]:
```
rf.predict([[-1.275759,0.821718,-0.817924,-0.333500,0.500183,1.356327,-2.554408,-0.
```

```
C:\Users\Aryansh Pathak\anaconda3\Lib\site-packages\sklearn\utils\validation.py:273
9: UserWarning: X does not have valid feature names, but RandomForestRegressor was f
itted with feature names
  warnings.warn(
```

Out[44]:
```
array([0.4365])
```

In [45]:
```
y_test #comparing the predicted data and test data
```

Out[45]:
```
177     0.35
289    10.11
228     4.95
198     0.15
60      6.95
       ...
234     5.50
296     9.50
281     2.10
285     7.40
182     0.30
Name: selling_price, Length: 61, dtype: float64
```

In [46]:
```
# let's do a prediction for this dataset the original output is 3.35
#       car_name        year    present_price   kms_driven      fuel_type       sel
#        ritz       2014            5.59              27000      Petrol
```

In [47]:
```
new_data=pd.DataFrame([['ritz',2014,5.59,27000,'Petrol','Dealer','Manual',0]],colum
```

In [48]:
```
new_data
```

Out[48]:

	car_name	year	present_price	kms_driven	fuel_type	seller_type	transmission	owner
0	ritz	2014	5.59	27000	Petrol	Dealer	Manual	0

In [49]:
```
new_data['car_name']=car_name_le.fit_transform(new_data['car_name'])
```

In [50]:
```
new_data['fuel_type']=fuel_type_le.fit_transform(new_data['fuel_type'])
```

In [51]:
```
new_data['seller_type']=seller_type_le.fit_transform(new_data['seller_type'])
```

In [52]:
```
new_data['transmission']=transmission_le.fit_transform(new_data['transmission'])
```

In [53]:
```
new_data=pd.DataFrame(ss.transform(new_data),columns=new_data.columns)
```

In [54]:
```
new_data
```

Out[54]:

	car_name	year	present_price	kms_driven	fuel_type	seller_type	transmission	
0	-2.4508	0.128897	-0.236215	-0.256224	-4.204665	-0.737285	-2.554408	-0.1

In [55]:
```
rf.predict(new_data)
```

Out[55]:
```
array([3.3675])
```

In [57]:
```
# our predicted value is 3.3675
```

Thank you !