In [ ]:
```
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\pavan\Downloads\used_cars_data (1).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.tail()
```

Out[4]:

| | S.No. | Name | Location | Year | Kilometers_Driven | Fuel_Type | Transmission | Owner_Type | Mileage | Engine | Power | Seats | New_Price |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 |

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

Out[5]:
```
(7253, 14)
```

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

Out[6]:

| | S.No. | Year | Kilometers_Driven | Seats | Price |
|---|---|---|---|---|---|
| **count** | 7253.000000 | 7253.000000 | 7.253000e+03 | 7200.000000 | 6019.000000 |
| **mean** | 3626.000000 | 2013.365366 | 5.869906e+04 | 5.279722 | 9.479468 |
| **std** | 2093.905084 | 3.254421 | 8.442772e+04 | 0.811660 | 11.187917 |
| **min** | 0.000000 | 1996.000000 | 1.710000e+02 | 0.000000 | 0.440000 |
| **25%** | 1813.000000 | 2011.000000 | 3.400000e+04 | 5.000000 | 3.500000 |
| **50%** | 3626.000000 | 2014.000000 | 5.341600e+04 | 5.000000 | 5.640000 |
| **75%** | 5439.000000 | 2016.000000 | 7.300000e+04 | 5.000000 | 9.950000 |
| **max** | 7252.000000 | 2019.000000 | 6.500000e+06 | 10.000000 | 160.000000 |

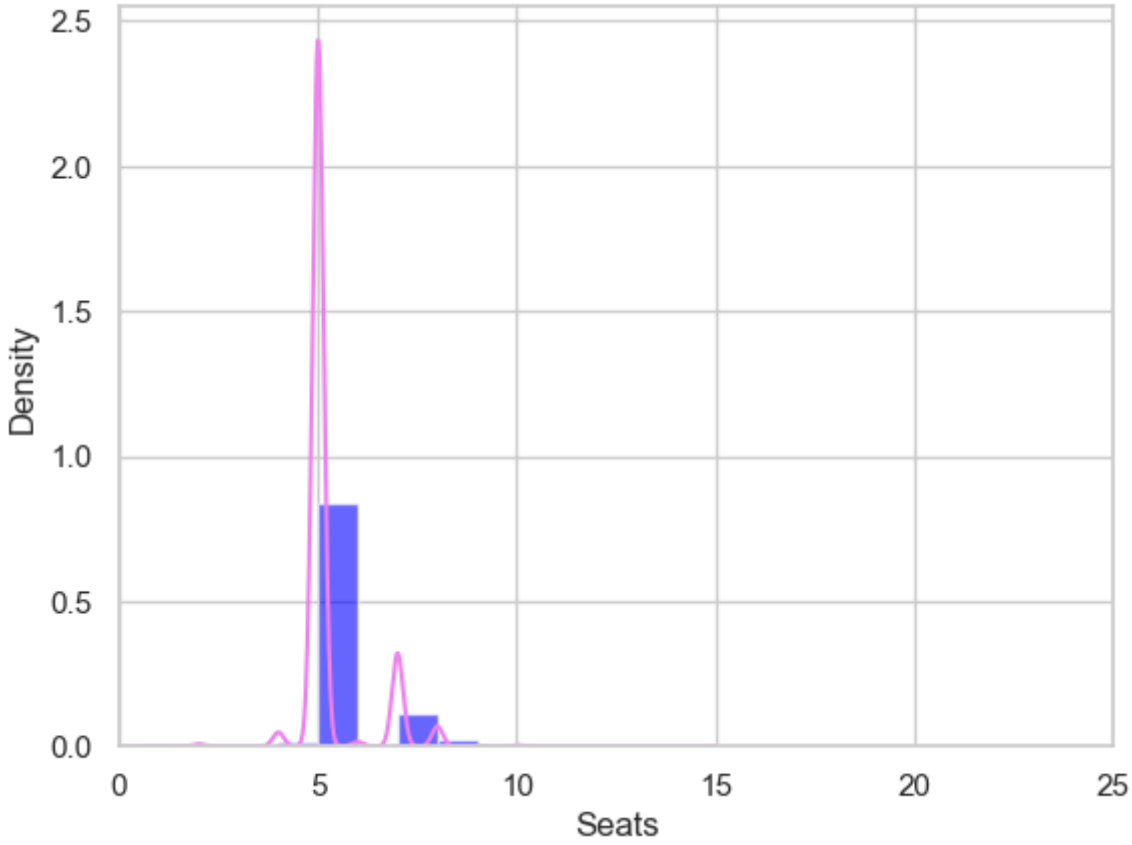
In [7]:
```
df.info()
```

```
<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 [8]:
```
df.isnull().sum()
```

Out[8]:
```
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 [9]:
```
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 [10]:
```
print(df["Seats"].mean(skipna=True))
print(df["Seats"].median(skipna=True))
```

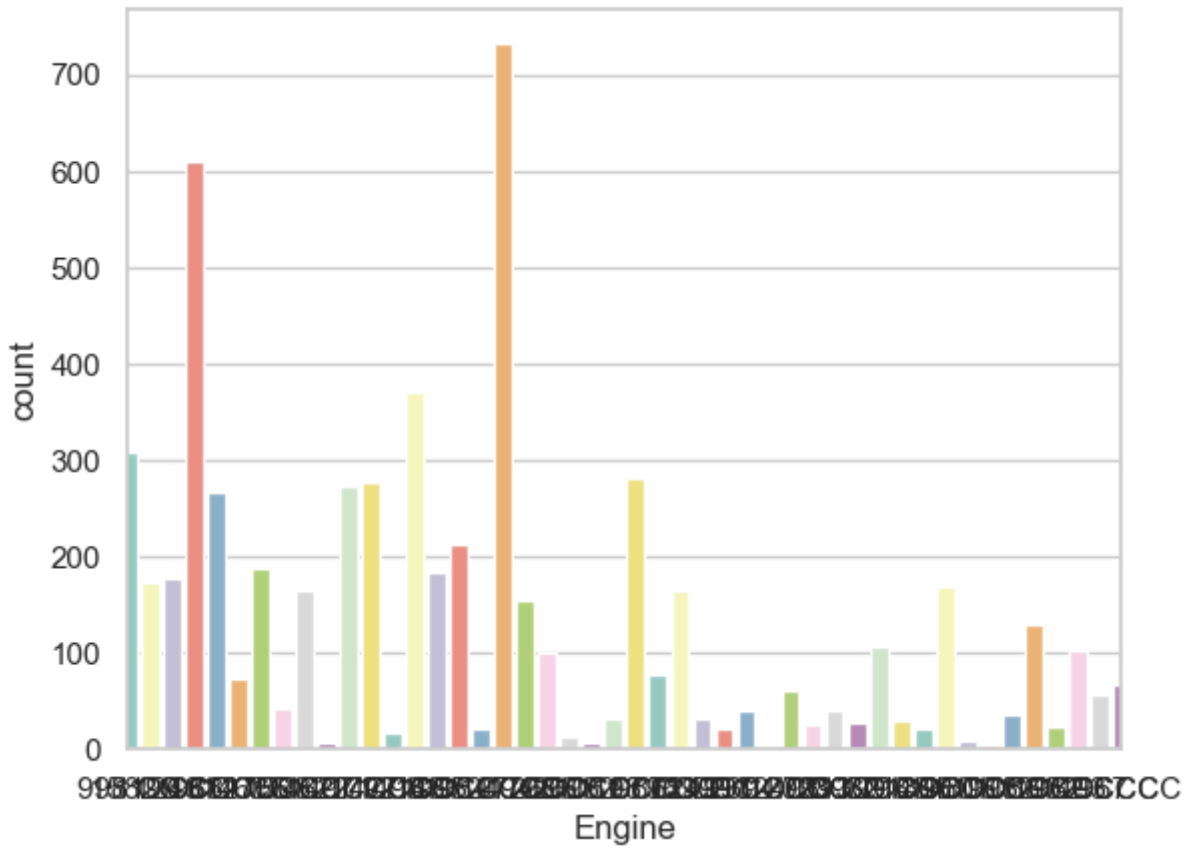
```
5.279722222222222
5.0
```

In [11]:
```
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 [12]:
```
print(df['Engine'].value_counts())
sns.countplot(x='Engine',data=df,palette='Set3')
plt.xlim(-0,45)
plt.show()
```

```
Engine
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: count, Length: 150, dtype: int64
```




In [13]:
```
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 [15]:
```
data.isnull().sum()
```

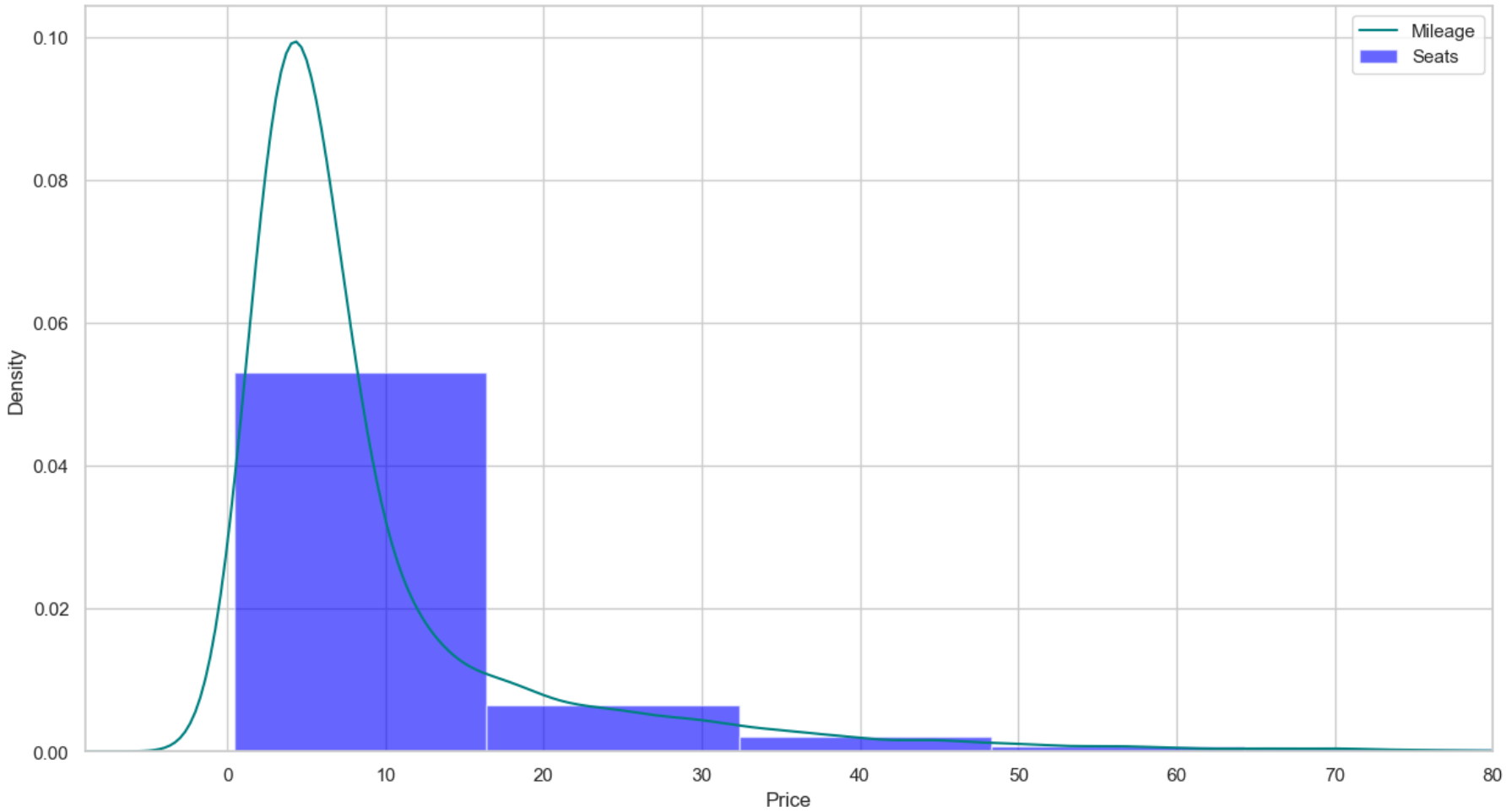
Out[15]:
```
S.No.                0
Name                 0
Location             0
Year                 0
Kilometers_Driven    0
Fuel_Type            0
Transmission         0
Owner_Type           0
Mileage              0
Seats                0
Price                0
dtype: int64
```

In [16]:
```
df.head()
```

Out[16]:

| | 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 [17]:
```
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 [18]:
```
training=pd.get_dummies(data,columns=["S.No."])
final_train=training
final_train.head()
```

Out[18]:

| | Name | Location | Year | Kilometers_Driven | Fuel_Type | Transmission | Owner_Type | Mileage | Seats | Price | ... | S.No._7243 | S.No._7244 | S.No |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | Maruti Wagon R LXI CNG | Mumbai | 2010 | 72000 | CNG | Manual | First | 26.6 km/kg | 5.0 | 1.75 | ... | False | False | |
| **1** | Hyundai Creta 1.6 CRDi SX Option | Pune | 2015 | 41000 | Diesel | Manual | First | 19.67 kmpl | 5.0 | 12.50 | ... | False | False | |
| **2** | Honda Jazz V | Chennai | 2011 | 46000 | Petrol | Manual | First | 18.2 kmpl | 5.0 | 4.50 | ... | False | False | |
| **3** | Maruti Ertiga VDI | Chennai | 2012 | 87000 | Diesel | Manual | First | 20.77 kmpl | 7.0 | 6.00 | ... | False | False | |
| **4** | Audi A4 New 2.0 TDI Multitronic | Coimbatore | 2013 | 40670 | Diesel | Automatic | Second | 15.2 kmpl | 5.0 | 17.74 | ... | False | False | |

5 rows × 7263 columns

In [ ]:
```
EXPLORATORY DATA ANALYSIS
```

In [20]:
```
sns.barplot(x='Price',y='Year',data=final_train,color='mediumturquoise')
plt.show()
```

In [21]:
```
import seaborn as sns
import matplotlib.pyplot as plt
sns.barplot(x='Year',y='Seats',data=df,color='aquamarine')
plt.show()
```