```
import pandas as pd
```

```
car= pd.read_csv('/content/quikr_car.csv')
```

```
car.head()
```

	name	company	year	Price	kms_driven	fuel_type
0	Hyundai Santro Xing XO eRLX Euro III	Hyundai	2007	80,000	45,000 kms	Petrol
1	Mahindra Jeep CL550 MDI	Mahindra	2006	4,25,000	40 kms	Diesel
2	Maruti Suzuki Alto 800 Vxi	Maruti	2018	Ask For Price	22,000 kms	Petrol
3	Hyundai Grand i10 Magna 1.2 Kappa VTVT	Hyundai	2014	3,25,000	28,000 kms	Petrol
4	Ford EcoSport Titanium 1.5L TDCi	Ford	2014	5,75,000	36,000 kms	Diesel

Next steps: Generate code with car View recommended plots

```
car.shape
```

```
(892, 6)
```

```
car.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 892 entries, 0 to 891
Data columns (total 6 columns):
 #   Column      Non-Null Count  Dtype 
---  ------      --------------  ----- 
 0   name        892 non-null    object
 1   company     892 non-null    object
 2   year        892 non-null    object
 3   Price       892 non-null    object
 4   kms_driven  840 non-null    object
 5   fuel_type   837 non-null    object
dtypes: object(6)
memory usage: 41.9+ KB
```

```
car['year'].unique()
```

```
array(['2007', '2006', '2018', '2014', '2015', '2012', '2013', '2016',
       '2010', '2017', '2008', '2011', '2019', '2009', '2005', '2000',
       '...', '150k', 'TOUR', '2003', 'r 15', '2004', 'Zest', '/-Rs',
       'sale', '1995', 'ara)', '2002', 'SELL', '2001', 'tion', 'odel',
       '2 bs', 'arry', 'Eon', 'o...', 'ture', 'emi', 'car', 'able', 'no.',
       'd...', 'SALE', 'digo', 'sell', 'd Ex', 'n...', 'e...', 'D...',
       ', Ac', 'go .', 'k...', 'o c4', 'zire', 'cent', 'Sumo', 'cab',
       't xe', 'EV2', 'r...', 'zest'], dtype=object)
```

```
car['Price'].unique()
```

```
array(['80,000', '4,25,000', 'Ask For Price', '3,25,000', '5,75,000',
       '1,75,000', '1,90,000', '8,30,000', '2,50,000', '1,82,000',
       '3,15,000', '4,15,000', '3,20,000', '10,00,000', '5,00,000',
       '3,50,000', '1,60,000', '3,10,000', '75,000', '1,00,000',
       '2,90,000', '95,000', '1,80,000', '3,85,000', '1,05,000',
       '6,50,000', '6,89,999', '4,48,000', '5,49,000', '5,01,000',
       '4,89,999', '2,80,000', '3,49,999', '2,84,999', '3,45,000',
       '4,99,999', '2,35,000', '2,49,999', '14,75,000', '3,95,000',
       '2,20,000', '1,70,000', '85,000', '2,00,000', '5,70,000',
       '1,10,000', '4,48,999', '18,91,111', '1,59,500', '3,44,999',
       '4,49,999', '8,65,000', '6,99,000', '3,75,000', '2,24,999',
       '12,00,000', '1,95,000', '3,51,000', '2,40,000', '90,000',
       '1,55,000', '6,00,000', '1,89,500', '2,10,000', '3,90,000',
       '1,35,000', '16,00,000', '7,01,000', '2,65,000', '5,25,000',
       '3,72,000', '6,35,000', '5,50,000', '4,85,000', '3,29,500',
       '2,51,111', '5,69,999', '69,999', '2,99,999', '3,99,999',
       '4,50,000', '2,70,000', '1,58,400', '1,79,000', '1,25,000',
       '2,99,000', '1,50,000', '2,75,000', '2,85,000', '3,40,000',
       '70,000', '2,89,999', '8,49,999', '7,49,999', '2,74,999',
       '9,84,999', '5,99,999', '2,44,999', '4,74,999', '2,45,000',
       '1,69,500', '3,70,000', '1,68,000', '1,45,000', '98,500',
       '2,09,000', '1,85,000', '9,00,000', '6,99,999', '1,99,999',
       '5,44,999', '1,99,000', '5,40,000', '49,000', '7,00,000', '55,000',
            '8,95,000', '3,55,000', '5,65,000', '3,65,000', '40,000',
            '4,00,000', '3,30,000', '5,80,000', '3,79,000', '2,19,000',
            '5,19,000', '7,30,000', '20,00,000', '21,00,000', '14,00,000',
            '3,11,000', '8,55,000', '5,35,000', '1,78,000', '3,00,000',
            '2,55,000', '5,49,999', '3,80,000', '57,000', '4,10,000',
            '2,25,000', '1,20,000', '59,000', '5,99,000', '6,75,000', '72,500',
            '6,10,000', '2,30,000', '5,20,000', '5,24,999', '4,24,999',
            '6,44,999', '5,84,999', '7,99,999', '4,44,999', '6,49,999',
            '9,44,999', '5,74,999', '3,74,999', '1,30,000', '4,01,000',
            '13,50,000', '1,74,999', '2,39,999', '99,999', '3,24,999',
            '10,74,999', '11,30,000', '1,49,000', '7,70,000', '30,000',
            '3,35,000', '3,99,000', '65,000', '1,69,999', '1,65,000',
            '5,60,000', '9,50,000', '7,15,000', '45,000', '9,40,000',
            '1,55,555', '15,00,000', '4,95,000', '8,00,000', '12,99,000',
            '5,30,000', '14,99,000', '32,000', '4,05,000', '7,60,000',
            '7,50,000', '4,19,000', '1,40,000', '15,40,000', '1,23,000',
            '4,98,000', '4,80,000', '4,88,000', '15,25,000', '5,48,900',
            '7,25,000', '99,000', '52,000', '28,00,000', '4,99,000',
            '3,81,000', '2,78,000', '6,90,000', '2,60,000', '90,001',
            '1,15,000', '15,99,000', '1,59,000', '51,999', '2,15,000',
            '35,000', '11,50,000', '2,69,000', '60,000', '4,30,000',
            '85,00,003', '4,01,919', '4,90,000', '4,24,000', '2,05,000',
            '5,49,900', '3,71,500', '4,35,000', '1,89,700', '3,89,700',
            '3,60,000', '2,95,000', '1,14,990', '10,65,000', '4,70,000',
            '48,000', '1,88,000', '4,65,000', '1,79,999', '21,90,000',
            '23,90,000', '10,75,000', '4,75,000', '10,25,000', '6,15,000',
            '19,00,000', '14,90,000', '15,10,000', '18,50,000', '7,90,000',
            '17,25,000', '12,25,000', '68,000', '9,70,000', '31,00,000',
            '8,99,000', '88,000', '53,000', '5,68,500', '71,000', '5,90,000',
            '7,95,000', '42,000', '1,89,000', '1,62,000', '35,999',
            '29,00,000', '39,999', '50,500', '5,10,000', '8,60,000',
            '5,00,001'], dtype=object)
```

```
car['kms_driven'].unique()
```

```
            '4,000 kms', '16,934 kms', '43,000 kms', '35,550 kms',
            '39,522 kms', '39,000 kms', '55,000 kms', '72,000 kms',
            '15,975 kms', '70,000 kms', '23,452 kms', '35,522 kms',
            '48,508 kms', '15,487 kms', '82,000 kms', '20,000 kms',
            '68,000 kms', '38,000 kms', '27,000 kms', '33,000 kms',
            '46,000 kms', '16,000 kms', '47,000 kms', '35,000 kms',
            '30,874 kms', '15,000 kms', '29,685 kms', '1,30,000 kms',
            '19,000 kms', nan, '54,000 kms', '13,000 kms', '38,200 kms',
            '50,000 kms', '13,500 kms', '3,600 kms', '45,863 kms',
            '60,500 kms', '12,500 kms', '18,000 kms', '13,349 kms',
            '29,000 kms', '44,000 kms', '42,000 kms', '14,000 kms',
            '49,000 kms', '36,200 kms', '51,000 kms', '1,04,000 kms',
            '33,333 kms', '33,600 kms', '5,600 kms', '7,500 kms', '26,000 kms',
            '24,330 kms', '65,480 kms', '28,028 kms', '2,00,000 kms',
            '99,000 kms', '2,800 kms', '21,000 kms', '11,000 kms',
            '66,000 kms', '3,000 kms', '7,000 kms', '38,500 kms', '37,200 kms',
            '43,200 kms', '24,800 kms', '45,872 kms', '40,000 kms',
            '11,400 kms', '97,200 kms', '52,000 kms', '31,000 kms',
            '1,75,430 kms', '37,000 kms', '65,000 kms', '3,350 kms',
            '75,000 kms', '62,000 kms', '73,000 kms', '2,200 kms',
            '54,870 kms', '34,580 kms', '97,000 kms', '60 kms', '80,200 kms',
            '3,200 kms', '0,000 kms', '5,000 kms', '588 kms', '71,200 kms',
            '1,75,400 kms', '9,300 kms', '56,758 kms', '10,000 kms',
            '56,450 kms', '56,000 kms', '32,700 kms', '9,000 kms', '73 kms',
            '1,60,000 kms', '84,000 kms', '58,559 kms', '57,000 kms',
            '1,70,000 kms', '80,000 kms', '6,821 kms', '23,000 kms',
            '34,000 kms', '1,800 kms', '4,00,000 kms', '48,000 kms',
            '90,000 kms', '12,000 kms', '69,900 kms', '1,66,000 kms',
            '122 kms', '0 kms', '24,000 kms', '36,469 kms', '7,800 kms',
            '24,695 kms', '15,141 kms', '59,910 kms', '1,00,000 kms',
            '4,500 kms', '1,29,000 kms', '300 kms', '1,31,000 kms',
            '1,11,111 kms', '59,466 kms', '25,500 kms', '44,005 kms',
            '2,110 kms', '43,222 kms', '1,00,200 kms', '65 kms',
            '1,40,000 kms', '1,03,553 kms', '58,000 kms', '1,20,000 kms',
            '49,800 kms', '100 kms', '81,876 kms', '6,020 kms', '55,700 kms',
            '18,500 kms', '1,80,000 kms', '53,000 kms', '35,500 kms',
            '22,134 kms', '1,000 kms', '8,500 kms', '87,000 kms', '6,000 kms',
            '15,574 kms', '8,000 kms', '55,800 kms', '56,400 kms',
            '72,160 kms', '11,500 kms', '1,33,000 kms', '2,000 kms',
            '88,000 kms', '65,422 kms', '1,17,000 kms', '1,50,000 kms',
            '10,750 kms', '6,800 kms', '5 kms', '9,800 kms', '57,923 kms',
            '30,201 kms', '6,200 kms', '37,518 kms', '24,652 kms', '383 kms',
            '95,000 kms', '3,528 kms', '52,500 kms', '47,900 kms',
            '52,800 kms', '1,95,000 kms', '48,008 kms', '48,247 kms',
            '9,400 kms', '64,000 kms', '2,137 kms', '10,544 kms', '49,500 kms',
       '28,600 kms', '41,800 kms', '1,16,000 kms', '42,590 kms',
       '7,400 kms', '54,500 kms', '76,000 kms', '00 kms', '11,523 kms',
       '38,600 kms', '95,500 kms', '37,458 kms', '85,960 kms',
       '12,516 kms', '30,600 kms', '2,550 kms', '62,500 kms',
       '69,000 kms', '28,400 kms', '68,485 kms', '3,500 kms',
       '85,455 kms', '63,000 kms', '1,600 kms', '77,000 kms',
       '26,500 kms', '2,875 kms', '13,900 kms', '1,500 kms', '2,450 kms',
       '1,625 kms', '33,400 kms', '60,123 kms', '38,900 kms',
       '1,37,495 kms', '91,200 kms', '1,46,000 kms', '1,00,800 kms',
       '2,100 kms', '2,500 kms', '1,32,000 kms', 'Petrol'], dtype=object)
```

Double-click (or enter) to edit

```
car['fuel_type'].unique()
```

```
array(['Petrol', 'Diesel', nan, 'LPG'], dtype=object)
```

Quality

- year has non year values
- year object to int
- price has Ask for Price
- Price object to int
- kms_driven has kms with int
- kms_driven object to int
- kms driven has NAN values
- fuel_type has NAN values
- keep first three words of name

CLEANING

```
backup= car.copy()
```

```
car= car[car['year'].str.isnumeric()]
```

```
car['year']= car['year'].astype(int)
```

```
<ipython-input-59-27f01879d805>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-c
  car['year']= car['year'].astype(int)
```

```
car= car[car['Price']!= 'Ask For Price']
```

```
car['Price']= car['Price'].str.replace(',','').astype(int)
```

```
car['kms_driven']= car['kms_driven'].str.split(' ').str.get(0).str.replace(',','')
```

```
car= car[car['kms_driven'].str.isnumeric()]
```

```
car['kms_driven']= car['kms_driven'].astype(int)
```

```
car.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 817 entries, 0 to 889
Data columns (total 6 columns):
 #   Column      Non-Null Count  Dtype
---  ------      --------------  -----
 0   name        817 non-null    object
 1   company     817 non-null    object
 2   year        817 non-null    int64
 3   Price       817 non-null    int64
 4   kms_driven  817 non-null    int64 
 5   fuel_type   816 non-null    object
dtypes: int64(3), object(3)
memory usage: 44.7+ KB
```

```
car= car[~car['fuel_type'].isna()]
```

```
car['name']= car['name'].str.split(' ').str.slice(0,3).str.join(' ')
```

```
<ipython-input-67-f22b21ffc2d3>:1: SettingWithCopyWarning: 
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-c
  car['name']= car['name'].str.split(' ').str.slice(0,3).str.join(' ')
```

```
car= car.reset_index(drop= True)
```

```
car
```

	name	company	year	Price	kms_driven	fuel_type
0	Hyundai Santro Xing	Hyundai	2007	80000	45000	Petrol
1	Mahindra Jeep CL550	Mahindra	2006	425000	40	Diesel
2	Hyundai Grand i10	Hyundai	2014	325000	28000	Petrol
3	Ford EcoSport Titanium	Ford	2014	575000	36000	Diesel
4	Ford Figo	Ford	2012	175000	41000	Diesel
...	...	...	...	...	...	...
811	Maruti Suzuki Ritz	Maruti	2011	270000	50000	Petrol
812	Tata Indica V2	Tata	2009	110000	30000	Diesel
813	Toyota Corolla Altis	Toyota	2009	300000	132000	Petrol
814	Tata Zest XM	Tata	2018	260000	27000	Diesel
815	Mahindra Quanto C8	Mahindra	2013	390000	40000	Diesel

816 rows × 6 columns

Next steps: Generate code with car | View recommended plots

```
car.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 816 entries, 0 to 815
Data columns (total 6 columns):
 #   Column      Non-Null Count  Dtype 
---  ------      --------------  ----- 
 0   name        816 non-null    object
 1   company     816 non-null    object
 2   year        816 non-null    int64 
 3   Price       816 non-null    int64 
 4   kms_driven  816 non-null    int64 
 5   fuel_type   816 non-null    object
dtypes: int64(3), object(3)
memory usage: 38.4+ KB
```

```
car.describe()
```

	year	Price	kms_driven
count	816.000000	8.160000e+02	816.000000
mean	2012.444853	4.117176e+05	46275.531863
std	4.002992	4.751844e+05	34297.428044
min	1995.000000	3.000000e+04	0.000000
25%	2010.000000	1.750000e+05	27000.000000
50%	2013.000000	2.999990e+05	41000.000000
75%	2015.000000	4.912500e+05	56818.500000
max	2019.000000	8.500003e+06	400000.000000

```
car=car[car['Price']<6e6].reset_index(drop=True)
```

```
car
```

	name	company	year	Price	kms_driven	fuel_type
0	Hyundai Santro Xing	Hyundai	2007	80000	45000	Petrol
1	Mahindra Jeep CL550	Mahindra	2006	425000	40	Diesel
2	Hyundai Grand i10	Hyundai	2014	325000	28000	Petrol
3	Ford EcoSport Titanium	Ford	2014	575000	36000	Diesel
4	Ford Figo	Ford	2012	175000	41000	Diesel
...	...	...	...	...	...	...
810	Maruti Suzuki Ritz	Maruti	2011	270000	50000	Petrol
811	Tata Indica V2	Tata	2009	110000	30000	Diesel
812	Toyota Corolla Altis	Toyota	2009	300000	132000	Petrol
813	Tata Zest XM	Tata	2018	260000	27000	Diesel
814	Mahindra Quanto C8	Mahindra	2013	390000	40000	Diesel

815 rows × 6 columns

Next steps: Generate code with car View recommended plots

```
car.to_csv('Cleaned Car.csv')
```

MODEL

```
X= car.drop(columns= 'Price')
y= car['Price']
```

```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test= train_test_split(X,y, test_size=0.2)
```

```
from sklearn.linear_model import LinearRegression
from sklearn.metrics import r2_score
from sklearn.preprocessing import OneHotEncoder
from sklearn.compose import make_column_transformer
from sklearn.pipeline import make_pipeline
```

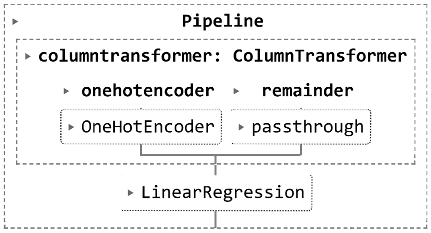
```
ohe= OneHotEncoder()
ohe.fit(X[['name', 'company', 'fuel_type']])
```

```
▾ OneHotEncoder
OneHotEncoder()
```

```
column_trans= make_column_transformer((OneHotEncoder(categories= ohe.categories_),['name', 'company', 'fuel_type']), remainder= 'passthroug
lr= LinearRegression()
```

```
pipe= make_pipeline(column_trans,lr)
```

```
pipe.fit(X_train, y_train)
```



```
y_pred= pipe.predict(X_test )
```

```
r2_score(y_test, y_pred)
```

```
0.6691770286777609
```

```
#finding random state with highest r2 score
scores=[]
for i in range(1000):
    X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=0.1,random_state=i)
    lr=LinearRegression()
    pipe=make_pipeline(column_trans,lr)
    pipe.fit(X_train,y_train)
    y_pred=pipe.predict(X_test)
    scores.append(r2_score(y_test,y_pred))
```

```
import numpy as np
```

```
np.argmax(scores)
```

```
302
```

```
scores[np.argmax(scores)]
```

```
0.8991190499074018
```

```
X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=0.1,random_state=np.argmax(scores))
lr=LinearRegression()
pipe=make_pipeline(column_trans,lr)
pipe.fit(X_train,y_train)
y_pred=pipe.predict(X_test)
r2_score(y_test, y_pred)
```

```
0.8991190499074018
```

```
import pickle
```

```
pickle.dump(pipe, open('LinearRegressionModel.pk1', 'wb'))
```

```
pipe.predict(pd.DataFrame({'name': ['Maruti Suzuki Swift'], 'company': ['Maruti'], 'year': [2019], 'kms_driven': [100], 'fuel_type': ['Petr
```

```
array([456549.33356479])
```

Start coding or generate with AI.