In [1]:

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

In [4]:

```
df = pd.read_csv('Desktop/car data.csv')
df
```

Out[4]:

	Car_Name	Year	Selling_Price	Present_Price	Driven_kms	Fuel_Type	Selling_type	Transm
0	ritz	2014	3.35	5.59	27000	Petrol	Dealer	M
1	sx4	2013	4.75	9.54	43000	Diesel	Dealer	M
2	ciaz	2017	7.25	9.85	6900	Petrol	Dealer	M
3	wagon r	2011	2.85	4.15	5200	Petrol	Dealer	M
4	swift	2014	4.60	6.87	42450	Diesel	Dealer	M
...	...	...	...	...	...	...	...	
296	city	2016	9.50	11.60	33988	Diesel	Dealer	M
297	brio	2015	4.00	5.90	60000	Petrol	Dealer	M
298	city	2009	3.35	11.00	87934	Petrol	Dealer	M
299	city	2017	11.50	12.50	9000	Diesel	Dealer	M
300	brio	2016	5.30	5.90	5464	Petrol	Dealer	M

301 rows × 9 columns

In [5]:

```
df.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   Selling_Price  301 non-null    float64
 3   Present_Price  301 non-null    float64
 4   Driven_kms     301 non-null    int64  
 5   Fuel_Type      301 non-null    object 
 6   Selling_type   301 non-null    object 
 7   Transmission   301 non-null    object 
 8   Owner          301 non-null    int64  
dtypes: float64(2), int64(3), object(4)
memory usage: 16.5+ KB
```

In [6]:
```
df.describe()
```

Out[6]:

	Year	Selling_Price	Present_Price	Driven_kms	Owner
count	301.000000	301.000000	301.000000	301.000000	301.000000
mean	2013.627907	4.661296	7.628472	36947.205980	0.043189
std	2.891554	5.082812	8.642584	38886.883882	0.247915
min	2003.000000	0.100000	0.320000	500.000000	0.000000
25%	2012.000000	0.900000	1.200000	15000.000000	0.000000
50%	2014.000000	3.600000	6.400000	32000.000000	0.000000
75%	2016.000000	6.000000	9.900000	48767.000000	0.000000
max	2018.000000	35.000000	92.600000	500000.000000	3.000000

In [16]:
```
df
```

Out[16]:

	Car_Name	Year	Selling_Price	Present_Price	Driven_kms	Fuel_Type	Selling_type	Transm
0	ritz	2014	3.35	5.59	27000	Petrol	Dealer	M
1	sx4	2013	4.75	9.54	43000	Diesel	Dealer	M
2	ciaz	2017	7.25	9.85	6900	Petrol	Dealer	M
3	wagon r	2011	2.85	4.15	5200	Petrol	Dealer	M
4	swift	2014	4.60	6.87	42450	Diesel	Dealer	M
...	...	...	...	...	...	...	...	
296	city	2016	9.50	11.60	33988	Diesel	Dealer	M
297	brio	2015	4.00	5.90	60000	Petrol	Dealer	M
298	city	2009	3.35	11.00	87934	Petrol	Dealer	M
299	city	2017	11.50	12.50	9000	Diesel	Dealer	M
300	brio	2016	5.30	5.90	5464	Petrol	Dealer	M

301 rows × 9 columns

In [9]:
```
df['Selling_Price'].mean()
```

Out[9]:
```
4.661295681063127
```

In [12]:
```
df['Year'].mean()
```

Out[12]:
```
2013.6279069767443
```

In [13]:
```
df['Year'].std()
```

Out[13]:
```
2.891554127336682
```

In [14]:
```
df['Present_Price'].max()
```

Out[14]:
```
92.6
```

In [15]:
```
df['Present_Price'].min()
```

Out[15]:
```
0.32
```

In [22]:
```
df[df['Car_Name'] == 'ritz']
```

Out[22]:

	Car_Name	Year	Selling_Price	Present_Price	Driven_kms	Fuel_Type	Selling_type	Transmis
0	ritz	2014	3.35	5.59	27000	Petrol	Dealer	M
30	ritz	2012	3.10	5.98	51439	Diesel	Dealer	M
31	ritz	2011	2.35	4.89	54200	Petrol	Dealer	M
46	ritz	2013	2.65	4.89	64532	Petrol	Dealer	M

In [25]:
```
 df[df['Car_Name'] == 'ritz']['Fuel_Type']
```

Out[25]:
```
0     Petrol
30    Diesel
31    Petrol
46    Petrol
Name: Fuel_Type, dtype: object
```

In [29]:
```
df[df['Car_Name'] == 'ritz']['Driven_kms']
```

Out[29]:
```
0     27000
30    51439
31    54200
46    64532
Name: Driven_kms, dtype: int64
```

In [30]:
```
df['Driven_kms'].max()
```

Out[30]:
```
500000
```

In [67]:
```
df[df['Driven_kms'] == df['Driven_kms'].max()]['Car_Name']
```

Out[67]:
```
196    Activa 3g
Name: Car_Name, dtype: object
```

In [31]:
```
df['Driven_kms'].min()
```

Out[31]:
```
500
```

In [66]:
```
df[df['Driven_kms'] == df['Driven_kms'].min()]['Car_Name']
```

Out[66]:
```
133    Bajaj Avenger 220
165            Activa 3g
Name: Car_Name, dtype: object
```

```
In [32]: df['Driven_kms'].std()

Out[32]: 38886.88388206788
```

```
In [33]: df['Driven_kms'].mean()

Out[33]: 36947.20598006644
```

```
In [38]: df['Driven_kms'].mode()

Out[38]: 0    15000
         1    45000
         Name: Driven_kms, dtype: int64
```

```
In [47]: df['Driven_kms'].shape

Out[47]: (301,)
```

```
In [69]: df.groupby('Year').mean()
```

Out[69]:

	Selling_Price	Present_Price	Driven_kms	Owner
Year				
2003	1.300000	5.130000	94500.000000	0.000000
2004	1.500000	12.350000	135154.000000	0.000000
2005	2.487500	9.485000	104294.000000	0.000000
2006	1.437500	9.057500	87422.250000	0.750000
2007	0.160000	0.665000	51000.000000	0.500000
2008	1.002857	4.759571	112128.571429	0.142857
2009	2.816667	10.601667	67820.500000	0.000000
2010	5.262667	14.330667	60014.066667	0.066667
2011	2.375263	5.148053	40327.368421	0.052632
2012	3.841304	7.984783	43798.217391	0.043478
2013	3.540909	6.821121	41534.333333	0.030303
2014	4.762105	7.811658	38080.315789	0.052632
2015	5.927049	8.181967	32109.196721	0.016393
2016	5.213200	6.550800	18387.340000	0.020000
2017	6.209143	7.037143	10419.800000	0.000000
2018	9.250000	9.830000	2071.000000	0.000000

In [73]:
```
df.groupby('Year').mean()['Present_Price']
```

Out[73]:
```
Year
2003     5.130000
2004    12.350000
2005     9.485000
2006     9.057500
2007     0.665000
2008     4.759571
2009    10.601667
2010    14.330667
2011     5.148053
2012     7.984783
2013     6.821121
2014     7.811658
2015     8.181967
2016     6.550800
2017     7.037143
2018     9.830000
Name: Present_Price, dtype: float64
```

In [75]:
```
df.groupby('Year').mean()['Selling_Price']
```

Out[75]:
```
Year
2003    1.300000
2004    1.500000
2005    2.487500
2006    1.437500
2007    0.160000
2008    1.002857
2009    2.816667
2010    5.262667
2011    2.375263
2012    3.841304
2013    3.540909
2014    4.762105
2015    5.927049
2016    5.213200
2017    6.209143
2018    9.250000
Name: Selling_Price, dtype: float64
```

In [76]:
```
df
```

Out[76]:

	Car_Name	Year	Selling_Price	Present_Price	Driven_kms	Fuel_Type	Selling_type	Transm
0	ritz	2014	3.35	5.59	27000	Petrol	Dealer	M
1	sx4	2013	4.75	9.54	43000	Diesel	Dealer	M
2	ciaz	2017	7.25	9.85	6900	Petrol	Dealer	M
3	wagon r	2011	2.85	4.15	5200	Petrol	Dealer	M
4	swift	2014	4.60	6.87	42450	Diesel	Dealer	M
...	...	...	...	...	...	...	...	
296	city	2016	9.50	11.60	33988	Diesel	Dealer	M
297	brio	2015	4.00	5.90	60000	Petrol	Dealer	M
298	city	2009	3.35	11.00	87934	Petrol	Dealer	M
299	city	2017	11.50	12.50	9000	Diesel	Dealer	M
300	brio	2016	5.30	5.90	5464	Petrol	Dealer	M

301 rows × 9 columns

In [79]:
```
df['Present_Price'].unique()
```

Out[79]:
```
array([ 5.59 ,  9.54 ,  9.85 ,  4.15 ,  6.87 ,  9.83 ,  8.12 ,  8.61 ,
        8.89 ,  8.92 ,  3.6  , 10.38 ,  9.94 ,  7.71 ,  7.21 , 10.79 ,
        5.09 ,  7.98 ,  3.95 ,  5.71 ,  8.01 ,  3.46 ,  4.41 ,  4.99 ,
        5.87 ,  6.49 ,  5.98 ,  4.89 ,  7.49 ,  9.95 ,  8.06 ,  7.74 ,
        7.2  ,  2.28 ,  3.76 ,  7.87 ,  3.98 ,  7.15 ,  2.69 , 12.04 ,
        9.29 , 30.61 , 19.77 , 10.21 , 15.04 ,  7.27 , 18.54 ,  6.8  ,
       35.96 , 18.61 ,  7.7  , 36.23 ,  6.95 , 23.15 , 20.45 , 13.74 ,
       20.91 ,  6.76 , 12.48 ,  8.93 , 14.68 , 12.35 , 22.83 , 14.89 ,
        7.85 , 25.39 , 13.46 , 23.73 , 92.6  ,  6.05 , 16.09 , 13.7  ,
       22.78 , 18.64 ,  1.9  ,  1.82 ,  1.78 ,  1.6  ,  1.47 ,  2.37 ,
        3.45 ,  1.5  ,  2.4  ,  1.4  ,  1.26 ,  1.17 ,  1.75 ,  0.95 ,
        0.8  ,  0.87 ,  0.84 ,  0.82 ,  0.81 ,  0.74 ,  1.2  ,  0.787,
        0.99 ,  0.94 ,  0.826,  0.55 ,  0.88 ,  0.51 ,  0.52 ,  0.54 ,
        0.73 ,  0.83 ,  0.64 ,  0.72 ,  1.05 ,  0.57 ,  0.48 ,  0.58 ,
        0.47 ,  0.75 ,  0.65 ,  0.32 ,  6.79 ,  5.7  ,  4.6  ,  4.43 ,
        7.13 ,  8.1  , 14.79 , 13.6  ,  9.4  ,  8.4  ,  5.43 ,  7.6  ,
        9.9  ,  6.82 ,  5.35 ,  7.   ,  5.97 ,  5.8  ,  8.7  , 10.   ,
        7.5  ,  5.9  , 14.   , 11.8  ,  8.5  ,  7.9  ,  6.4  ,  6.1  ,
       13.09 , 11.6  , 11.   , 12.5  ])
```

In [80]:
```
df['Present_Price'].nunique()
```

Out[80]:
```
148
```

In [81]:
```
df['Car_Name'].unique()
```

Out[81]:
```
array(['ritz', 'sx4', 'ciaz', 'wagon r', 'swift', 'vitara brezza',
       's cross', 'alto 800', 'ertiga', 'dzire', 'alto k10', 'ignis',
       '800', 'baleno', 'omni', 'fortuner', 'innova', 'corolla altis',
       'etios cross', 'etios g', 'etios liva', 'corolla', 'etios gd',
       'camry', 'land cruiser', 'Royal Enfield Thunder 500',
       'UM Renegade Mojave', 'KTM RC200', 'Bajaj Dominar 400',
       'Royal Enfield Classic 350', 'KTM RC390', 'Hyosung GT250R',
       'Royal Enfield Thunder 350', 'KTM 390 Duke ',
       'Mahindra Mojo XT300', 'Bajaj Pulsar RS200',
       'Royal Enfield Bullet 350', 'Royal Enfield Classic 500',
       'Bajaj Avenger 220', 'Bajaj Avenger 150', 'Honda CB Hornet 160R',
       'Yamaha FZ S V 2.0', 'Yamaha FZ 16', 'TVS Apache RTR 160',
       'Bajaj Pulsar 150', 'Honda CBR 150', 'Hero Extreme',
       'Bajaj Avenger 220 dtsi', 'Bajaj Avenger 150 street',
       'Yamaha FZ  v 2.0', 'Bajaj Pulsar  NS 200', 'Bajaj Pulsar 220 F',
       'TVS Apache RTR 180', 'Hero Passion X pro', 'Bajaj Pulsar NS 200',
       'Yamaha Fazer ', 'Honda Activa 4G', 'TVS Sport ',
       'Honda Dream Yuga ', 'Bajaj Avenger Street 220',
       'Hero Splender iSmart', 'Activa 3g', 'Hero Passion Pro',
```

In [82]:
```
df['Car_Name'].nunique()
```

Out[82]:
```
98
```

In [83]:
```
df['Fuel_Type'].unique()
```

Out[83]:
```
array(['Petrol', 'Diesel', 'CNG'], dtype=object)
```

In [84]:
```
df['Fuel_Type'].nunique()
```

Out[84]:
```
3
```

In [85]:
```
df['Transmission'].unique()
```

Out[85]:
```
array(['Manual', 'Automatic'], dtype=object)
```

In [86]:
```
df['Transmission'].nunique()
```

Out[86]:
```
2
```

In [87]:
```
df['Year'].unique()
```

Out[87]:
```
array([2014, 2013, 2017, 2011, 2018, 2015, 2016, 2009, 2010, 2012, 2003,
       2008, 2006, 2005, 2004, 2007], dtype=int64)
```

In [88]:
```
df['Year'].nunique()
```

Out[88]:
```
16
```

In [98]:
```
df['Car_Name'].value_counts()[:5]
```

Out[98]:
```
city              26
corolla altis     16
verna             14
fortuner          11
brio              10
Name: Car_Name, dtype: int64
```

In [104]:
```
df['Fuel_Type'].value_counts()[:3]
```

Out[104]:
```
Petrol    239
Diesel     60
CNG         2
Name: Fuel_Type, dtype: int64
```

In [108]:
```
df['Year'].value_counts()[:5]
```

Out[108]:
```
2015    61
2016    50
2014    38
2017    35
2013    33
Name: Year, dtype: int64
```

In [117]:
```
df[df['Year'] == 2013]
```

Out[117]:

	Car_Name	Year	Selling_Price	Present_Price	Driven_kms	Fuel_Type	Selling_type	Tran
1	sx4	2013	4.75	9.540	43000	Diesel	Dealer	
24	wagon r	2013	2.90	4.410	56879	Petrol	Dealer	
26	swift	2013	4.15	5.870	55138	Petrol	Dealer	
46	ritz	2013	2.65	4.890	64532	Petrol	Dealer	
53	fortuner	2013	16.00	30.610	135000	Diesel	Individual	
60	corolla altis	2013	6.95	18.610	40001	Petrol	Dealer	
72	corolla altis	2013	7.45	18.610	56001	Petrol	Dealer	
76	corolla altis	2013	5.50	14.680	72000	Petrol	Dealer	
88	etios liva	2013	3.45	6.050	47000	Petrol	Dealer	

In [129]:
```
(df[df['Year'] == 2013]['Car_Name'].value_counts() == 1).sum()
```

Out[129]:
```
21
```

```
In [112]: df[df['Year'] == 2017]
```

Out[112]:

	Car_Name	Year	Selling_Price	Present_Price	Driven_kms	Fuel_Type	Selling_type	Transm
2	ciaz	2017	7.25	9.85	6900	Petrol	Dealer	M
10	alto 800	2017	2.85	3.60	2135	Petrol	Dealer	M
21	ignis	2017	4.90	5.71	2400	Petrol	Dealer	M
27	swift	2017	6.00	6.49	16200	Petrol	Individual	M
49	ciaz	2017	7.75	9.29	37000	Petrol	Dealer	Aut
52	innova	2017	18.00	19.77	15000	Diesel	Dealer	Aut
64	fortuner	2017	33.00	36.23	6000	Diesel	Dealer	Aut
66	innova	2017	19.75	23.15	11000	Petrol	Dealer	Aut
82	innova	2017	23.00	25.39	15000	Diesel	Dealer	Aut
97	corolla altis	2017	17.00	18.64	8700	Petrol	Dealer	M
101	UM Renegade Mojave	2017	1.70	1.82	1400	Petrol	Individual	M
102	KTM RC200	2017	1.65	1.78	4000	Petrol	Individual	M
103	Bajaj Dominar 400	2017	1.45	1.60	1200	Petrol	Individual	M
104	Royal Enfield Classic 350	2017	1.35	1.47	4100	Petrol	Individual	M
109	Royal Enfield Classic 350	2017	1.20	1.47	11000	Petrol	Individual	M
126	Bajaj Avenger 220	2017	0.90	0.95	1300	Petrol	Individual	M
128	Honda CB Hornet 160R	2017	0.80	0.87	3000	Petrol	Individual	M
129	Yamaha FZ S V 2.0	2017	0.78	0.84	5000	Petrol	Individual	M
130	Honda CB Hornet 160R	2017	0.75	0.87	11000	Petrol	Individual	M
132	Bajaj Avenger 220	2017	0.75	0.95	3500	Petrol	Individual	M
134	TVS Apache RTR 160	2017	0.65	0.81	11800	Petrol	Individual	M
155	Honda Activa 4G	2017	0.48	0.51	4300	Petrol	Individual	Aut
156	TVS Sport	2017	0.48	0.52	15000	Petrol	Individual	M

	Car_Name	Year	Selling_Price	Present_Price	Driven_kms	Fuel_Type	Selling_type	Transm
158	Honda Dream Yuga	2017	0.48	0.54	8600	Petrol	Individual	M
159	Honda Activa 4G	2017	0.45	0.51	4000	Petrol	Individual	Aut
173	Activa 4g	2017	0.40	0.51	1300	Petrol	Individual	Aut
206	xcent	2017	5.75	7.13	12479	Petrol	Dealer	M
208	i20	2017	7.90	8.10	3435	Petrol	Dealer	M
214	grand i10	2017	5.25	5.70	20114	Petrol	Dealer	M
220	eon	2017	3.50	5.43	38488	Petrol	Dealer	M
231	verna	2017	9.25	9.40	15001	Petrol	Dealer	M
235	verna	2017	9.10	9.40	15141	Petrol	Dealer	M
265	jazz	2017	6.50	8.70	21200	Petrol	Dealer	M
268	brio	2017	4.80	5.80	19000	Petrol	Dealer	M
299	city	2017	11.50	12.50	9000	Diesel	Dealer	M

In [128]:

```
(df[df['Year'] == 2017]['Fuel_Type'].value_counts() == 1).sum()
```

Out[128]:

```
0
```

In [113]:

```
df[df['Year'] == 2008]
```

Out[113]:

	Car_Name	Year	Selling_Price	Present_Price	Driven_kms	Fuel_Type	Selling_type	Transm
42	sx4	2008	1.95	7.150	58000	Petrol	Dealer	M
94	corolla altis	2008	4.00	22.780	89000	Petrol	Dealer	Aut
184	Bajaj Pulsar 150	2008	0.25	0.750	26000	Petrol	Individual	M
185	Suzuki Access 125	2008	0.25	0.580	1900	Petrol	Individual	Aut
190	Bajaj Pulsar 150	2008	0.20	0.750	60000	Petrol	Individual	M
194	Hero CBZ Xtreme	2008	0.20	0.787	50000	Petrol	Individual	M
196	Activa 3g	2008	0.17	0.520	500000	Petrol	Individual	Aut

In [126]:

```
(df[df['Year'] == 2008]['Transmission'].value_counts() == 1).sum()
```

Out[126]:

```
0
```

In [152]:

```
def Petrol(string):
    if 'Fuel_Type' in (string.lower()):
        return True
    else:
        return False
```

In [153]:

```
df['Fuel_Type'].apply(lambda x: Petrol(x))
```

Out[153]:

```
0      False
1      False
2      False
3      False
4      False
       ...
296    False
297    False
298    False
299    False
300    False
Name: Fuel_Type, Length: 301, dtype: bool
```

Thank You