In [1]:
```
import pandas as pd
import numpy as np
from sklearn import preprocessing
import matplotlib.pyplot as plt
import seaborn as sns
sns.set(style="white")
sns.set(style="whitegrid",color_codes=True)
import warnings
warnings.simplefilter(action='ignore')
```

In [2]:
```
df=pd.read_csv(r"C:\Users\joel\Downloads\used_cars_data.csv")
df
```

Out[2]:

	S.No.	Name	Location	Year	Kilometers_Driven	Fuel_Type	Transmission	Owner_Type	Mileage	Engine	Power	Seats	New_Price
0	0	Maruti Wagon R LXI CNG	Mumbai	2010	72000	CNG	Manual	First	26.6 km/kg	998 CC	58.16 bhp	5.0	NaN
1	1	Hyundai Creta 1.6 CRDi SX Option	Pune	2015	41000	Diesel	Manual	First	19.67 kmpl	1582 CC	126.2 bhp	5.0	NaN
2	2	Honda Jazz V	Chennai	2011	46000	Petrol	Manual	First	18.2 kmpl	1199 CC	88.7 bhp	5.0	8.61 Lakh
3	3	Maruti Ertiga VDI	Chennai	2012	87000	Diesel	Manual	First	20.77 kmpl	1248 CC	88.76 bhp	7.0	NaN
4	4	Audi A4 New 2.0 TDI Multitronic	Coimbatore	2013	40670	Diesel	Automatic	Second	15.2 kmpl	1968 CC	140.8 bhp	5.0	NaN
...	...	...	...	...	...	...	...	...	...	...	...	...	...
7248	7248	Volkswagen Vento Diesel Trendline	Hyderabad	2011	89411	Diesel	Manual	First	20.54 kmpl	1598 CC	103.6 bhp	5.0	NaN
7249	7249	Volkswagen Polo GT TSI	Mumbai	2015	59000	Petrol	Automatic	First	17.21 kmpl	1197 CC	103.6 bhp	5.0	NaN
7250	7250	Nissan Micra Diesel XV	Kolkata	2012	28000	Diesel	Manual	First	23.08 kmpl	1461 CC	63.1 bhp	5.0	NaN
7251	7251	Volkswagen Polo GT TSI	Pune	2013	52262	Petrol	Automatic	Third	17.2 kmpl	1197 CC	103.6 bhp	5.0	NaN
7252	7252	Mercedes-Benz E-Class 2009-2013 E 220 CDI Avan...	Kochi	2014	72443	Diesel	Automatic	First	10.0 kmpl	2148 CC	170 bhp	5.0	NaN

7253 rows × 14 columns

In [3]:
```
df.head()
```

Out[3]:

	S.No.	Name	Location	Year	Kilometers_Driven	Fuel_Type	Transmission	Owner_Type	Mileage	Engine	Power	Seats	New_Price	Pric
0	0	Maruti Wagon R LXI CNG	Mumbai	2010	72000	CNG	Manual	First	26.6 km/kg	998 CC	58.16 bhp	5.0	NaN	1.7
1	1	Hyundai Creta 1.6 CRDi SX Option	Pune	2015	41000	Diesel	Manual	First	19.67 kmpl	1582 CC	126.2 bhp	5.0	NaN	12.5
2	2	Honda Jazz V	Chennai	2011	46000	Petrol	Manual	First	18.2 kmpl	1199 CC	88.7 bhp	5.0	8.61 Lakh	4.5
3	3	Maruti Ertiga VDI	Chennai	2012	87000	Diesel	Manual	First	20.77 kmpl	1248 CC	88.76 bhp	7.0	NaN	6.0
4	4	Audi A4 New 2.0 TDI Multitronic	Coimbatore	2013	40670	Diesel	Automatic	Second	15.2 kmpl	1968 CC	140.8 bhp	5.0	NaN	17.7

In [4]:
```
df.shape
```

Out[4]:
```
(7253, 14)
```

In [5]:
```
df.describe
```

Out[5]:
```
<bound method NDFrame.describe of       S.No.                                          Name    Location  \
0         0                              Maruti Wagon R LXI CNG      Mumbai
1         1                  Hyundai Creta 1.6 CRDi SX Option        Pune
2         2                                       Honda Jazz V     Chennai
3         3                                  Maruti Ertiga VDI     Chennai
4         4                    Audi A4 New 2.0 TDI Multitronic  Coimbatore
...     ...                                                ...         ...
7248   7248                 Volkswagen Vento Diesel Trendline   Hyderabad
7249   7249                           Volkswagen Polo GT TSI      Mumbai
7250   7250                           Nissan Micra Diesel XV     Kolkata
7251   7251                           Volkswagen Polo GT TSI        Pune
7252   7252  Mercedes-Benz E-Class 2009-2013 E 220 CDI Avan...       Kochi

      Year  Kilometers_Driven Fuel_Type Transmission Owner_Type     Mileage  \
0     2010              72000       CNG       Manual      First  26.6 km/kg
1     2015              41000    Diesel       Manual      First  19.67 kmpl
2     2011              46000    Petrol       Manual      First   18.2 kmpl
3     2012              87000    Diesel       Manual      First  20.77 kmpl
4     2013              40670    Diesel    Automatic     Second   15.2 kmpl
...    ...                ...       ...          ...        ...         ...
7248  2011              89411    Diesel       Manual      First  20.54 kmpl
7249  2015              59000    Petrol    Automatic      First  17.21 kmpl
7250  2012              28000    Diesel       Manual      First  23.08 kmpl
7251  2013              52262    Petrol    Automatic      Third   17.2 kmpl
7252  2014              72443    Diesel    Automatic      First   10.0 kmpl

       Engine      Power  Seats  New_Price  Price
0      998 CC  58.16 bhp    5.0        NaN   1.75
1     1582 CC  126.2 bhp    5.0        NaN  12.50
2     1199 CC   88.7 bhp    5.0  8.61 Lakh   4.50
3     1248 CC  88.76 bhp    7.0        NaN   6.00
4     1968 CC  140.8 bhp    5.0        NaN  17.74
...       ...        ...    ...        ...    ...
7248  1598 CC  103.6 bhp    5.0        NaN    NaN
7249  1197 CC  103.6 bhp    5.0        NaN    NaN
7250  1461 CC   63.1 bhp    5.0        NaN    NaN
7251  1197 CC  103.6 bhp    5.0        NaN    NaN
7252  2148 CC    170 bhp    5.0        NaN    NaN

[7253 rows x 14 columns]>
```

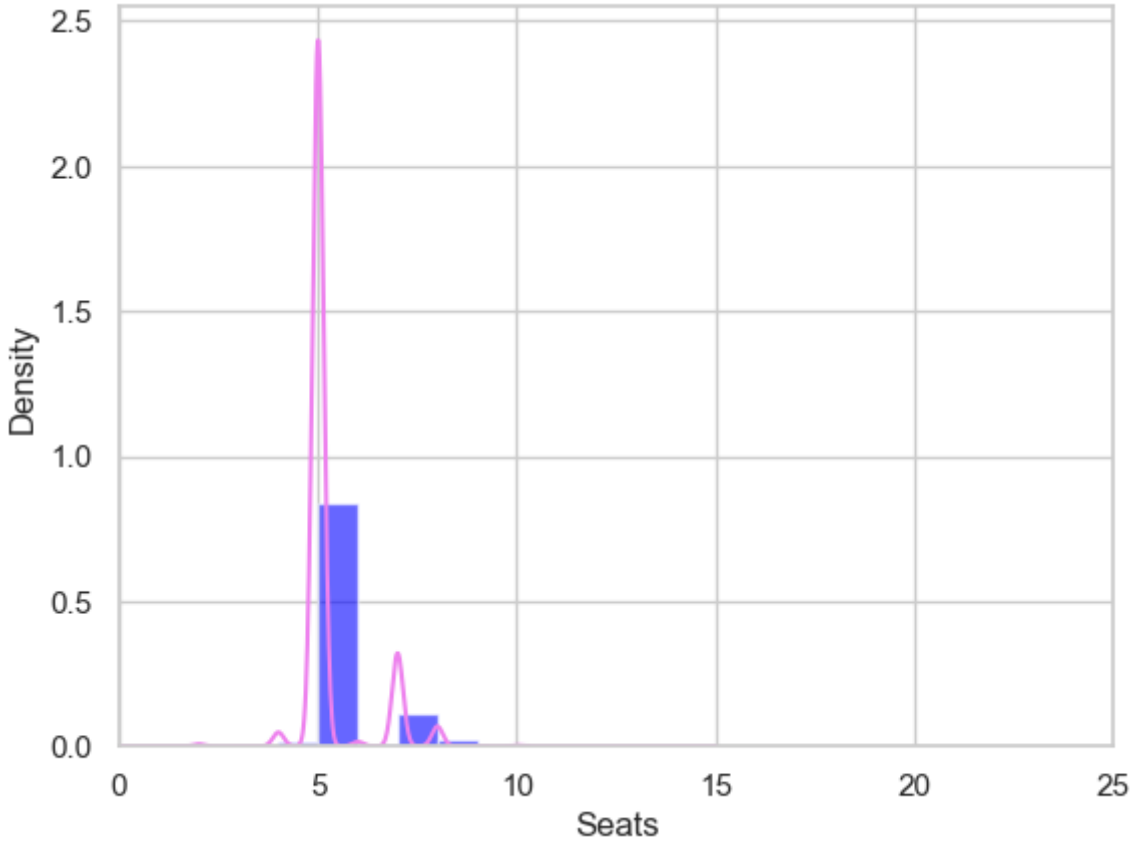
In [6]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7253 entries, 0 to 7252
Data columns (total 14 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   S.No.              7253 non-null   int64  
 1   Name               7253 non-null   object 
 2   Location           7253 non-null   object 
 3   Year               7253 non-null   int64  
 4   Kilometers_Driven  7253 non-null   int64  
 5   Fuel_Type          7253 non-null   object 
 6   Transmission       7253 non-null   object 
 7   Owner_Type         7253 non-null   object 
 8   Mileage            7251 non-null   object 
 9   Engine             7207 non-null   object 
 10  Power              7207 non-null   object 
 11  Seats              7200 non-null   float64
 12  New_Price          1006 non-null   object 
 13  Price              6019 non-null   float64
dtypes: float64(2), int64(3), object(9)
memory usage: 793.4+ KB
```

In [7]:
```
df.isna().sum()
```

Out[7]:
```
S.No.                0
Name                 0
Location             0
Year                 0
Kilometers_Driven    0
Fuel_Type            0
Transmission         0
Owner_Type           0
Mileage              2
Engine              46
Power               46
Seats               53
New_Price         6247
Price             1234
dtype: int64
```

In [8]:
```
ax=df["Seats"].hist(bins=10,density=True,stacked=True,color='blue',alpha=0.6)
df["Seats"].plot(kind='density',color='violet')
ax.set(xlabel='Seats')
plt.xlim(-0,25)
plt.show()
```



In [9]:
```
print(df["Seats"].mean(skipna=True))
print(df["Seats"].median(skipna=True))
```

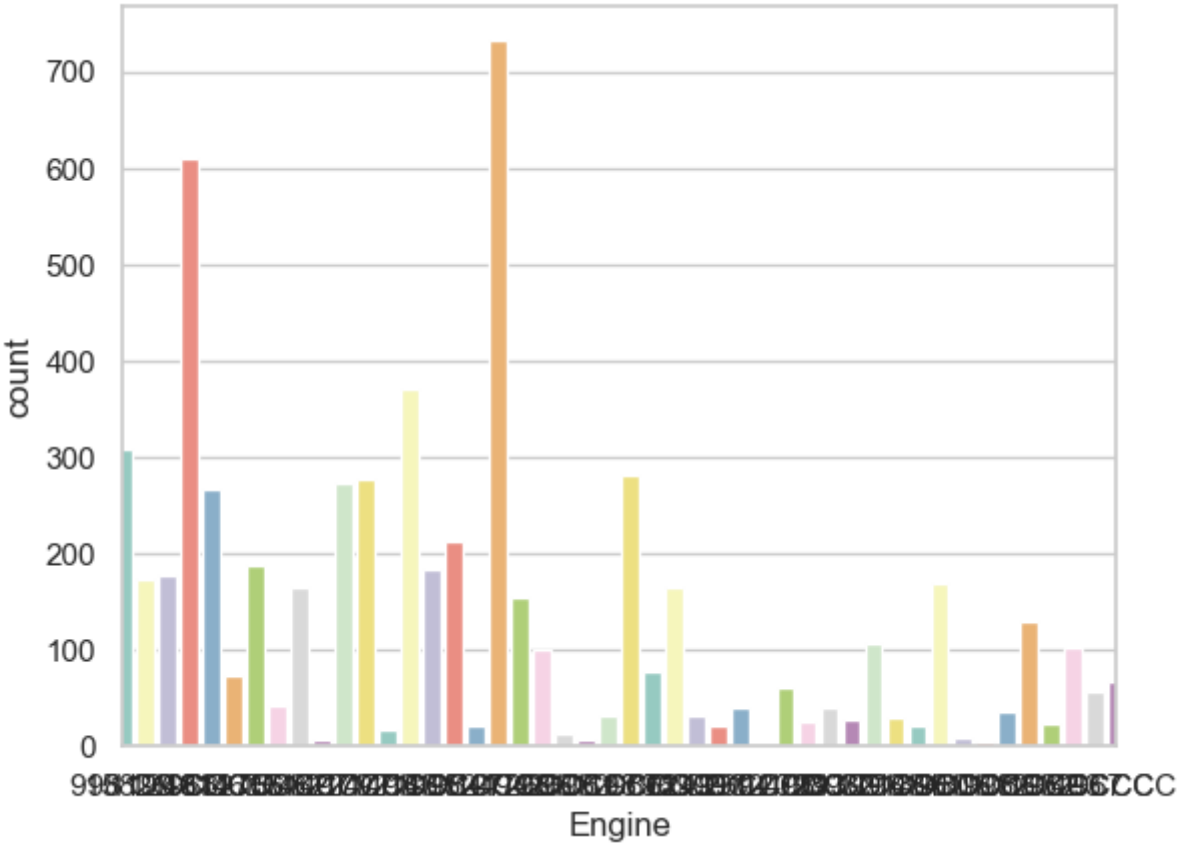
```
5.279722222222222
5.0
```

In [10]:
```
print(df["New_Price"].isnull().sum()/df.shape[0])
print(df["Price"].isnull().sum()/df.shape[0])
print(df["Mileage"].isnull().sum()/df.shape[0])
print(df["Engine"].isnull().sum()/df.shape[0])
print(df["Power"].isnull().sum()/df.shape[0])
```

```
0.8612987729215497
0.1701364952433476
0.0002757479663587481
0.006342203226251206
0.006342203226251206
```

In [11]:
```
print(df['Engine'].value_counts())
sns.countplot(x='Engine',data=df,palette='Set3')
plt.xlim(-0,45)
plt.show()
```

```
1197 CC    732
1248 CC    610
1498 CC    370
998 CC     309
1198 CC    281
           ...
1489 CC      1
1422 CC      1
2706 CC      1
1978 CC      1
1389 CC      1
Name: Engine, Length: 150, dtype: int64
```



In [12]:
```
data=df.copy()
data['Seats'].fillna(df['Seats'].median(skipna=True),inplace=True)
data.drop('New_Price',axis=1,inplace=True)
data['Price'].fillna(df['Price'].median(skipna=True),inplace=True)
data['Mileage'].fillna(df['Mileage'].value_counts().idxmax(),inplace=True)
data.drop('Engine',axis=1,inplace=True)
data.drop('Power',axis=1,inplace=True)
```

In [13]:
```
data.isnull().sum()
```

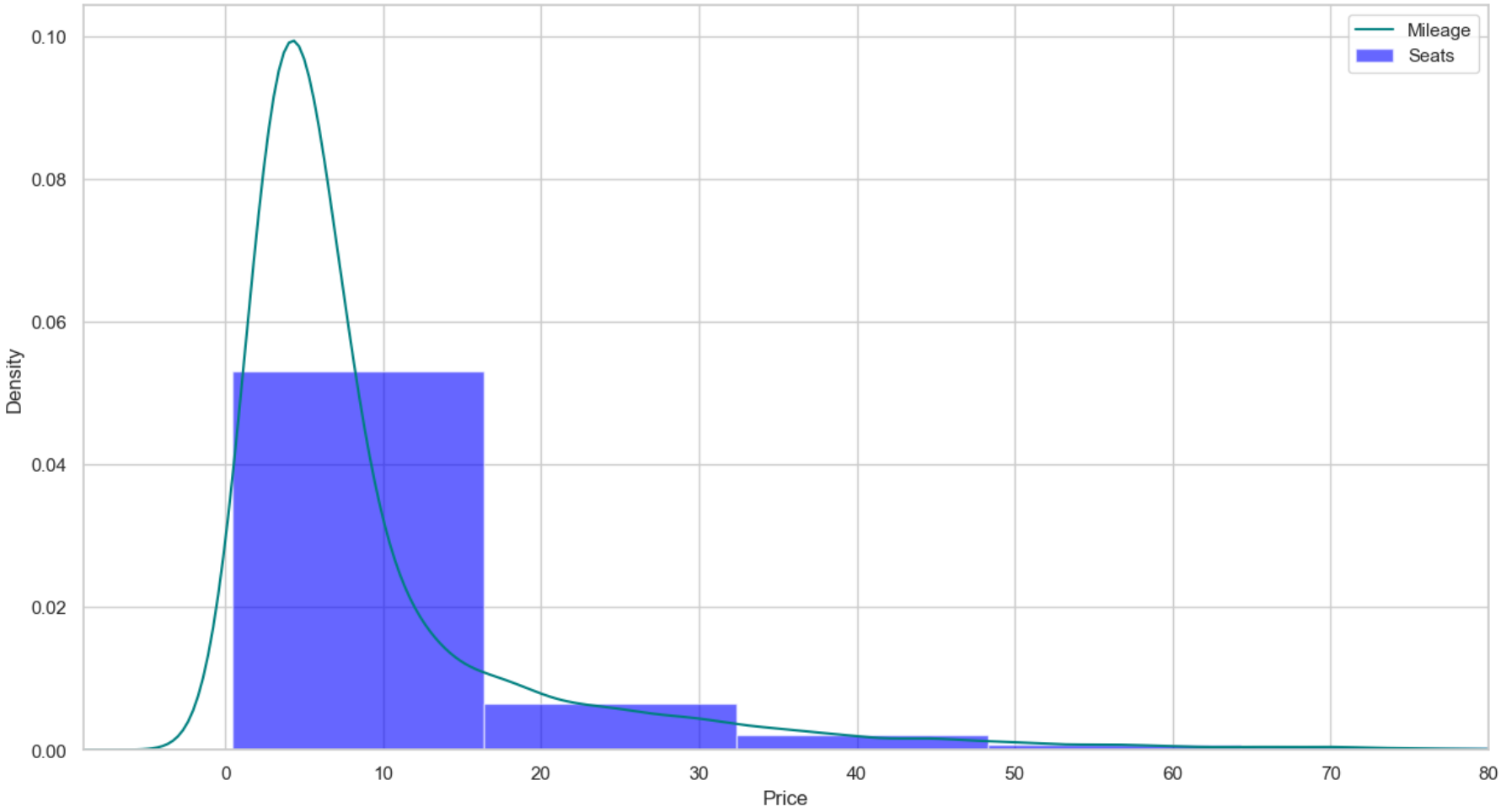
Out[13]:
```
S.No.                0
Name                 0
Location             0
Year                 0
Kilometers_Driven    0
Fuel_Type            0
Transmission         0
Owner_Type           0
Mileage              0
Seats                0
Price                0
dtype: int64
```

In [14]:
```
data.head()
```

Out[14]:

	S.No.	Name	Location	Year	Kilometers_Driven	Fuel_Type	Transmission	Owner_Type	Mileage	Seats	Price
0	0	Maruti Wagon R LXI CNG	Mumbai	2010	72000	CNG	Manual	First	26.6 km/kg	5.0	1.75
1	1	Hyundai Creta 1.6 CRDi SX Option	Pune	2015	41000	Diesel	Manual	First	19.67 kmpl	5.0	12.50
2	2	Honda Jazz V	Chennai	2011	46000	Petrol	Manual	First	18.2 kmpl	5.0	4.50
3	3	Maruti Ertiga VDI	Chennai	2012	87000	Diesel	Manual	First	20.77 kmpl	7.0	6.00
4	4	Audi A4 New 2.0 TDI Multitronic	Coimbatore	2013	40670	Diesel	Automatic	Second	15.2 kmpl	5.0	17.74

In [15]:
```
plt.figure(figsize=(15,8))
ax=df["Price"].hist(bins=10,density=True,stacked=True,color='blue',alpha=0.6)
df["Price"].plot(kind='density',color='teal')
ax.legend(['Mileage','Seats'])
ax.set(xlabel='Price')
plt.xlim(-9,80)
plt.show()
```



In [16]:
```
training=pd.get_dummies(data,columns=["S.No."])
final_train=training
final_train.head()
```

Out[16]:

nsmission	Owner_Type	Mileage	Seats	Price	...	S.No._7243	S.No._7244	S.No._7245	S.No._7246	S.No._7247	S.No._7248	S.No._7249	S.No._725(
Manual	First	26.6 km/kg	5.0	1.75	...	0	0	0	0	0	0	0	(
Manual	First	19.67 kmpl	5.0	12.50	...	0	0	0	0	0	0	0	(
Manual	First	18.2 kmpl	5.0	4.50	...	0	0	0	0	0	0	0	(
Manual	First	20.77 kmpl	7.0	6.00	...	0	0	0	0	0	0	0	(
Automatic	Second	15.2 kmpl	5.0	17.74	...	0	0	0	0	0	0	0	(

exploratoray data analysis

In [17]:
```
sns.barplot(x='Price',y='Year',data=final_train,color='mediumturquoise')
plt.show()
```

In [18]:
```
import seaborn as sns
import matplotlib.pyplot as plt
sns.barplot(x='Year',y='Seats',data=df,color='aquamarine')
plt.show()
```